Aggregate Resource Trends

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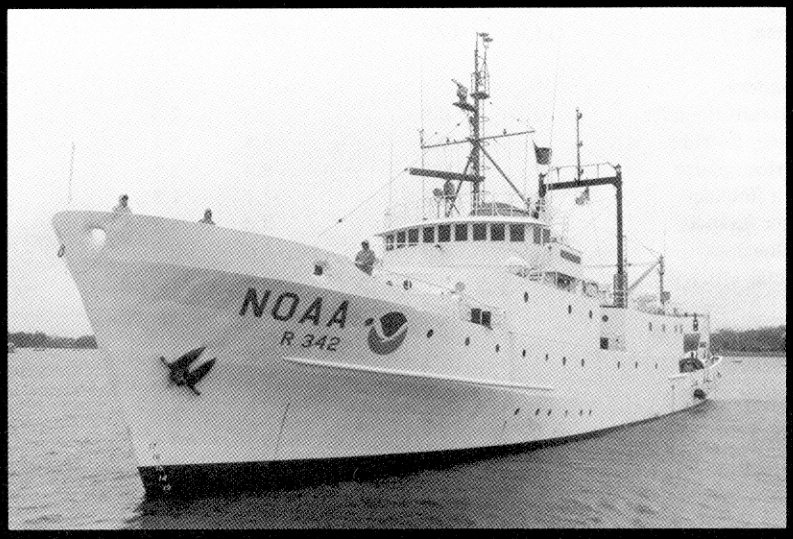
The fishery resources off the northeastern United States are harvested by a variety of fishing gears, including trawls, gillnets, handlines, traps, longlines, and dredges. While each type of gear takes a different mixture of species, few fishers target one species exclusively. The degree of mixture in the catches varies among the types of gear used in different areas. In addition, there are predatory and competitive relationships among many of the fishery resources.

These relationships result in significant interactions among gear types termed 'technical interactions', and among some species termed 'biological interactions'. Management of fishing activity in the northeast region is a complex problem in part due to these types of interactions. This complexity is reflected, for example, in the structure of some of the fishery management plans (FMPs). The groundfish resources off New England are managed under the Northeast Multispecies FMP (of the New England Fishery Management Council or FMC), while several pelagic stocks are managed under the Atlantic Mackerel, Squid, and Butterfish FMP of the Mid-Atlantic FMC.

While much of the stock assessment advice used in managing these fisheries requires knowledge of the dynamics of individual populations, there is an increasing need to consider information on a more aggregated level. In this section, trends are presented for several aggregated fishery resources to illustrate major changes in the fishery ecosystems off the northeastern United States.

Two sources of data are available for measuring trends in aggregate resource abundance: (1) research vessel survey data (termed "fishery-in-



R/V Albatross IV

NOAA Fisheries
NEFSC Photo by Brenda Figueridо

Sampling for age & growth studies during resource survey cruise

NOAA Fisheries
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dependent data"), and (2) commercial catch and effort data (termed "fishery-dependent" data). While neither data source completely reflects the changes in all fishery resources, both provide useful information in interpreting recent changes in fishery resources and fishing activity.

FISHERY- INDEPENDENT DATA

The Northeast Fisheries Science Center (NEFSC) has conducted an intensive bottom trawl survey program off the northeastern United States for 35 years. An autumn survey has been conducted annually since 1963; a spring survey was initiated in 1968, and a winter survey (primarily providing information on flatfishes and other demersal resources of the Mid-Atlantic to Georges Bank region) began in 1992. The NEFSC surveys employ standard gear and sampling procedures following a stratified random sampling design and thus provide a valuable time series of data for monitoring resource trends. Several states also conduct fishery-independent monitoring programs using bottom trawl surveys to document the status of species distributed near shore (*e.g.* Massachusetts, Rhode Island, Connecticut, Delaware, Maryland and Virginia). Since bottom-tending gear is used, the data are most appropriate for demersal species, although reliable indices of abundance have been developed for some pelagic species as well. Four groups of species are considered here:

1. **Principal groundfish and flounders,** including demersal species such as Atlantic cod, haddock, yellowtail flounder, winter flounder and summer flounder, that have historically supported important offshore trawl fisheries.

2. **Other finfish,** including a variety of demersal and pelagic species, such as goosefish, black sea bass, white hake, and butterfish, that collectively are of considerable economic importance.

3. **Principal pelagics,** including Atlantic herring and Atlantic mackerel.

4. **Skates and spiny dogfish,** have traditionally been of minor commercial importance but are now a major component of the finfish biomass.

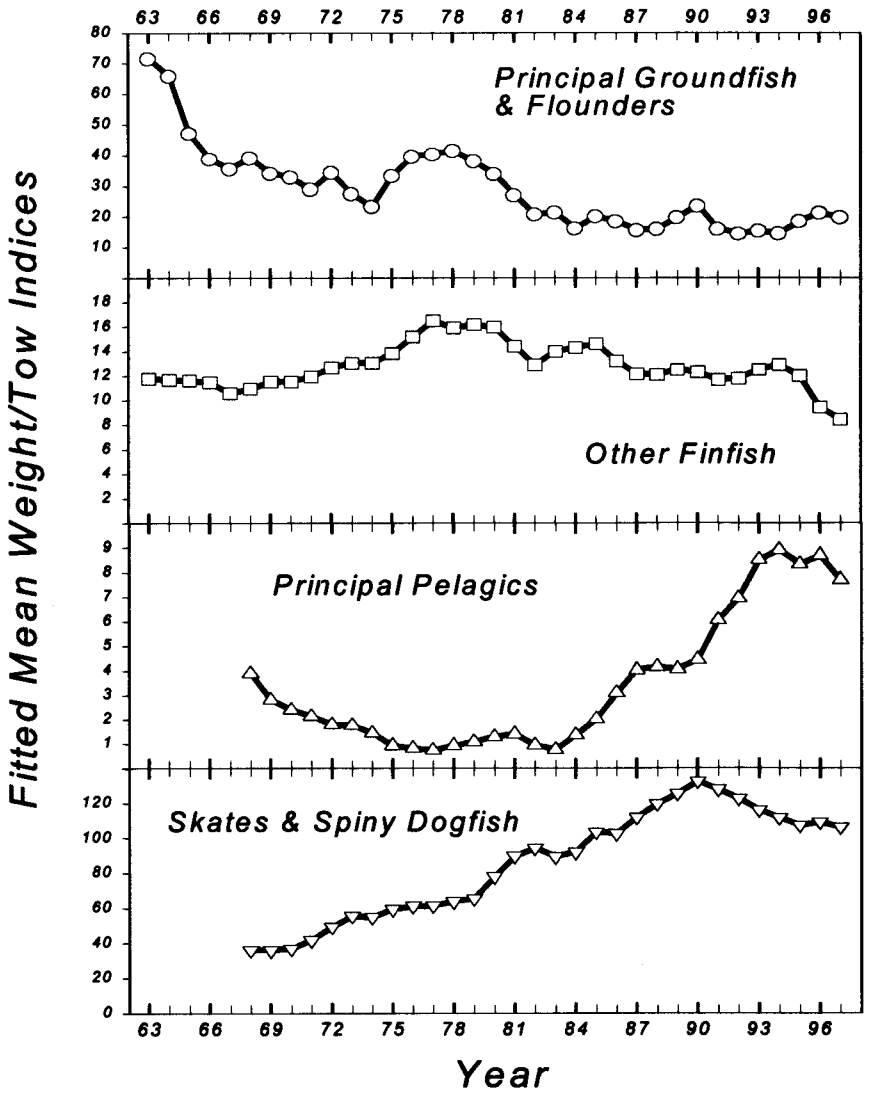

Figure 4. Trends in indices of aggregate abundance (catch per standard tow, kg) for four species groups, reflecting major resource trends, 1963-1997 (species groups given in text).

For each of these groups, an aggregate index of abundance has been developed to monitor resource trends (Figure 4). Autumn survey data (stratified mean catch per tow, kg) were used for principal groundfish and flounders and for other finfish, while spring survey data were used for principal pelagics and for skates and spiny dogfish. For each group, an aggregate index of abundance has been computed as the sum of the individual species stratified mean catch-per-tow values, smoothed to compensate for between-year variability. No adjustments have been made for differences in vulnerability to the trawl gear by species; and thus the overall index in each case reflects trends in abundance of those species within each group that are most vulnerable. However, vulnerability to the gear is not thought to change markedly over time. The aggregate indices therefore appear to provide useful general measures of overall resource trends, although they are weighted toward certain species.

Principal Groundfish and Flounders

This group includes important gadid species (Atlantic cod, haddock, redfish, silver and red hake, and pollock) and several flatfish (yellowtail flounder, summer and winter flounder, American plaice, witch flounder and windowpane flounder). The combined index for this group declined by almost 70 percent between 1963 and 1974, reflecting substantial increases in exploitation associated with the advent of distant-water fleets (Figure 4). Pronounced declines in abundance occurred for many stocks in this group, notably Georges Bank haddock, silver and red hake, and most of the flatfish stocks. By 1974, indices of abundance for many of these species had dropped to the lowest levels observed at that time in the history of the survey time series.

Partial resource recovery occurred during the mid-to-late 1970s. This has been attributed to reduced fishing effort associated with increasingly restrictive management under the International Commission for the Northwest Atlantic Fisheries (ICNAF) during the early 1970s, and to implementation of the Magnuson Fishery Conservation and Management Act (MFCMA) in 1977. Cod and haddock abundance increased markedly, stock biomass of pollock increased more or less continuously, and recruitment and abundance of several of the flatfish stocks also increased. The aggregate index peaked in 1978. Subsequently, the combined index again declined; the 1987 and 1988 values were among the lowest in the time series to that point. During 1989-1990, the aggregate index increased due to improved recruitment (primarily for cod, redfish, silver and red hake, and American plaice). The index dropped sharply in 1991 and remained at record-low levels during 1992-1994. Subsequent indices have been moderately higher primarily due to increased abundance of redfish and modest improvements in biomass of groundfish stocks on Georges Bank. However, the most recent indices are still well below the levels seen in the 1960s and late 1970s, when groundfish and flatfish populations were relatively high.

Other Finfish

This group includes a number of demersal and pelagic species that are taken in directed fisheries or are important in mixed-fishery situations. The combined index for this group (Figure 4) includes data for 10 demersal species (white hake, cusk, croaker, black sea bass, scup, weakfish, spot, wolffish, ocean pout, and goosefish) and five pelagic species (alewife, blueback, shad, butterfish, and bluefish). Landings for many of these species have been small, although their combined contribution to U.S. commercial and recreational harvests is significant.

The aggregate index for this group was relatively stable from 1963 to 1970 and then increased to peak levels during 1977 to 1980, reflecting unusually high survey catches of Atlantic croaker and spot and strong recruitment of butterfish from the 1979 and 1980 year classes. Survey catches of a number of other finfish species were anomalously low in 1982 for unknown reasons. Strong 1983 and 1984 butterfish year classes contributed to a peak in 1985. The index decreased in 1986 and 1987 and stabilized during 1988-1995. Since then, the index has sharply declined to record-low levels due to declining abundance of white hake, black sea bass and ocean pout. Overall, the index for this species group has declined by half since 1977, reflecting increased exploitation of the species in this group as traditional fishery resource species have declined.

Principal Pelagics

Abundance of Atlantic herring and Atlantic mackerel has been monitored using spring survey data, since both species occur primarily within the boundaries of the survey area in March and April, when this survey is conducted. In general, survey catch-per-tow data for these species have been more variable than those for principal groundfish and flounders, although the aggregate index adequately depicts overall trends. The index dropped to minimal levels in the mid-1970s, reflecting pronounced declines in abundance of both herring and mackerel (including the collapse of the Georges Bank herring stock). Since 1983, the index has markedly increased with the 1994 value the highest in the time series (Figure 4). This trend is supported by virtual population analyses (VPA) which indicate high levels of abundance of both the coastwide herring stock and the northwest Atlantic mackerel stock in recent years. There is also evidence for recovery of the Georges Bank herring stock. The index of abundance for pelagic stocks has declined slightly since 1994.

Skates and Spiny Dogfish

The remaining aggregate index includes data for two important resource components, spiny dogfish and skates, which are monitored using spring survey data (Figure 4). Spiny dogfish and seven skate species are included in this index: little, winter, thorny, smooth, rosette, clearnose, and barndoor. The continued increase in this index from the late 1960s through 1990 reflects large increases in abundance of several species within this group. Since 1990, the index has markedly declined reflecting reductions in biomass due to harvesting of some skate species (primarily winter skate) and spiny dogfish.

FISHERY-DEPENDENT DATA

A considerable amount of information on the status of stocks is derived from data collected on the catches and performance of commer-

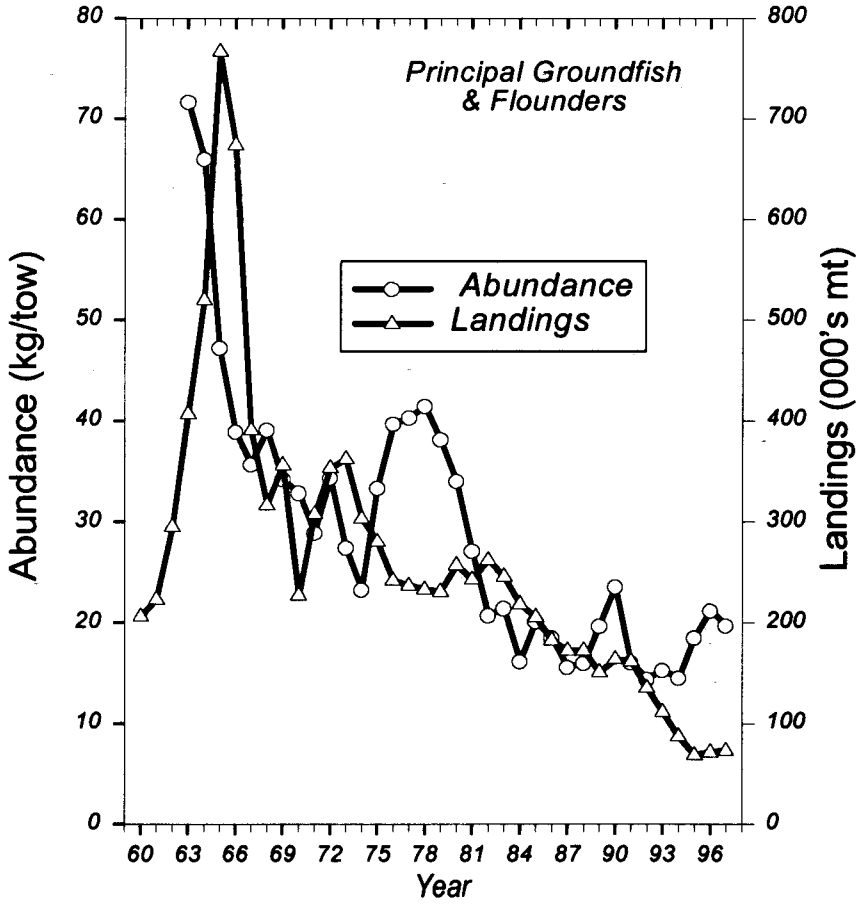

Figure 5. Trends in relative abundance and commercial landings of principal groundfish and flounders off the northeastern United States, 1963-1997. Landings include U.S. and foreign catches.

cial and recreational fisheries. Fishery-dependent data include landings (catches brought ashore), discards (catches culled at sea), fishing effort (*e.g.* number and duration of sets of gear; time spent fishing), and biological sampling of landings and discards. In general, landings trends alone are insufficient as indicators of trends in stock abundance since they are influenced by many factors including prices paid for fish, changes in fishing effort, and regulations (*e.g.* closed areas, trip limits, *etc.*).

Use of Landings Data

When trends in landings are evaluated in conjunction with a measure of stock abundance, some useful conclusions can be derived. The trend in landings of principal groundfish and flounders during 1960-1997 is plotted with the NEFSC autumn bottom trawl survey aggregate index of abundance for this species group in Figure 5. There is a general correspondence in these two data sets, with several important points of divergence. Landings increased greatly in response to high catches by foreign fleets beginning in 1963. The resource declined substantially in response to the effort buildup. Increasingly restrictive management resulted in a period of stock rebuilding and correspondingly lower landings during the mid-to-late 1970s. This rebuilding was short-lived, however, and landings and abundance again declined during the 1980s and early 1990s. Since 1992 the trends in abundance and landings have again diverged, and some stocks have begun to rebuild.

A simple index of exploitation can be derived by dividing the landings by the corresponding survey abundance index (Figure 6). This index is a crude measure of the exploitation rate since it does not account for discarded catch, and assumes that all landings are reported. Nevertheless, changes in the exploitation rate index show that fishing intensity on principal groundfish and flounders has declined during the 1990s to the lowest levels seen in the time series. Indices of exploitation for the other species groups show differing patterns over time, reflecting the transition from intensive fishing, primarily by foreign fleets in the late 1960s and 1970s to use by domestic fleets.

Fishery Abundance Indices

Overall effort in northeast offshore fisheries increased rapidly after the institution of the MFCMA. This pattern of effort increase was seen in all regions (Gulf of Maine, Georges Bank, Southern New England-Middle Atlantic), and gear types. Effort leveled off in the trawl sector in the mid-1980s, as catch rates fell and the profitability of many fisheries was insufficient to attract additional new vessel construction.

A measure of resource abundance can be derived directly from fishery-dependent data by dividing catch (or landings, if the discarded component can be assumed to be relatively small) by fishing effort used to obtain the catch. This so-called catch per unit of effort (or CPUE) provides indices of abundance and/or biomass which are useful when management restrictions do not significantly alter the relationship between effort and catch (*e.g.* by changing the spatial distribution of effort or restricting landings through trip limits or other measures). Such CPUE values from the New England otter trawl fisheries were used as indices of abundance for many New England groundfish stocks during the 1970s to early 1990s, because regulations did not generally limit the total quantity of landings or the amount of effort. Trends in trawl fishery CPUE

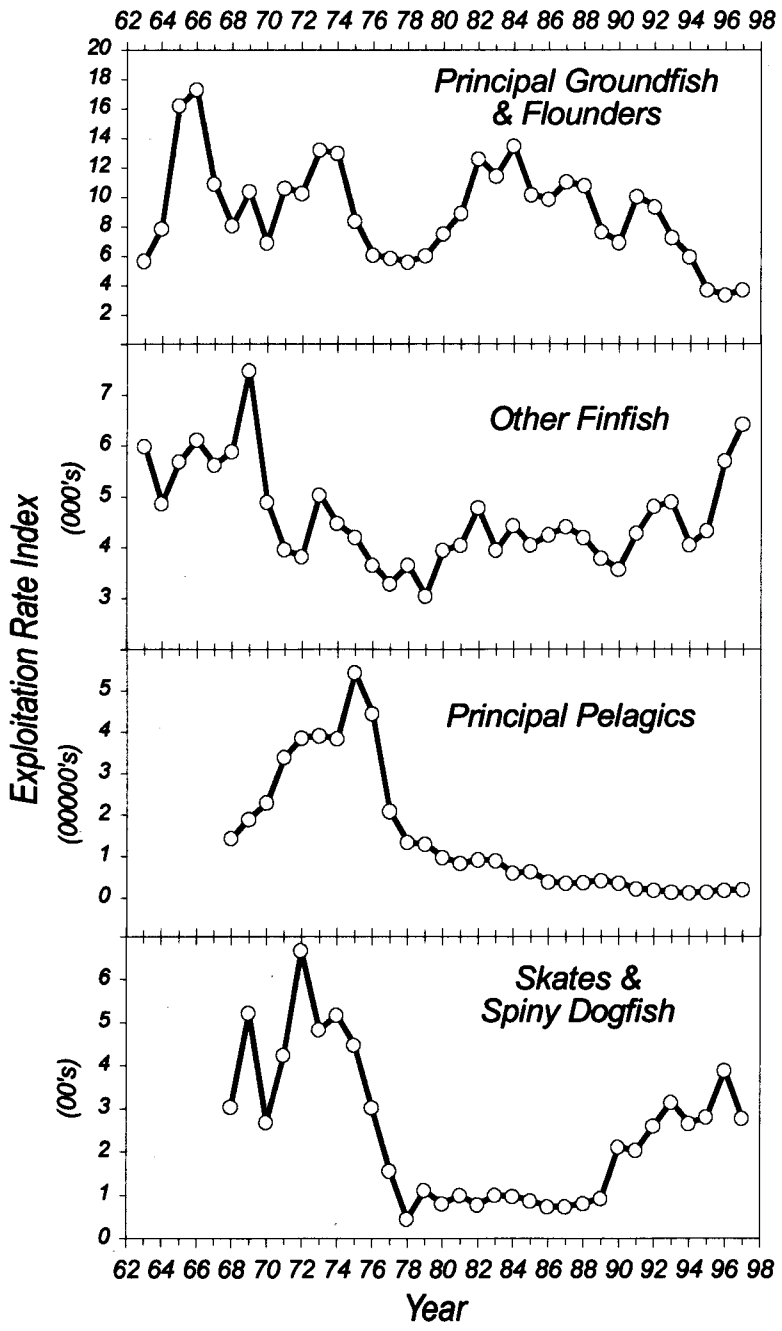

Figure 6. Indices of exploitation for aggregate species groups off the northeastern United States, 1963-1997. Each index is derived by dividing landings (in thousands of metric tons) by the relative abundance index (mean weight per standard tow in the NEFSC autumn bottom trawl surveys) for each species group.

(landings per standardized day fished by trawlers operating in the Gulf of Maine, Georges Bank and Southern New England region during this period) are similar to those from fishery independent measures of abundance (Figure 7). Both data sets detected the rebuilding of the resource in the late 1970s, followed by the decline in the 1980s, and temporary increase at the end of that decade. This CPUE index cannot easily be extended back in time, due to the difficulty in calibrating the effort of large foreign factory trawlers. Likewise, restrictions on effort and on areas fished, and changes in fishing reporting procedures render post-1994 data difficult to compare with 1976-1993 effort and CPUE. The amount of effort (days at sea) has declined significantly in both the groundfish and sea scallop directed fisheries as effort control has become the primary management measure in these fisheries. Given the reduced number of days, closed areas on Georges Bank, Southern New England and the Gulf of Maine, and changes in mesh size for groundfish and sea scallops, merging current CPUE with previous data is problematic.

CONCLUSIONS ABOUT RESOURCE ABUNDANCE

Both fishery-independent and fishery-dependent data suggest major changes in the abundance of resources in the Northwest Atlantic, especially since implementation of the MFCMA in 1977. Increases in abundance of groundfish and flounders associated with the reduction of foreign fishing during the mid-1970s were followed by increased domestic fishing effort and landings. Abundance of principal groundfish and flounders began declining after 1978, reached record low levels in the early 1990s, and has since improved slightly, although abundance and biomass for most stocks remain low. Abundance of other finfish slowly declined since 1977, with more rapid declines in recent years. Abundance of principal pelagics has sharply increased in recent years. Extensive changes in the species composition of the catches have also occurred over the past three decades, with shifts to previously less desirable species. During this same time, major increases in the abundance of historically nontargeted species such as spiny dogfish and skates, have occurred followed by the development of directed fisheries for these stocks.

Most of the changes in resource abundance can be directly attributed to changes in fishing mortality. For example, increases in abundance of groundfish and flounder occurred during 1975 to 1978 when fishing effort was being reduced by international and domestic management actions. Decreases in abundance began in the early 1980s when fishing effort

from domestic fleets substantially increased. The record high levels of fishing effort in the late 1980s and early 1990s resulted in rapid reduction of new year classes before they were able to achieve full growth and reproduce.

One marked result of the reduced abundance of traditional groundfish stocks has been a change in the mix of species targeted in the trawl fisheries. The aggregate U.S. catch of cod, haddock and yellowtail flounder from 1976 to 1997 is plotted in the upper panel of Figure 8. There is an obvious declining trend in the total since 1983, and an increasing reliance on cod. The bottom panel gives the aggregate catches of four species which have exhibited large increases in landings since MFCMA: goosefish, spiny dogfish, northern shortfin (*Illex*) squid, and longfin inshore (*Loligo*) squid. The increasing reliance on nontraditional species, often supporting export markets, is a major trend since MFCMA. Declines in the abundance of traditional stocks have increased fishing pressure on previously underexploited resources, often resulting in changes in the status of these alternative species (*e.g.* goosefish and spiny dogfish are now considered overexploited). This is but one example of the versatility domestic fleets have shown in their ability to target different resources and to pursue a variety of alternatives.

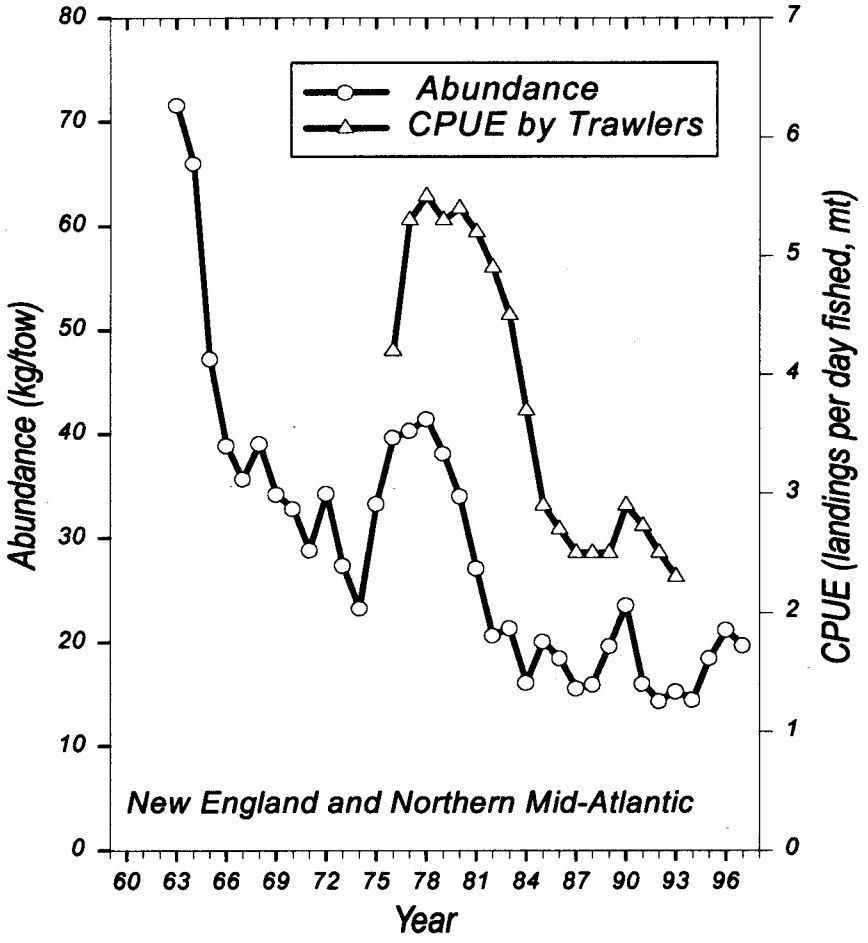

Figure 7. Comparisons of two indices of relative abundance of principal groundfish and flounders off the northeastern United States. Indices are the standardized catch per unit of effort (landings in metric tons per day fished, 1976-1993), and the relative abundance index (stratified mean weight per tow in NEFSC autumn bottom trawl surveys, 1963-1997).

SUMMARY OF STOCK STATUS

The status of 51 finfish and invertebrate stocks of the Northeast Region is summarized in Tables 3 and 4, and Figure 9. Status can be measured in several ways: (1) the abundance of the stock measured against historic levels, (2) landings from the stock relative to past landings levels, and (3) the exploitation rate (fraction of the stock taken by fishing) relative to quantitative overfishing definitions.

In this report, stock status is evaluated realtive to both abundance (low, medium and high levels) and exploitation status (underexploited, fully exploited, and overexploited). Using this categorization scheme, 59% (30 stocks) are considered to be at a low level of abundance, 31% (16 stocks) at medium, and only 10% (5 stocks) at high abundance (Table 3). Two-thirds of the stocks considered in this report are overexploited; only 10% (5 stocks) are underexploited relative to overfishing definitions (northern red hake, herring, butterfish, mackerel, and surfclam). Since only 12% (6 of the 51 stocks) are currently fully exploited and also at medium-high abundance, the vast majority of the region's resources have been historically mismanaged (*e.g.* overexploited and at low abundance levels or underexploited).

New England and Mid-Atlantic groundfish and anadromous species currently have more than 70% of their stocks in the low abundance category. Spiny dogfish and skates, and pelagics show the highest fractions of stocks in the high abundance range (50%). Mid-Atlantic and New England groundfish species have the highest fractions of overexploited stocks (100% and 70%, respectively). The pelagic group has the highest percentage (75%) of underexploited stocks (Table 3).

Recent (1995-96) and five-year (1992-96) trends in landings and abundance are presented in Table 4. During 1995-96, landings declined in 16% of the stocks, and were unchanged in 50%. Three groundfish stocks showed major increases (more than 25%) in landings during 1995-96 (haddock, winter flounder, and yellowtail on Georges Bank) as did three pelagic stocks (Atlantic herring, Atlantic mackerel, and butterfish). Landings

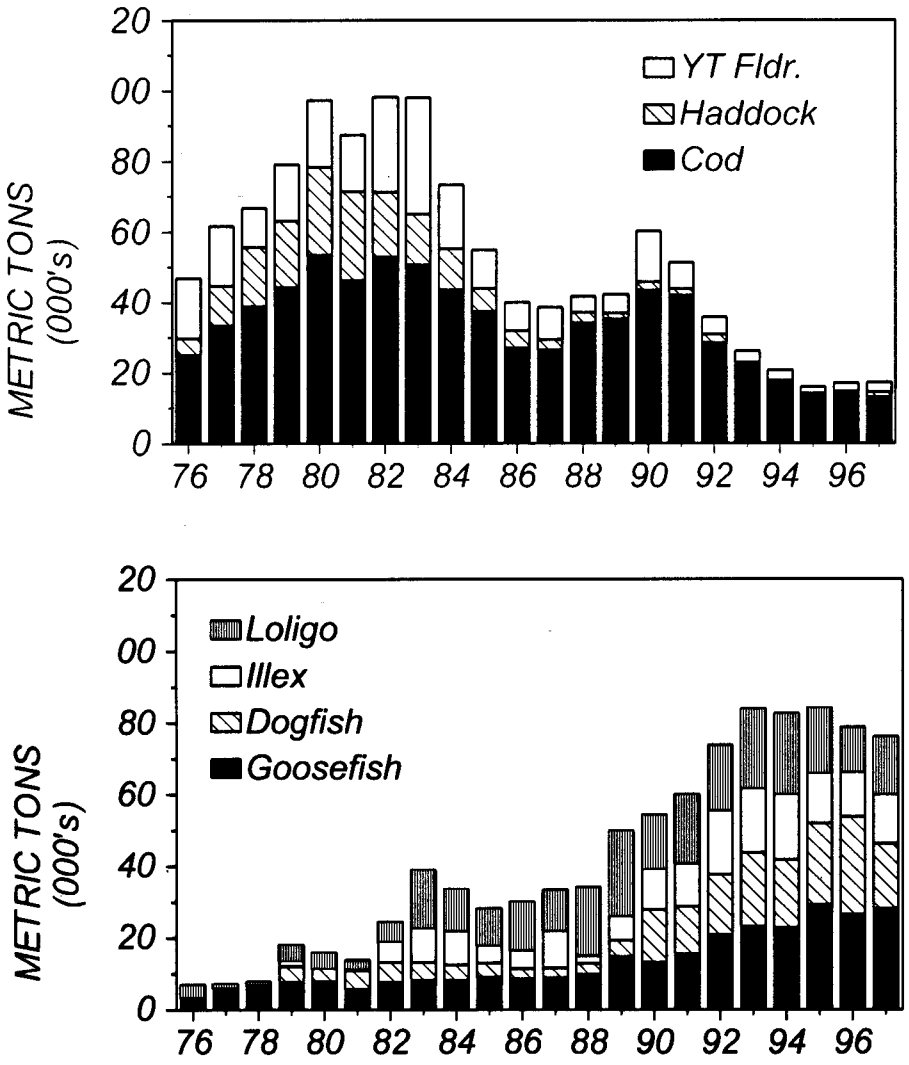

Figure 8. Relative changes in U.S. landings of two species groups, 1976-1997. Top panel details trends for cod, haddock, and yellowtail flounder. Bottom panel presents landings of spiny dogfish, squids, and goosefish.

for skates, northern shrimp, northern shortfin squid and striped bass also increased notably. During 1992-1996, landings decreased in 59% of the stocks, increased in 25%, and were unchanged in 16%. Increased abundance was noted for 18% of the stocks while 25% decreased in 1996 compared to 1995. However, during the past five years, 26% of the stocks declined, 36% exhibited no significant change, and 38% increased.

Management Actions

Improvements noted for some resource components in recent years reflect recent management actions by the New England and Mid-Atlantic Fishery Management Councils and the Atlantic States Marine Fisheries Commission. Amendment 5 to the Multispecies FMP was implemented in 1994 to decrease fishing effort by 50% over five to seven years. Amendment 7 (implemented in 1996) closed large areas of fishery habitat to fishing indefinitely, and accelerated days-at-sea effort reductions.

These measures have resulted in marked reductions in fishing mortality rates for four of the main New England groundfish stocks (Georges Bank cod, Georges Bank haddock, Georges Bank yellowtail flounder and Southern New England yellowtail flounder). The exploitation status of the latter three stocks has recently changed from overexploited to fully exploited. Obviously, other overfished components of the groundfish resource are benefitting as well. Monkfish and spiny dogfish, the focus of increased fishing activity in recent years, will be regulated under provisions of new FMPs being developed cooperatively by the New England and Mid-Atlantic Fishery Management Councils.

Amendments 4, 5, and 6 to the Sea Scallop FMP were implemented beginning in 1994 to replace meat count regulations with direct controls on fishing effort (*e.g.*, days at sea). The elimination of controls on meat count has resulted in increased exploitation on small scallops, even though a larger ring size (3-1/2 in.) is now required in scallop dredges. The closure of the Georges Bank grounds has put additional pressure on other scallop grounds, and has prompted additional closures of grounds off Hudson Canyon and the Virginia Capes. Long-term management provisions to address continuing overfishing of the resource and to manage closed areas are currently being debated.

Management programs for summer flounder have been successful in reducing exploitation levels, although fishing mortality still exceeds the overfishing definition. The quota-based system of management has resulted in a series of trip limits, and state-by-state closures as the quota is approached. The time schedule adopted by the Mid-Atlantic FMC calls for additional reductions in mortality to broaden the age distribution within the stock and to reduce fishery dependence on ages 0-2 fish.

Other fishery management programs are currently being developed to address overfishing of inshore stocks (winter flounder, bluefish, weakfish, scup and others) primarily under the jurisdiction of the ASMFC and individual states.

For further information

Mayo, R.K, M.J. Fogarty and F.M. Serchuk. 1992. Aggregate fish

Figure 9. Summary of the status of 51 finfish and invertebrate stocks reviewed in this report. Stocks are classified by current exploitation rate (underexploited, fully exploited, or overexploited), and current abundance level (low, medium, or high). Percentages refer to total number of stocks by category.

Abundance Level	Underexploited	Fully Exploited	Overexploited	
High	Atlantic herring Atlantic mackerel 4%	Striped bass 2%	Am. lobster- GOM Spiny dogfish 4%	10%
Medium	Atlantic surfclam Butterfish No. red hake 6%	Longfin inshore squid Ocean quahog Northern shortfin squid Skates No. windowpane 10%	Summer flounder Am. lobster- GB&S, SNE-LIS No. silver hake Yellowtail flounder-CC, Am. plaice Winter flounder-GB Northern shrimp 15%	31%
Low	0%	Haddock-GB Yellowtail flounder -SNE,GB Redfish Pollock, Am. shad 12%	Scup, Black sea bass, Sea scallop Cod-GB, Witch flounder, Cusk, Tilefish, Cod-GOM Wolffish, Goosefish, Bluefish White hake, Yellowtail flounder-MA, River herring, Ocean pout Haddock-GOM, So. silver hake, So. red hake Winter flounder - SNE-MA, GOM, Atl. sturgeon, shortnose sturgeon So. windowpane Atl. salmon 47%	59%
	10%	24%	66%	

Table 3. Abundance and exploitation status of 51 finfish and invertebrate stocks off the northeastern United States, 1997. Stocks are grouped into six categories: New England groundfish, Mid-Atlantic groundfish, pelagics, dogfish & skates, invertebrates, and anadromous

Category	Number of Stocks	Abundance	Number	%	Exploitation Status	Number	%
New England groundfish[1]	23	High	0	0%	Under	1	4%
		Medium	6	26%	Fully	6	26%
		Low	17	74%	Over	16	70%
Mid-Atlantic groundfish[2]	7	High	0	0%	Under	0	0%
		Medium	1	14%	Fully	0	0%
		Low	6	86%	Over	7	100%
Pelagics[3]	4	High	2	50%	Under	3	75%
		Medium	1	25%	Fully	0	0%
		Low	1	25%	Over	1	25%
Dogfish & skates[4]	2	High	1	50%	Under	0	0%
		Medium	1	50%	Fully	1	50%
		Low	0	0%	Over	1	50%
Invertebrates[5]	9	High	1	11%	Under	1	11%
		Medium	7	78%	Fully	3	33%
		Low	1	11%	Over	5	56%
Anadromous[6]	6	High	1	17%	Under	0	0%
		Medium	0	0%	Fully	2	33%
		Low	5	83%	Over	4	67%
All	51	High	5	10%	Under	5	10%
		Medium	16	31%	Fully	12	24%
		Low	30	59%	Over	34	66%

[1] New England groundfish = Georges Bank and Gulf of Maine Atlantic cod (two stocks), Georges Bank and Gulf of Maine haddock (two stocks), Northern silver hake, Northern red hake, white hake, goosefish, witch flounder, American plaice, Northern windowpane, Southern windowpane, Gulf of Maine, Georges Bank and Southern New England-Middle Atlantic winter flounder (three stocks), Cape Cod, Georges Bank and Southern New England yellowtail flounder (three stocks), ocean pout, redfish, pollock, cusk, and wolffish

[2] Mid-Atlantic groundfish = summer flounder, scup, black sea bass, tilefish, Mid-Atlantic yellowtail flounder, Southern silver hake, Southern red hake

[3] Pelagics = Atlantic herring, Atlantic mackerel, butterfish, and bluefish

[4] Spiny dogfish and skates = spiny dogfish, skates (includes 7 species listed in the species summary)

[5] Invertebrates = Atlantic surfclam; ocean quahog; Atlantic sea scallop; Gulf of Maine, Georges Bank and South, and Southern New England-Long Island Sound American lobster (three stocks); northern shrimp; northern shortfin squid, and longfin inshore squid.

[6] Anadromous = striped bass, Atlantic salmon, river herrings (alewife and blueback herring), American shad, Atlantic sturgeon, and shortnose sturgeon

Table 4. Summary of changes in landings and abundance for 51 finfish and invertebrate stocks off the northeastern United States (stocks in each category are given in Table 3)

Category	Number of Stocks	Change[1]	Landings[2]		Abundance[3]	
			1995-96	1992-96	1995-96	1992-96
New England groundfish	23	--	2 (9%)	14 (61%)	3 (13%)	3 (13%)
		-	3 (13%)	4 (17%)	1 (4%)	1 (4%)
			14 (61%)	3 (13%)	14 (61%)	9 (39%)
		+	1 (4%)	0 (0%)	1 (4%)	2 (9%)
		++	3 (13%)	2 (9%)	4 (17%)	8 (35%)
Mid-Atlantic groundfish[4]	7	--	0 (0%)	2 (40%)	1 (17%)	3 (50%)
		-	0 (0%)	0 (0%)	1 (17%)	0 (0%)
			2 (40%)	2 (40%)	4 (66%)	2 (33%)
		+	3 (60%)	0 (0%)	0 (0%)	0 (0%)
		++	0 (0%)	1 (20%)	0 (0%)	1 (17%)
Pelagics	4	--	0 (0%)	1 (25%)	1 (50%)	1 (50%)
		-	0 (0%)	0 (0%)	0 (0%)	0 (0%)
			1 (25%)	1 (25%)	1 (50%)	1 (50%)
		+	0 (0%)	0 (0%)	0 (0%)	0 (0%)
		++	3 (75%)	2 (50%)	0 (0%)	0 (0%)
Dogfish & skates	2	--	0 (0%)	0 (0%)	0 (0%)	1 (50%)
		-	0 (0%)	0 (0%)	1 (50%)	0 (0%)
			0 (0%)	0 (0%)	0 (0%)	1 (50%)
		+	1 (50%)	1 (50%)	0 (0%)	0 (0%)
		++	1 (50%)	1 (50%)	1 (50%)	0 (0%)
Invertebrates[5]	9	--	1 (14%)	2 (29%)	1 (20%)	1 (20%)
		-	0 (0%)	1 (14%)	1 (20%)	0 (0%)
			4 (57%)	1 (14%)	3 (60%	1 (20%)
		+	0 (0%)	0 (0%)	0 (0%)	0 (0%)
		++	2 (29%)	3 (43%)	0 (0%)	3 (60%)
Anadromous	6	--	1 33%)	2 (67%)	0 (0%)	0 (0%)
		-	0 (0%)	0 (0%)	0 (0%)	0 (0%)
			1 (33%)	0 (0%)	0 (0%)	0 (0%)
		+	0 (0%)	0 0%)	0 (0%)	0 (0%)
		++	1 (33%)	1 (33%)	1 (100%)	1 (100%)
All	51	--	4 (9%)	21 (48%)	6 (15%)	9 (23%)
		-	3 (7%)	5 (11%)	4 (10%)	1 (3%)
			22 (50%)	7 (16%)	22 (56%)	14 (36%)
		+	5 (11%)	1 (2%)	1 (3%)	2 (5%)
		++	10 (23%)	10 (23%)	6 (15%)	13 (33%)

[1] Symbols are as follows: (--) major decrease; (-) minor decrease; ( ) no change; (+) minor increase; (++) major increase. Major = >25%; minor = 10-25%; no change = <10%.

[2] Landings data combined for silver hake, red hake, and American lobster stocks; and stocks currently under landings moratoria (Atlantic salmon, Atlantic and shortnose sturgeon) not included.

[3] Abundance indices or VPA results for 1996 not available for tilefish, Atlantic herring, Atlantic mackerel, Atlantic surfclam, ocean quahog, Atlantic salmon, Atlantic and shortnose sturgeon, river herrings, and American shad.

[4] Does not include landings data for silver or red hake.

[5] Landings and abundance indices combined for American lobster.

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