
Northeast Demersal Fisheries

INTRODUCTION

Northeast demersal (groundfish) fisheries include about 35 species and stocks, primarily in New England waters, but also off the Mid-Atlantic states. In New England, the groundfish complex is dominated by members of the cod family (cod, haddock, hakes, and pollock), flounders, goosfish, dogfish sharks, and skates. The Mid-Atlantic groundfish fisheries are primarily for summer flounder, scup, goosfish, and black sea bass.

Northeast groundfish fishermen employ fishing gears such as otter trawls, gillnets, traps, and set lines. Otter trawling is the predominant fishing method for groundfish throughout the region, with 1,229 registered otter trawl vessels in the Northeast region in 1996. Gillnets contribute a substantial proportion of the catch, particularly in the Gulf of Maine, with 472 gillnet vessels registered in 1996. Many of the vessels participating in the groundfish fisheries switch gears on a seasonal basis. Recent average (1995–97) landings (U.S., Canadian, and recreational) of mixed groundfish in the Northeast region were about 160,000 metric tons (t) (Table 1-1), with the 1997 total being 156,700 t, less than one-half of the long-term potential yield.

Groundfish resources in the Northeast occur in mixed-species aggregations, resulting in significant bycatch interactions among fisheries directed to particular target species or species groups. Management is complex because of these interactions. This complexity is reflected, for example, in the use of different mesh, gear, minimum landing size, and seasonal closure regulations set by the various management bodies in the region (e.g. New England Fishery Management Council (NEFMC), Mid-Atlantic Fishery Management Council (MAFMC), Atlantic States Marine Fisheries Com-

mission (ASMFC), individual states, and the Canadian government). New England groundfish (13 species) are managed primarily under the Northeast Multispecies Fishery Management Plan, as well as peripherally under provisions of the ASMFC's Northern Shrimp Fishery Management Plan. Summer flounder, scup, and black sea bass are managed under a joint ASMFC-MAFMC fishery management plan, and weakfish is managed under an ASMFC fishery management plan. Demersal fisheries in New England were traditionally managed primarily by indirect methods such as mesh sizes, minimum fish lengths, and some area closures. The principal regulatory measures currently in place for the major New England groundfish stocks are allowable days at sea for fishing coupled with closed areas, trip limits (for cod and haddock), and target total allowable catch corresponding to target fishing mortality rates. The Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan includes provisions for catch quota targets aimed at restoring these stocks.

Extensive historical data for the Northeast demersal fisheries have been derived from both fishery-dependent (i.e. catch and effort monitoring) and fishery-independent (e.g. National Oceanic and Atmospheric Administration research vessel) sampling programs (since 1963). Since 1989, a sea sampling program has been conducted aboard commercial fishing vessels for documenting discard rates and collecting high quality, high resolution data on their catch. Despite the past management record, some of the Northeast demersal stocks (cod, yellowtail flounder, haddock, American plaice, and summer flounder) are among the best understood and assessed fishery resources in the country.

Unit 1

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Table 1-1

Productivity in metric tons and status of Northeast demersal fisheries resources.

Species	Recent average yield (RAY) ¹	Current potential yield (CPY)	Long-term potential yield (LTPY)	Fishery utilization level	Stock level relative to LTPY
Atlantic cod ^{2,3,4}	17,300	6,500	45,400	Over	Below
Silver hake	15,500	Unknown	Unknown	Over	Below
Pollock ^{2,3,5}	14,100	Unknown	37,000	Full	Near
Summer flounder ³	9,700	8,400	24,500	Over	Below
Winter flounder ³	5,500	Unknown	12,900	Over	Below
American plaice	4,300	Unknown	7,200	Over	Below
Haddock ^{2,6}	3,800	4,800	52,000	Full	Below
Yellowtail flounder ^{2,7}	2,900	3,500	31,900	Full	Below
Witch flounder	2,000	Unknown	2,900	Over	Below
Red hake	1,400	Unknown	Unknown	Over	Below
Windowpane flounder	800	Unknown	1,900	Over	Below
Redfish	400	Unknown	14,000	Full	Below
Spiny dogfish ^{2,3}	23,900	10,000	Unknown	Over	Below
Skates	10,700	Unknown	Unknown	Unknown	Unknown
Goosefish ^{2,8}	27,900	Unknown	Unknown	Over	Below
Weakfish ³	4,200	3,900	Unknown	Full	Below
White hake ^{2,9}	3,800	Unknown	5,700	Full	Below
Black sea bass ³	3,500	2,800	Unknown	Over	Below
Scup ³	3,300	3,300	Unknown	Over	Below
Spot ³	2,500	Unknown	Unknown	Unknown	Unknown
Tilefish	1,200	Unknown	1,200	Over	Below
Cusk ^{2,10}	700	Unknown	Unknown	Over	Below
Wolffish	400	Unknown	Unknown	Over	Below
Ocean pout	60	Unknown	1,500	Full	Near
Atlantic halibut	15	Unknown	300	Over	Below
Total	159,875	134,475	317,500		
U.S. Subtotal	142,215	118,230	253,555		

¹1995-97 average (including foreign and recreational landings).

²Includes more than 100 t/year of foreign (Canadian) landings.

³Includes more than 100 t/year of recreational landings.

⁴For cod, U.S. portion of RAY is 15,200 t (88% of total).

⁵For pollock, U.S. portion of RAY is 3,800 t (27% of total).

⁶For haddock, U.S. portion of RAY is 900 t (24% of total).

⁷For yellowtail flounder, U.S. portion of RAY is 2,400 t (83% of total).

⁸For goosefish, U.S. portion of RAY is 27,600 t (99% of total).

⁹For white hake, U.S. portion of RAY is 3,300 t (87% of total).

¹⁰For cusk, U.S. RAY is 600 t (86% of total).

SPECIES AND STATUS

Principal Groundfish and Flounders

The principal groundfish and flounders group includes important species in the cod family (Atlantic cod, haddock, silver hake, red hake, and pollock), flounders (yellowtail, summer, winter, witch, windowpane, and American plaice) and redfish (Figure 1-1). Recent annual landings of these 12 species (representing 19 stocks) have averaged 77,700 t (70% U.S. commercial, 21% Canadian, and 9% U.S. recreational), compared with a combined long-term potential yield of 246,600 t (Table

1-1). Total ex-vessel revenue from the principal U.S. groundfish and flounder commercial landings in 1997 was \$109 million compared to \$121 million in 1994. The Northeast groundfish complex supports important recreational fisheries for species including summer flounder, Atlantic cod, winter flounder, and pollock.

Fishing effort restrictions have been implemented under Amendments 5 and 7 to the Northeast Multispecies Fishery Management Plan through days-at-sea allocations based on either individual vessel or fleet-level performance criteria. Under the individual vessel category, the total number of permitted vessels and the allocated

number of days at sea declined continuously between 1995 and 1997. The total number of vessels in the fleet-level category rose between 1995 and 1996 when the fixed-gear sector was brought under the fishery management plan following the adoption of Amendment 7. Both vessel numbers and their associated days at sea declined substantially between 1996 and 1997 as restrictions on the fixed-gear sector were implemented.

The research vessel survey abundance index for this group of species declined by almost 70% between 1963 and 1974 (Figure 1-1), reflecting substantial increases in exploitation associated with the advent of distant-water fleets. Many stocks in this group declined sharply, notably Georges Bank haddock, most silver and red hake stocks, and most flatfish stocks. By 1974, indices of abundance for many of these species had dropped to the lowest ever recorded.

Groundfish partially recovered during the mid-to-late 1970's because of reduced fishing effort associated with increasingly restrictive management under the International Commission for the Northwest Atlantic Fisheries in the early 1970's, and implementation of the Magnuson Fishery Conservation and Management Act in 1977 (Mayo et al., 1992). Cod and haddock abundance increased markedly, stock biomass of pollock increased more or less continually, and recruitment and abundance also increased for several flatfish stocks. The aggregate index peaked in 1978, but subsequently declined, reaching new lows in 1987 and 1988. The 1989 and 1990 abundance values were slightly higher than the previous two years, primarily due to recruitment of moderate 1987 year classes of Atlantic cod, haddock, and yellowtail flounder. However, subsequent abundance indices declined due in large part to the rapid depletion of the 1987 yellowtail flounder year class, and declining cod abundance. The overall index for the principal groundfish and flounders reached a 30-year low in 1992 and during 1995–97 had increased by about 35%. Landings of most of these species declined substantially from 1994 through 1997 and were predicted to decline further in 1998 in the face of generally poor recruitment and continued restrictions on days at sea and/or reduced target total allowable catches. Landings of cod in 1997 were the lowest on record, while those for

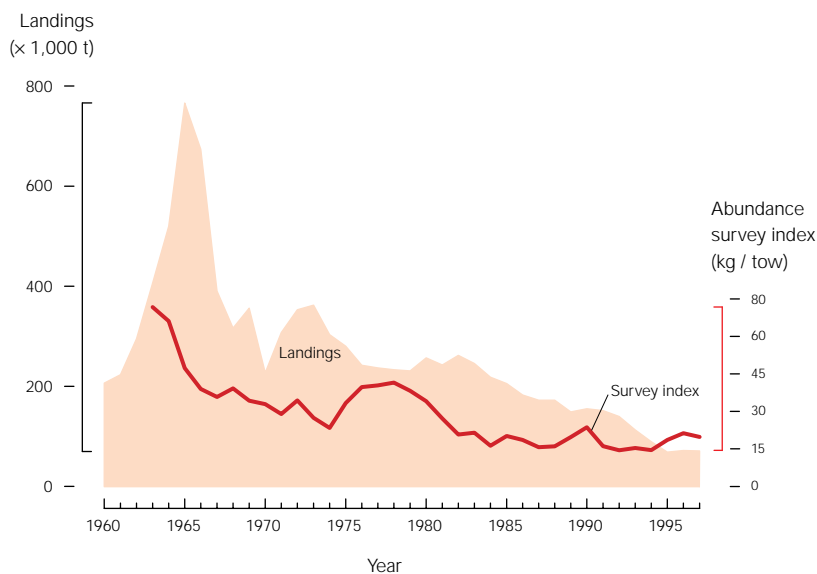


Figure 1-1
Landings in metric tons (t) and abundance index of principal groundfish and flounders, 1960–97.

haddock and yellowtail flounder¹ improved slightly in 1996 and 1997 as a result of improvements in stock biomass and sharp reductions in fishing mortality beginning in 1995 (Northeast Fisheries Science Center, 1997c,d) as a result of regulatory measures. A more detailed description of these changes is contained in the feature article on the rebuilding of New England groundfish stocks.

Summer flounder, one of the most valuable groundfish species in the Mid-Atlantic area, is the focus of both commercial and recreational fisheries, with about 60% of the landings commercial and 40% recreational. Prior to the implementation of management measures in 1988, stock abundance had been steadily declining and fishing mortality rates had been excessively high. However, spawning stock biomass subsequently increased over threefold from 1989 to 1996 (Northeast Fisheries Science Center, 1997e,f), and fishing mortality has declined, particularly after 1992 when greatly reduced target fishing mortality rates for 1993 and subsequent years were adopted. Landings have remained relatively steady at about 10,000 t annually during 1990–97, compared with a long-term potential yield of 24,500 t (Table 1-1).

¹Two out of four stocks of yellowtail flounder and one out of two haddock stocks improved.

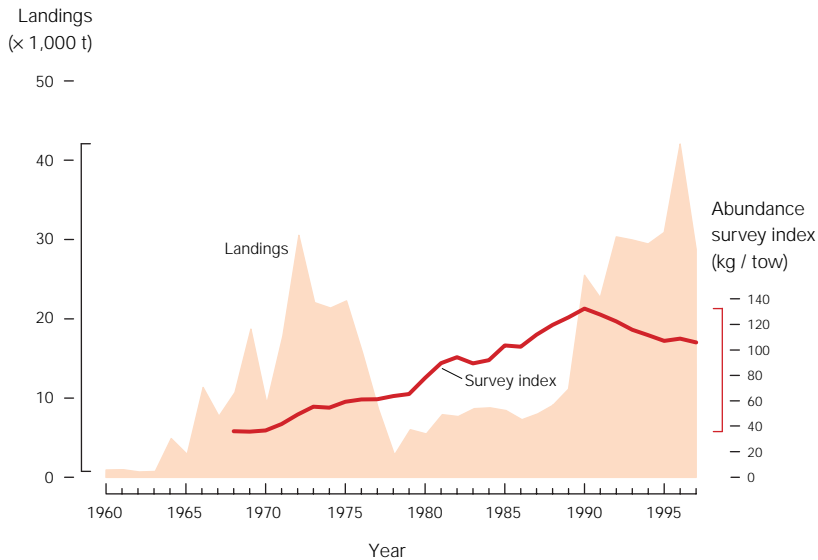


Figure 1-2
Landings in metric tons (t) and abundance index of skates and spiny dogfish, 1960–97.

Dogfish and Skates

Dogfish and skates are a significant part of the aggregate groundfish stock biomass in the Northeast (Figure 1-2). Of the two dogfishes (spiny and smooth), the spiny dogfish is dominant by far. Seven species of skates, including little, winter, barndoor, clearnose, thorny, rosette, and smooth, occur on the Northeast shelf—winter, little, and thorny skates account for most of the landings.

Skate and spiny dogfish landings underwent a marked increase from 2,900 t in 1978 to 31,500 t in 1992, increasing further to record high levels of 42,500 t in 1996. Recent annual landings averaged 34,600 t (Table 1-1). Discards of both species in fishing activities directed towards other species are thought to be equivalent to the amounts landed. Abundance of skates and dogfish increased throughout the 1970's and 1980's, peaked in 1990, and declined each year since (Figure 1-2). Despite these recent declines, overall abundance of skates and dogfish continues to remain high, although a 1997 assessment (Northeast Fisheries Science Center, 1998a,b) indicated that the biomass of mature female spiny dogfish had decreased by over 50% from a peak in 1989 to 1997 and that the stock is overexploited.

Other Finfish

Other groundfish species taken primarily as bycatch in the Gulf of Maine include goosefish, white hake, ocean pout, cusk, wolffish, and Atlantic halibut. In Southern New England, ocean pout are taken as bycatch, while goosefish are primarily taken in directed fisheries. In the Mid-Atlantic, goosefish, scup, weakfish, black sea bass, spot, tilefish, and several others are landed either in directed fisheries or as bycatch. As a group, they can be characterized generally as overexploited, with recent annual landings totaling 47,575 t (Table 1-1); individually, some have landings well below their long-term maximum as a result of being depleted, while for others (e.g. goosefish), recent landings have been well in excess of their long-term maximum as a consequence of overexploitation. Most of these stocks are managed implicitly with other species included in various fishery management plans. For example, white hake, goosefish, cusk, wolffish, and Atlantic halibut are taken in various groundfish fisheries regulated under the Northeast Multispecies Fisheries Management Plan. Scup and black sea bass represent major components of the summer flounder directed fishery, and those three species are managed under a single fishery management plan. Weakfish, a stock that has responded well to management controls (under an ASMFC fishery management plan) has experienced a recent substantial decline in fishing mortality and increase in stock biomass (Northeast Fisheries Science Center, 1998a,b).

In recent years, goosefish has become one of the most important species in the Northeast region. U.S. landings increased from a yearly average of around 300 t during 1964–72 to about 8,800 t during 1980–88, and then continued to climb to a record high of 28,800 t, valued at \$35 million, in 1997 making it the top-ranked demersal species in both landings and value in the Northeast region. The recent average yield was 27,900 t (Table 1-1). This dramatic increase in landings resulted from a diversion of fishing effort and attention caused by the decline in abundance of the principal groundfish and flounders as well as increased market demand and prices. As a consequence, goosefish abundance has dropped to low levels and the stock is now overexploited

(Northeast Fisheries Science Center, 1997a,b). The growth of this fishery has prompted development of regulations to control both landings and the size of fish landed. Since landings occur both from directed fishing (primarily by otter trawls and gillnets) and as bycatch from fishing directed towards many other species, regulatory measures being developed under a joint New England Council and Mid-Atlantic Council Goosefish Fishery Management Plan are extensive and complicated.

ISSUES

Management Concerns

Until the early 1990's, New England groundfish harvests were regulated by indirect controls on fishing mortality, such as mesh and minimum fish size restrictions and some area closures. However, as a result of litigation filed by the Conservation Law Foundation and the Massachusetts Audubon Society, which significantly raised public awareness and concern and stimulated demand for strong action to eliminate overfishing and restore depleted stocks of cod, haddock, and yellowtail flounder, regulatory measures since 1994 have been more stringent and focused. Amendment 5 to the NEFMC's Multispecies Fishery Management Plan, implemented in March 1994, marked the beginning of an effort reduction program to address the requirement to eliminate the overfished condition of cod and yellowtail flounder in 5 years and haddock in 10 years. The regulatory package included a moratorium on new vessel entrants, a schedule of reduction in days at sea for trawl and gillnet vessels, increases in regulated mesh size, and expanded closed areas to protect haddock. The objective of the plan was to gradually eliminate the overfished condition of cod, yellowtail flounder, and haddock over 5–7 years. Since December 1994, three large areas (i.e. Closed Areas I and II on Georges Bank and Nantucket Lightship Closed Area) (Figure 1-3) have been closed through emergency action by the Secretary of Commerce to protect the regulated groundfish, particularly spawning fish. In view of a Special Advisory on Groundfish Status on Georges Bank (Northeast Fisheries Science Center, 1994), based on new assessments which indi-

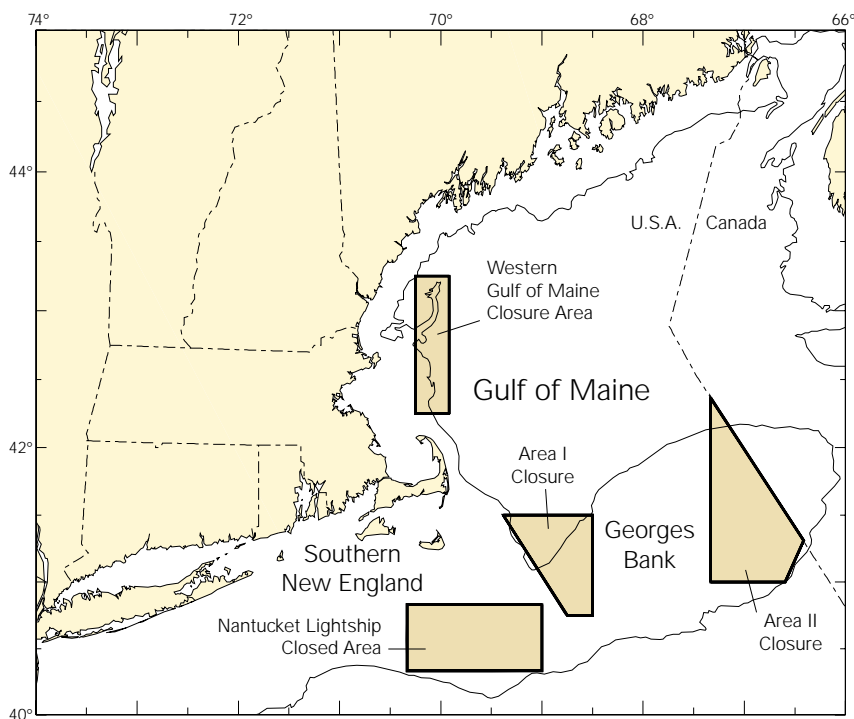


Figure 1-3

Areas closed year-round to protect New England groundfish.

cated that the stocks of haddock and yellowtail flounder had already collapsed and that cod was in imminent danger of also collapsing, Amendment 7 to the Northeast Multispecies Fishery Management Plan was developed and implemented (in 1996) to accelerate the existing days-at-sea reduction schedule established in Amendment 5 and impose other tighter restrictions, including three closed areas in the Gulf of Maine, in order to reduce fishing mortality to the $F_{0.1}$ level.² Since 1994, the Multispecies Plan has been modified by a series of framework adjustments, with Framework 25 (implemented in April 1998) imposing reduced trip limits and area closures to achieve management objectives for cod in the Gulf of Maine (i.e. reduce landings and fishing mortality to target levels).

The joint MAFMC-ASMFC Summer Flounder Fishery Management Plan, initially approved in 1988 but subsequently modified by a series of

² $F_{0.1}$ and F_{max} are two reference rates of fishing mortality used in fisheries management (see Appendix 4). F_{max} maximizes the amount of yield from the average recruit to the stock; $F_{0.1}$ results in nearly as much yield per recruit but is more conservative than F_{max} .

amendments, has a strategy to reduce fishing mortality to F_{\max}^2 , the level chosen as the overfishing definition for this stock. The Summer Flounder Plan uses commercial catch quotas, allocated by state and season, and recreational harvest limits and possession size limits to achieve these management goals. Increased recruitment levels, combined with lower fishing mortality rates during 1993–96, have resulted in increased biomass.

Transboundary Stocks and Jurisdiction

Significant catches are taken from transboundary stocks of Atlantic cod, haddock, and pollock from Canadian waters of Georges Bank and the Gulf of Maine. In 1997, 18% of the cod, 64% of the haddock, and 73% of the pollock landings were taken by Canadian fishermen. Management regulations employed by the two countries, although different, are based on a common objective of maintaining fishing mortality at or below $F_{0.1}$. There is coordination of stock assessment activities between the countries, and beginning in 1998, the two countries embarked on a joint process for annually performing and peer reviewing the assessments of these transboundary stocks. The two countries will, however, continue to independently prepare management advice on the basis of jointly prepared and reviewed assessments. There is no formal joint management of these shared resources, although regular informal discussions take place between government officials, managers, and industry representatives of the two countries.

Economics

Rebuilt stocks eventually will provide increased net benefits to producers and consumers, but in the short term, effort reductions will curtail revenues to fishermen and may raise prices to consumers. Recent analyses (New England Fishery Management Council, 1997) indicate that fishing mortality rates in 1997 for the Georges Bank stocks of cod, haddock, and yellowtail flounder and the Southern New England stock of yellowtail were at or below the overfishing definitions for those stocks and below the more restrictive Amendment 7 targets ($F_{0.1}$) for all but Georges Bank cod. For Gulf of Maine cod, however, fish-

ing mortality in 1997 was well above both the overfishing definition and the target (F_{\max}). Substantial reductions in fishing effort have occurred in the New England area in recent years. For example, the total number of limited access permitted vessels with individual days-at-sea allocations declined from 197 in 1995 to 162 in 1997, and the total days at sea allocated to these vessels declined from 37,320 in 1995 to 18,295 in 1997. The fixed-gear sector was brought into the limited access category in 1996, and the total number of days allocated to the fleet days-at-sea category decreased from 187,372 in 1996 to 109,888 in 1997. In addition to these reductions in days at sea for fishing vessels, a vessel buyout program, authorized by the Secretary of Commerce and administered by the National Oceanic and Atmospheric Administration, was initiated in 1995, first as a pilot project and later as a comprehensive fishing capacity reduction project. The program was designed to provide economic assistance to fishermen adversely affected by the collapse of the groundfish fishery and who voluntarily chose to remove their vessels permanently from the fishery, while helping fish stocks recover to a sustainable level by reducing the excess fishing capacity in the Northeast. The vessel buyout program, which concluded early in 1998, removed 79 fishing vessels at a cost of nearly \$25 million and resulted in an approximate 20% reduction in fishing effort in the Northeast groundfish fishery. The ultimate net benefits of all these effort reductions for the Northeast groundfish resources will be both positive and substantial to the Nation as a whole.

Progress

Considerable progress in the development and implementation of management alternatives for the Northeast demersal resources has been made since 1994. The implemented measures include reductions in days at sea, increased minimum mesh sizes, a moratorium on new vessels, expanded closed areas to fishing (Figure 1-3), and trip limits for depleted cod and haddock stocks. An annual review provision allows the level of effort reduction measures to be changed, depending on the actual state of fishing mortality relative to plan targets. Mandatory reporting systems for North-

east resources have been developed to better monitor the performance of the fishery. New assessments for principal species including cod, haddock, and yellowtail flounder have documented patterns of fishing mortality, discarding, and recruitment, and form the basis for additional regulatory proposals.

Fishing effort in the Northeast demersal fisheries has been reduced substantially since 1994 when Amendment 5 to the Northeast Multispecies Fishery Management Plan became effective. Beginning in March 1994, Amendment 5 introduced a phased-in, 5-year, 50% reduction in days at sea, and expanded Closed Area II on the Northeast Peak of Georges Bank. Closed Areas I and II were closed on a year-round basis by emergency action in December 1994, and the closures became permanent following implementation of Framework 9 in April 1995. Amendment 7, which became effective in July 1996, incorporated the essential features of Amendment 5 and Framework 9. Amendment 7 introduced further restrictions on days at sea to cover fixed-gear as well as mobile-gear sectors, accelerated the days-at-sea reduction schedule, and adopted biomass targets. These targets were keyed to rebuilding the spawning stock through fishing mortality levels well below the 20% maximum spawning potential overfishing definition. Annual adjustments to the allowed days at sea are determined by monitoring a series of target total allowable catches keyed to the fishing mortality rates.

Management of the summer flounder stock has proceeded with a goal of reducing fishing mortality to F_{\max} . A series of state-by-state allocations of the annual quota has been the primary regulatory measure. With improved recruitment, coupled with reduced fishing mortality, catch rates for the commercial and recreational sectors improved during 1993–96. Lower fishing mortality rates and slightly improved recruitment will result in increased landings and a rebuilding of the spawning stock biomass and its age structure (currently comprised primarily of fish aged 2 years or younger).

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