PART 3: DESCRIPTION OF THE FISHERY

SUBPART A: THE NORTHEAST MULTI-SPECIES FISHERY

Multi-species interactions result from resource and market characteristics. They may be summarized in the following categories:

(1) Joint harvesting relationships, commonly referred to as by-catch relationships, are prevalent in the demersal finfish fishery. They exist because demersal finfish congregate together as described above in §2A3, and because demersal finfish gear does not selectively harvest individual species.

(2) Seasonal switching among species or species-mixes is another form of interaction at the harvesting level. As the fisherman expects net revenues from one species or mix to increase relative to those of another he will shift his fishing effort, partially or entirely, to the more desirable species. A major reason behind such changes in relative net revenues is the seasonal change in availability and abundance of individual species. Seasonal switching of effort between species or mixes is the rule rather than the exception for otter trawlers and fixed gear fishermen.

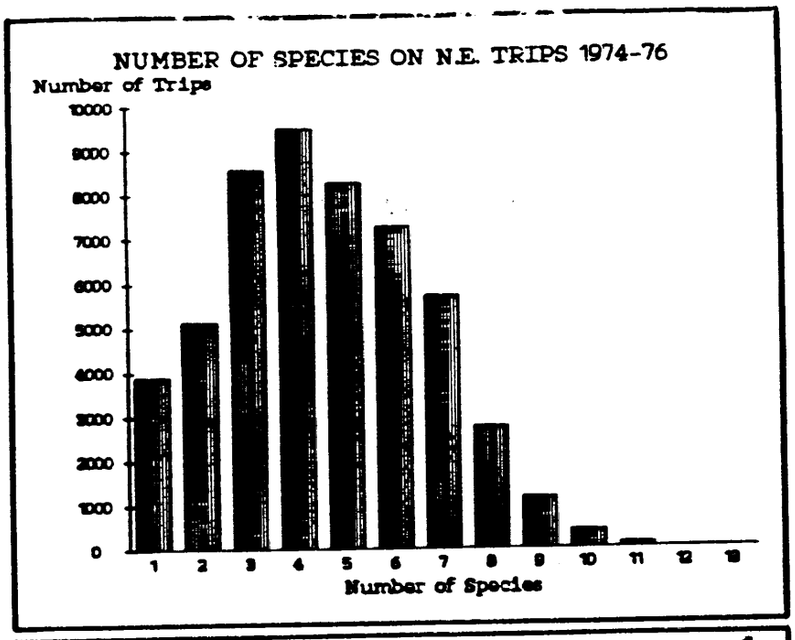
(3) Substitution of species in the marketplace is also a form of species interaction. The price of cod is partially dependent on the price or landings of haddock, both of which are roundfish. See §3C2, The Processing Sector, for a further discussion of these multi-species market interactions.

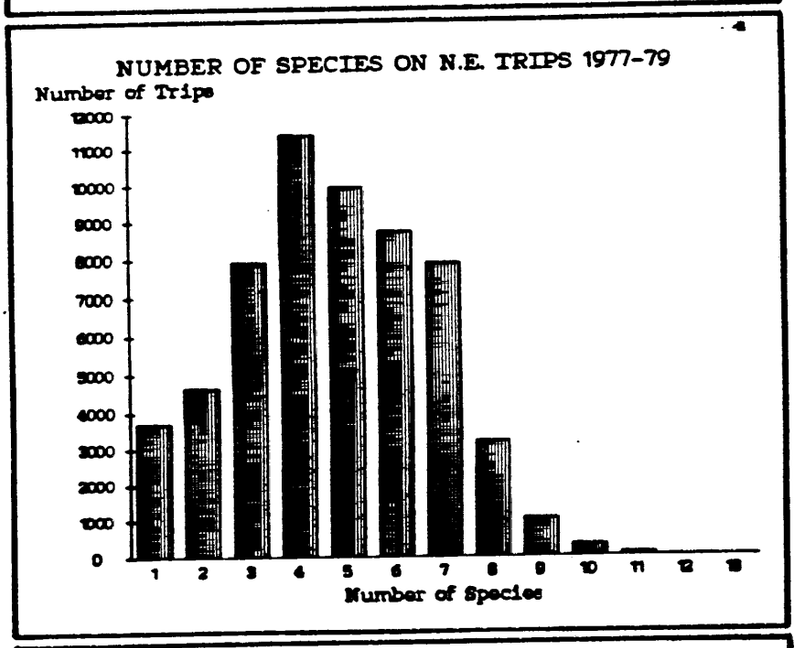
Most of the figures and tables in Subparts A & B originate from the Northeast Fishery Center's (NMFS) commercial weigh-out files, unless otherwise noted.

§3A1 Joint Harvesting Relationships

The joint harvesting relationship can most easily be seen in Figure 3A1, which shows the number of trips on which a given number of species were caught, during the three year periods 1974-1976 and 1977-1979 and during 1982. Although single-species trips are landed by otter trawls, line trawls and gillnets (first column), they make up a small percent (7.4% for 1974-1976; 6.5% for 1977-1979; 4.8% for 1982) of the total number of trips taken by groundfish gears. The figure is not intended to imply that a maximum of only 13 species are ever caught on groundfish trips, because many species are combined into groups (see below for the species and species-groups used in this discussion).

Landings of many species on one fishing trip is evident when one looks at a sampling of otter trawl trips. Such a view of Point Judith is depicted in Figure 3A2, with trips ordered chronologically from front to back. In 1983, Point Judith trawls landed relatively large amounts of silver hake on trips for most of the year. High trip landings of yellowtail, summer flounder and squid appear during the middle of the year, whereas butterfish landings rise late in 1983. Species such as haddock, pollock and redfish are not of much importance to Point Judith. Low levels of winter flounder and yellowtail are caught together throughout the year. Pictures of Point Judith for 1973, 1976, 1979 and 1982 show similar seasonal landings.


NUMBER OF SPECIES ON N.E. TRIPS 1974-76
Number of Trips
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1 2 3 4 5 6 7 8 9 10 11 12 13
Number of Species


NUMBER OF SPECIES ON N.E. TRIPS 1977-79
Number of Trips
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1 2 3 4 5 6 7 8 9 10 11 12 13
Number of Species

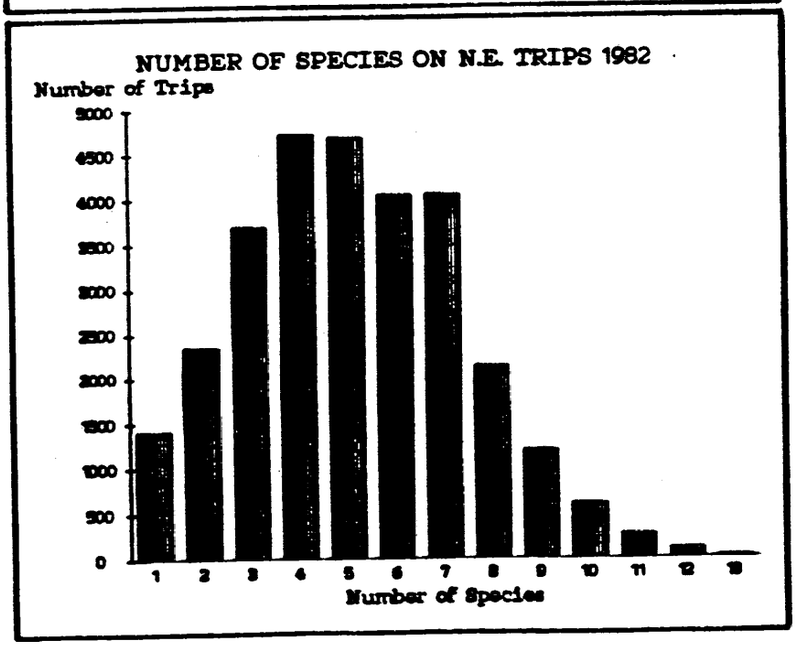
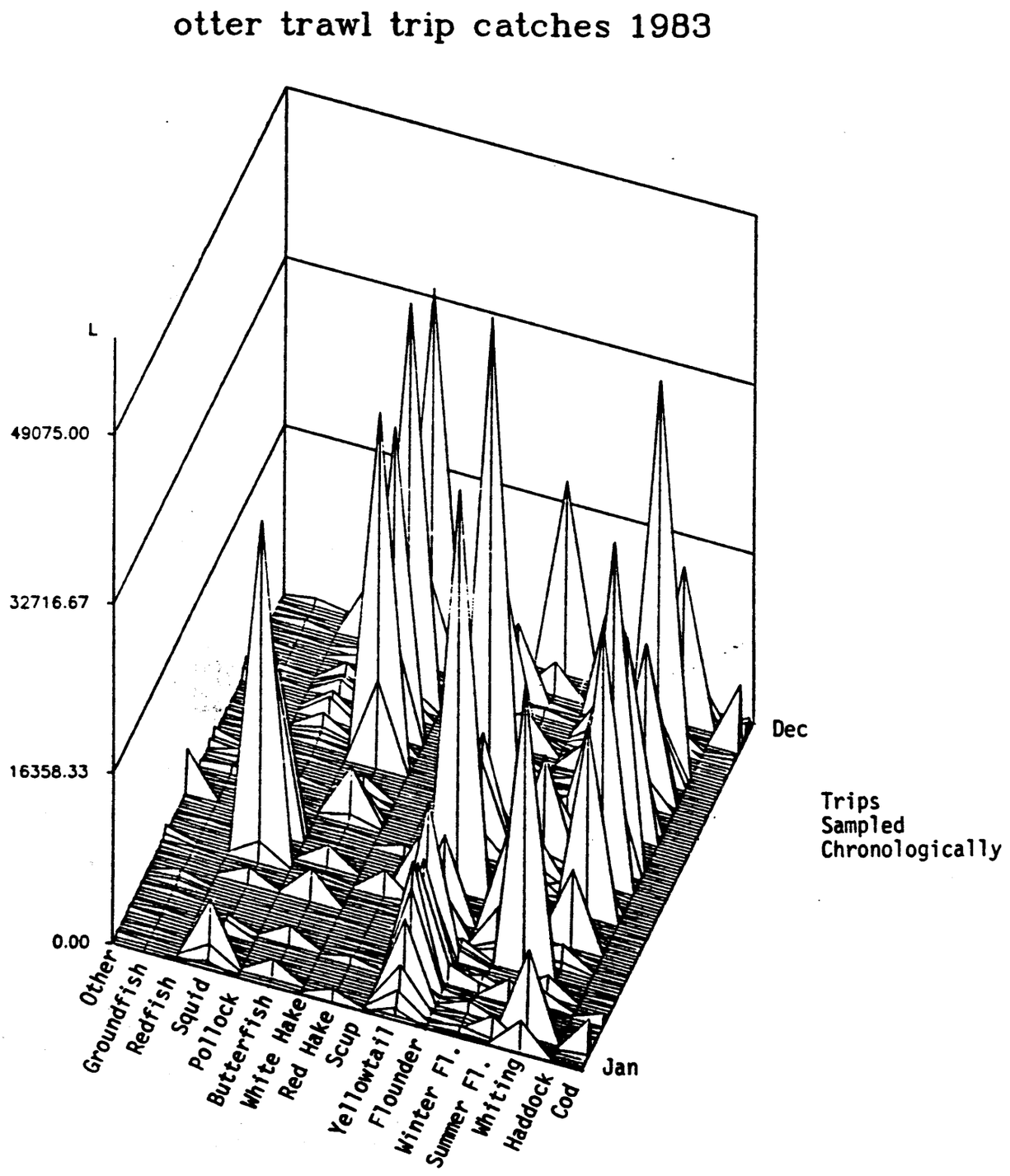

NUMBER OF SPECIES ON N.E. TRIPS 1982
Number of Trips
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1 2 3 4 5 6 7 8 9 10 11 12 13
Number of Species

Figure 3A1

Figure 3A2

Point Judith



Source: NEFC Weigh-Out Data.

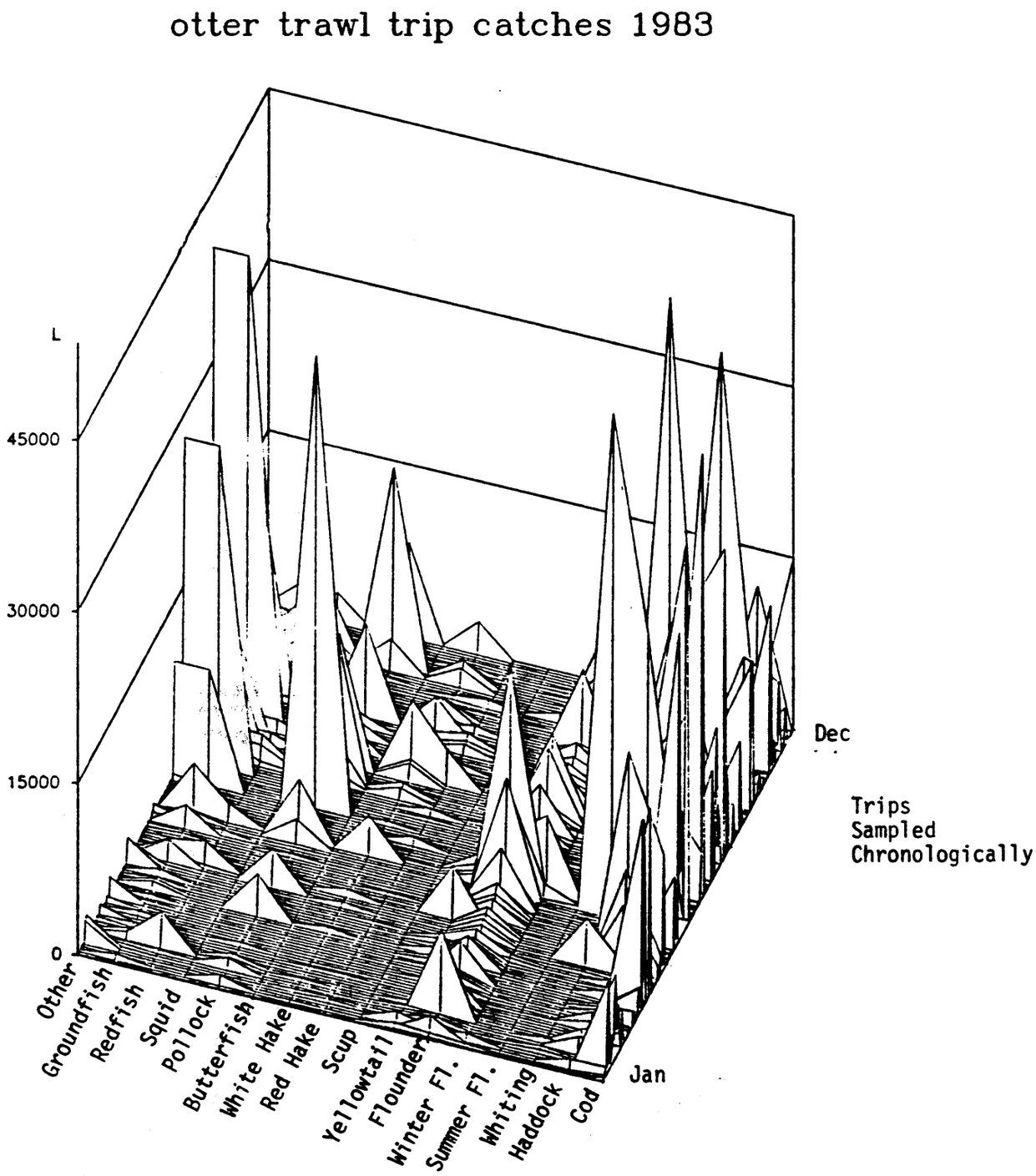
A trip graph of Gloucester otter trawls in 1983 (Figure 3A3) displays a high level of trip landings of cod and haddock throughout the year, and pollock during the fall-winter. The catch composition of other more northly species such as cod and pollock stands in contrast to the important species in Point Judith. Flounders such as American plaice, witch flounder and sand dabs appear to be landed on almost every trip. From 1973 to 1983, Gloucester landings have shifted to cod, flounder and pollock, at the expense of silver hake and especially redfish, although high whiting landings still occur in summer. These changes reflect the species' abundance levels and price differentials during the period. New Bedford (Figure 3A4) illustrates yellowtail and winter flounder, and cod and haddock, almost always being caught together in 1983. This picture is similar to 1979 when New Bedford was also relatively more dependent on cod-haddock than on yellowtail-winter flounder. In 1973, 1976 and 1982 yellowtail-winter flounder were more important than cod-haddock in New Bedford. Portland (Figure 3A5) had looked like a single-species port for redfish in 1973 and 1976, but today landings include haddock, other flounder (American plaice, witch flounder and sand dabs), pollock, white hake, as well as redfish. By 1979 cod, haddock and other flounder had increased in importance. Trip landings of redfish in 1983 were one-tenth of what they were in 1973 and 1976, and overall redfish landings in Portland reflect the same trend dropping from 10 to 3 million pounds during the period.

The view of Rockland (Figure 3A6) is quite similar to that of Portland, but other species (notably haddock and pollock) became relatively important more because redfish landings plummeted. Pollock and redfish seem to be caught together in both ports, with pollock increasing proportionately in recent years for the same reason. In Provincetown (Figure 3A7), most trips landed include cod and flounders (including yellowtail and winter flounder but excluding summer flounder) throughout the year. Landings of silver hake, red hake and pollock usually increase during the second half of the year. These patterns have persisted during the period 1973-1983 for otter trawls. Boston (Figure 3A8) is characterized by trip landings of cod and haddock, pollock and some redfish throughout the year and the period. Flounders have become less important overall, but are still landed on the majority of trips, and white hake generally increases during fall-winter in Boston. Flounder has consistently characterized trip landings in Newport (Figure 3A9), especially yellowtail and winter flounder. Summer flounder landings increased again in 1983, and cod has become seasonally important. Trip graphs for 1973, 1976, 1979 and 1982 are included in Appendix 3A.1.

Overall New England landings by otter trawls indicate that most major species are landed as by-catch (less than 50% of the trip catch). This is illustrated in Figure 3A10 for the two major fishing areas, the Gulf of Maine (GM) and Georges Bank and South (GB/S). Although cod and yellowtail from the Georges Bank and South area are listed as principally directed species, one should notice that between 45 and 50 percent of those landings are by-catch. Less than 15% of redfish landings are caught as by-catch. The major fishing areas, or stock areas, in which the multi-species fishery is conducted are important and are described in §2A2. Involvement in these stock areas is predicated on vessel location, or port of landings, from the harvesting industry standpoint (Figure 3A11). For example, port of landing of groundfish vessels (otter trawls, line trawls and gillnets) was examined with respect to area of catch for the period 1977-1979 and the year 1983. Portland and

Figure 3A3

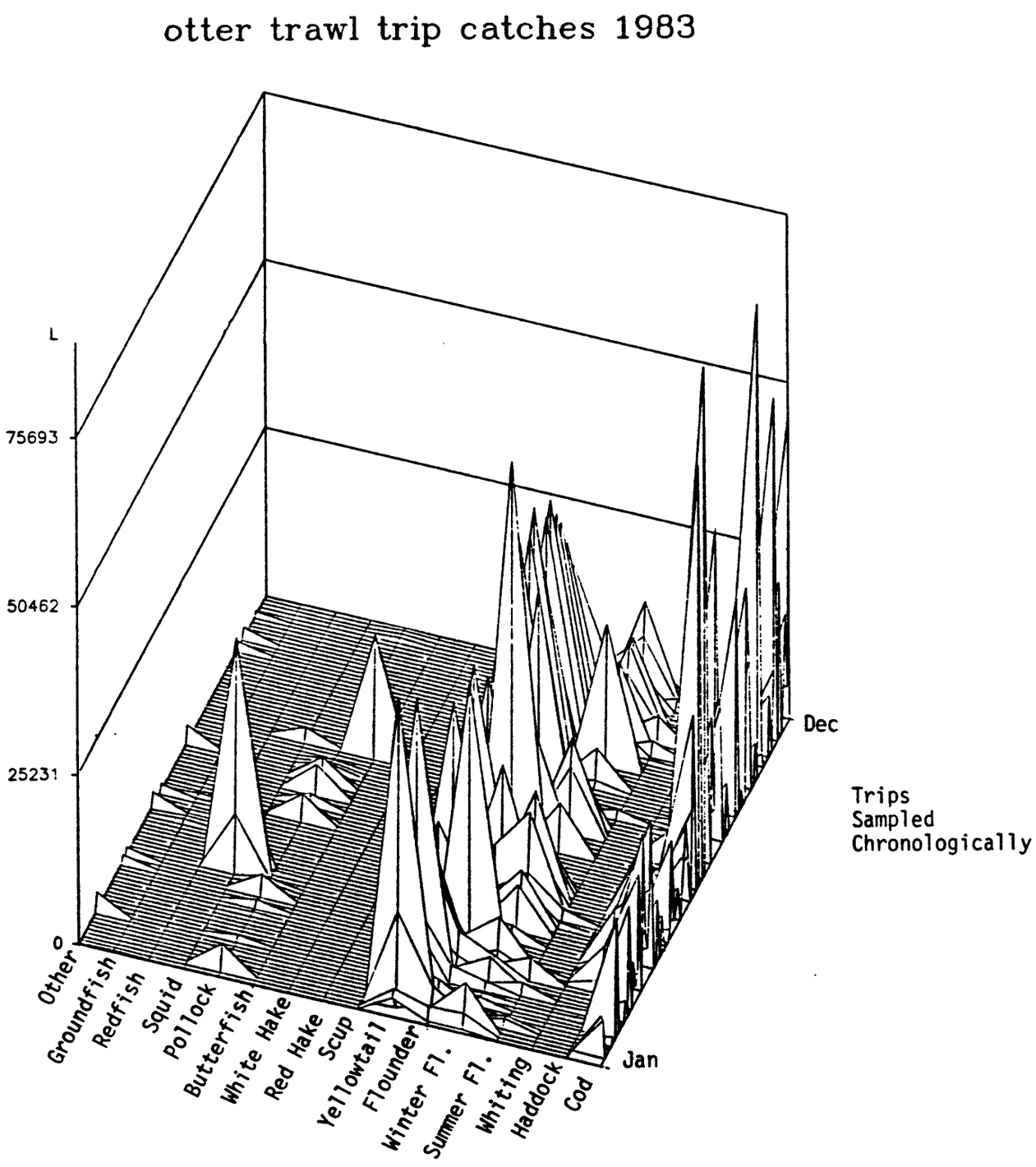
Gloucester



Source: NEFC Weigh-Out Data.

Figure 3A4

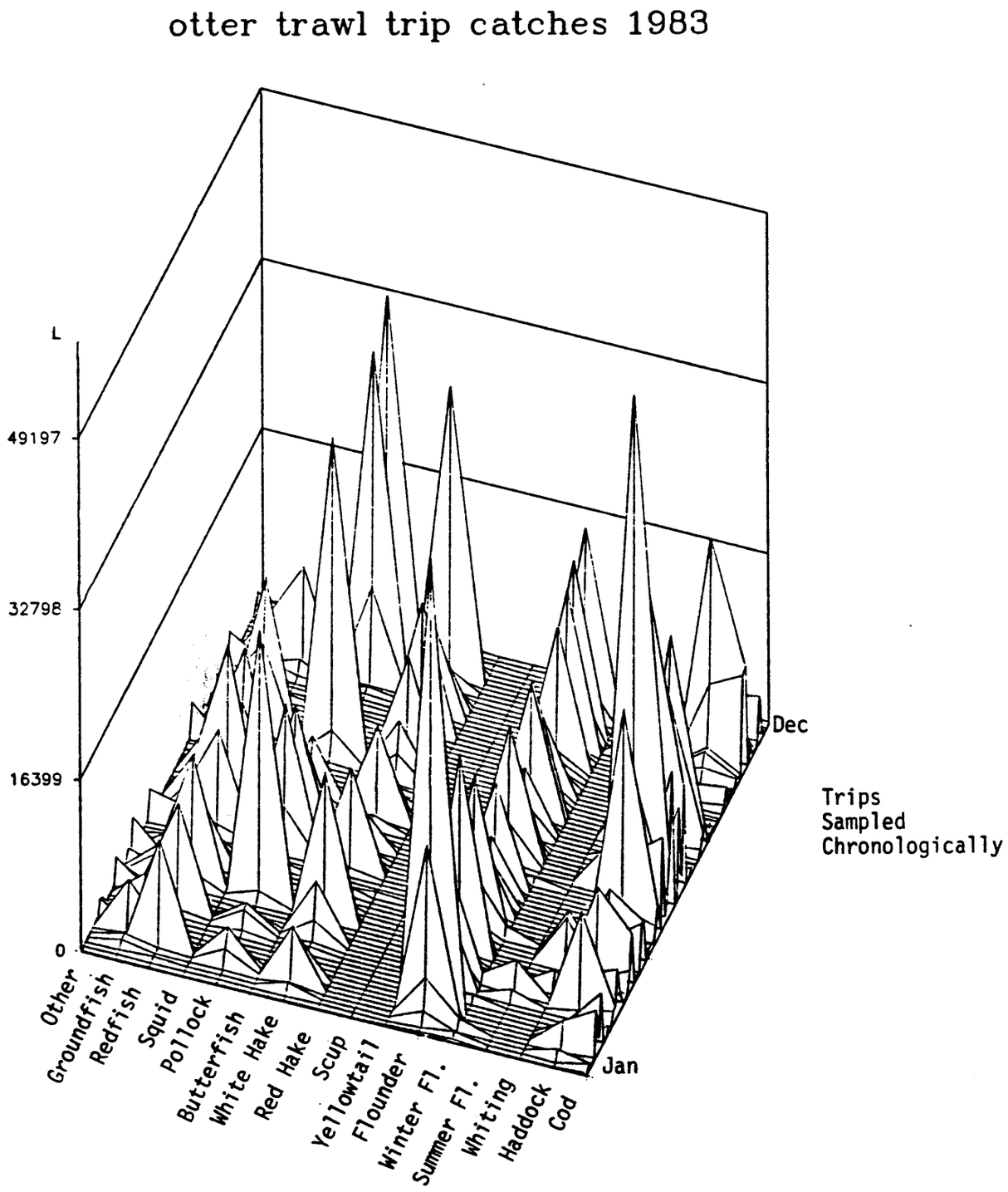
New Bedford



Source: NEFC Weigh-Out Data.

Figure 3A5

Portland

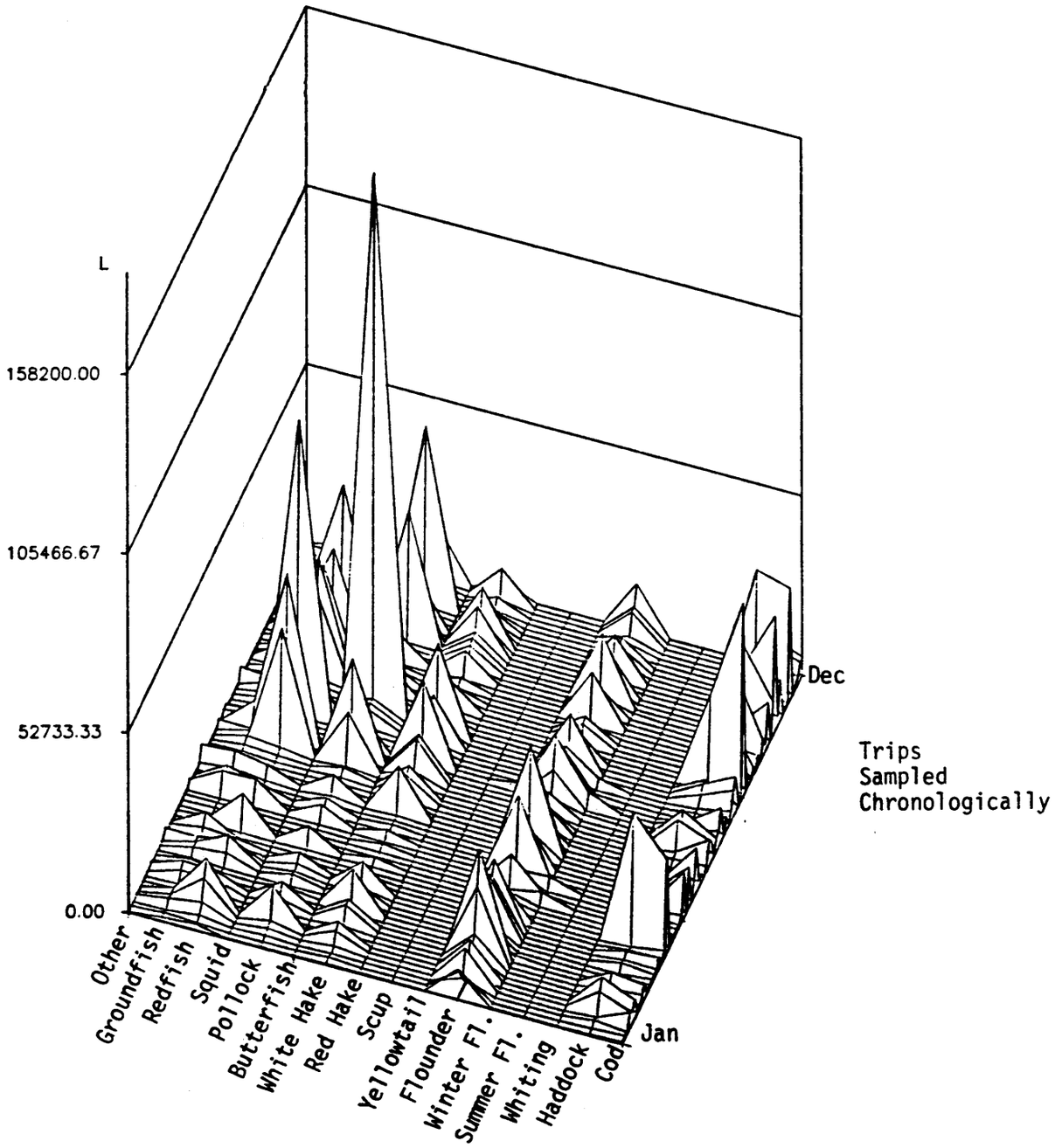


Source: NEFC Weigh-Out Data.

Figure 3A6

Rockland

otter trawl trip catches 1983



Source: NEFC Weigh-Out Data.

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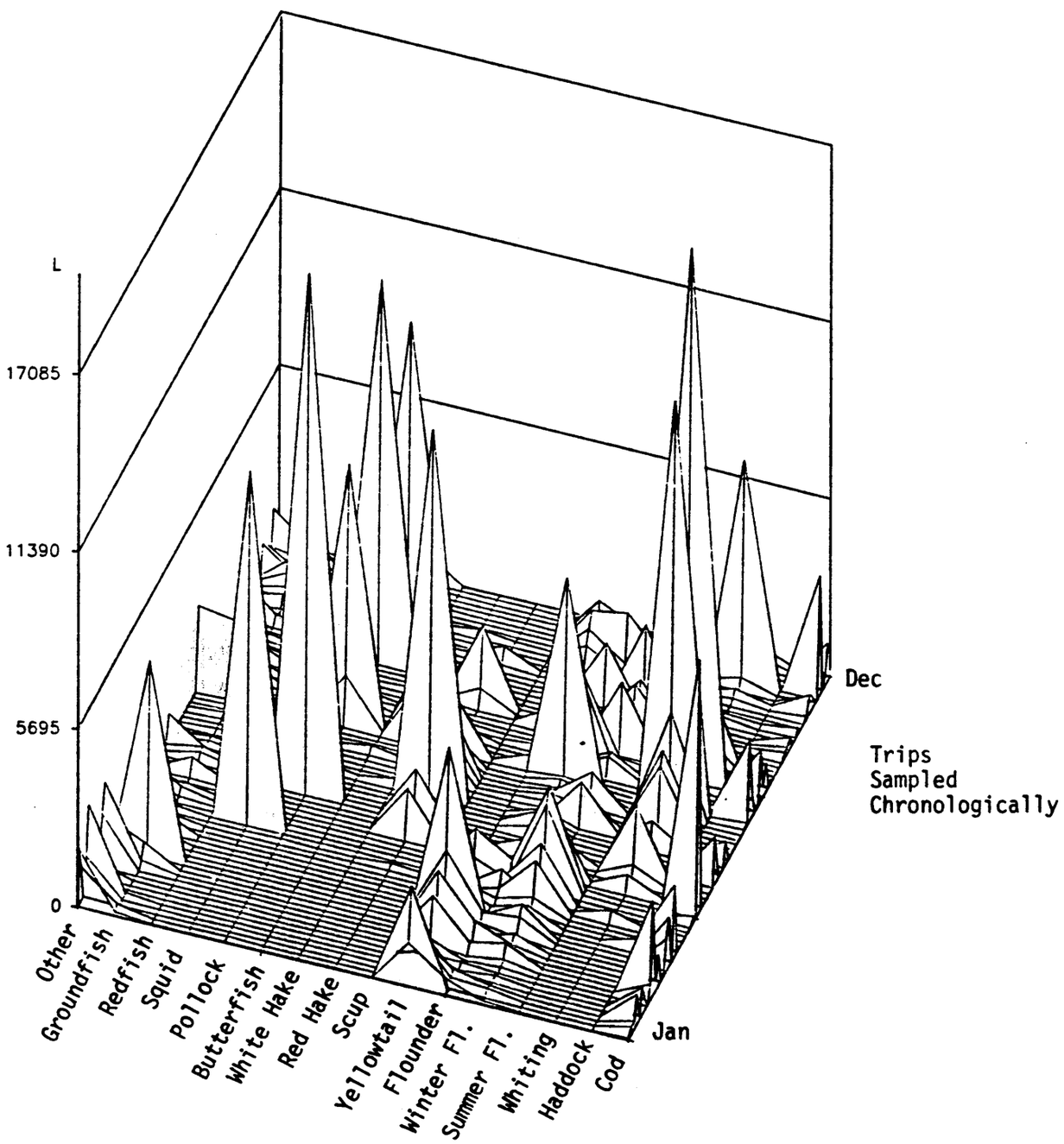
Figure 3A7

Provincetown

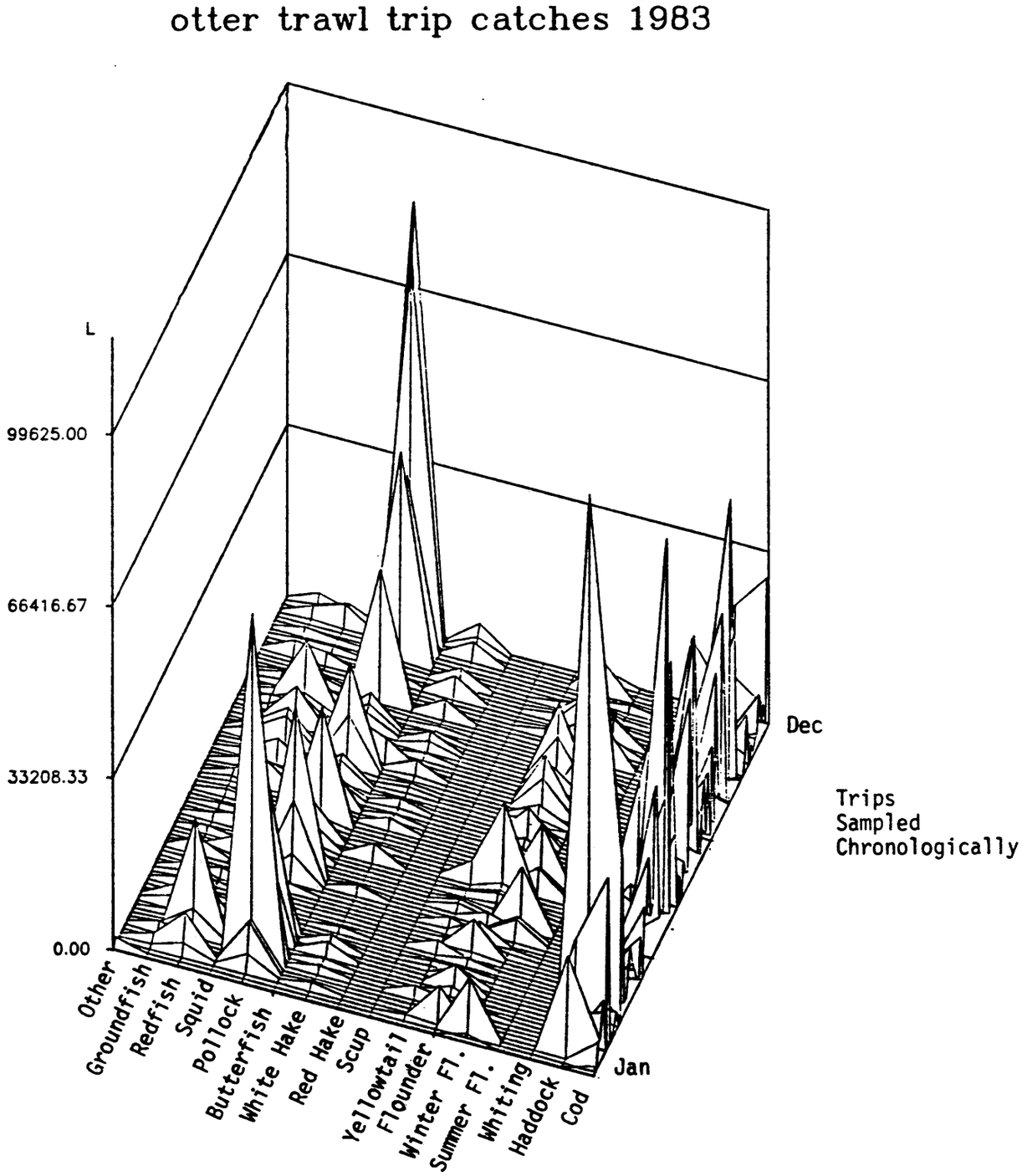
otter trawl trip catches 1983



Source: NEFC Weigh-Out Data.

Figure 3A8

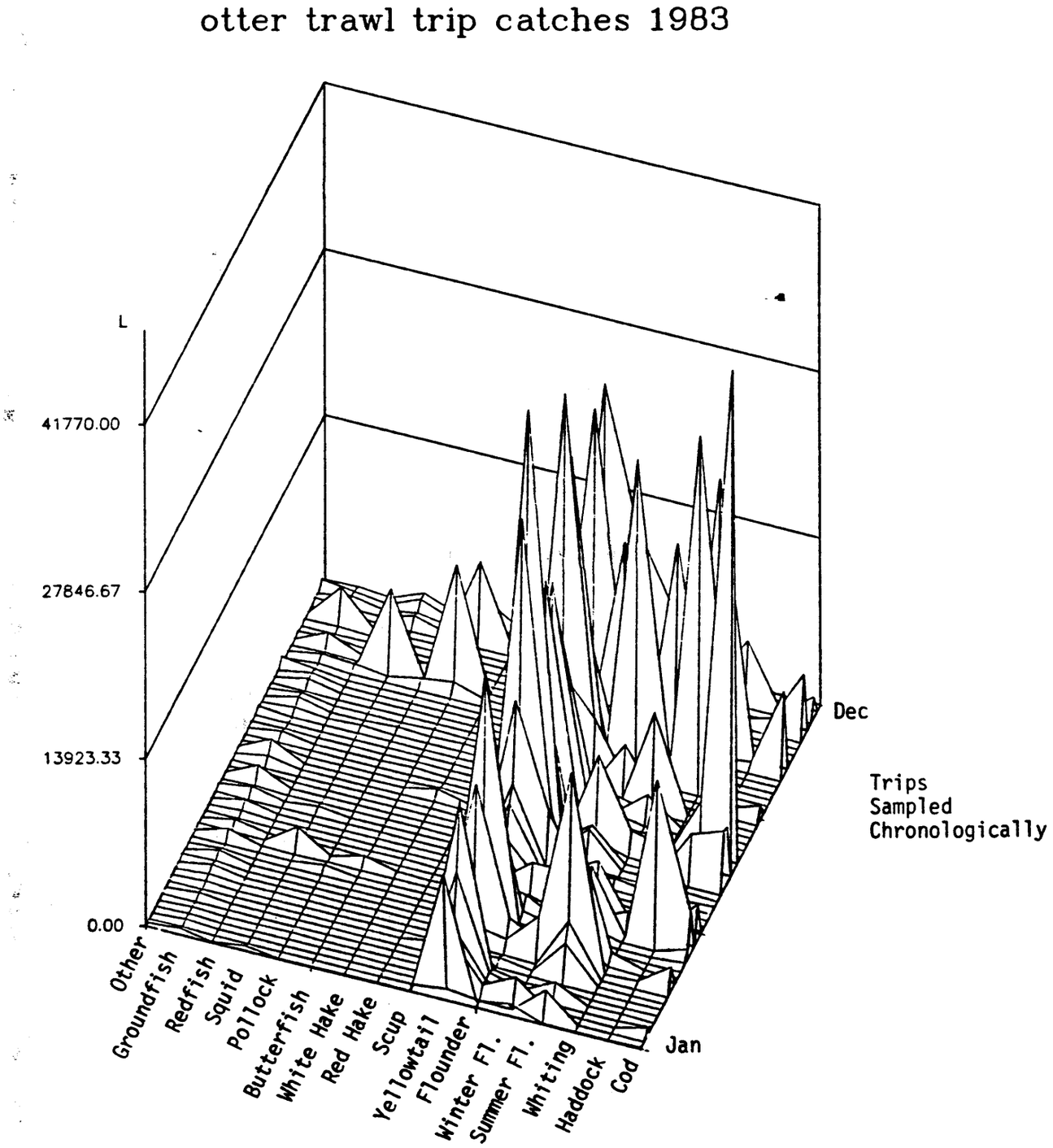
Boston



Source: NEFC Weigh-Out Data.

Figure 3A9

Newport



Source: NEFC Weigh-Out Data.

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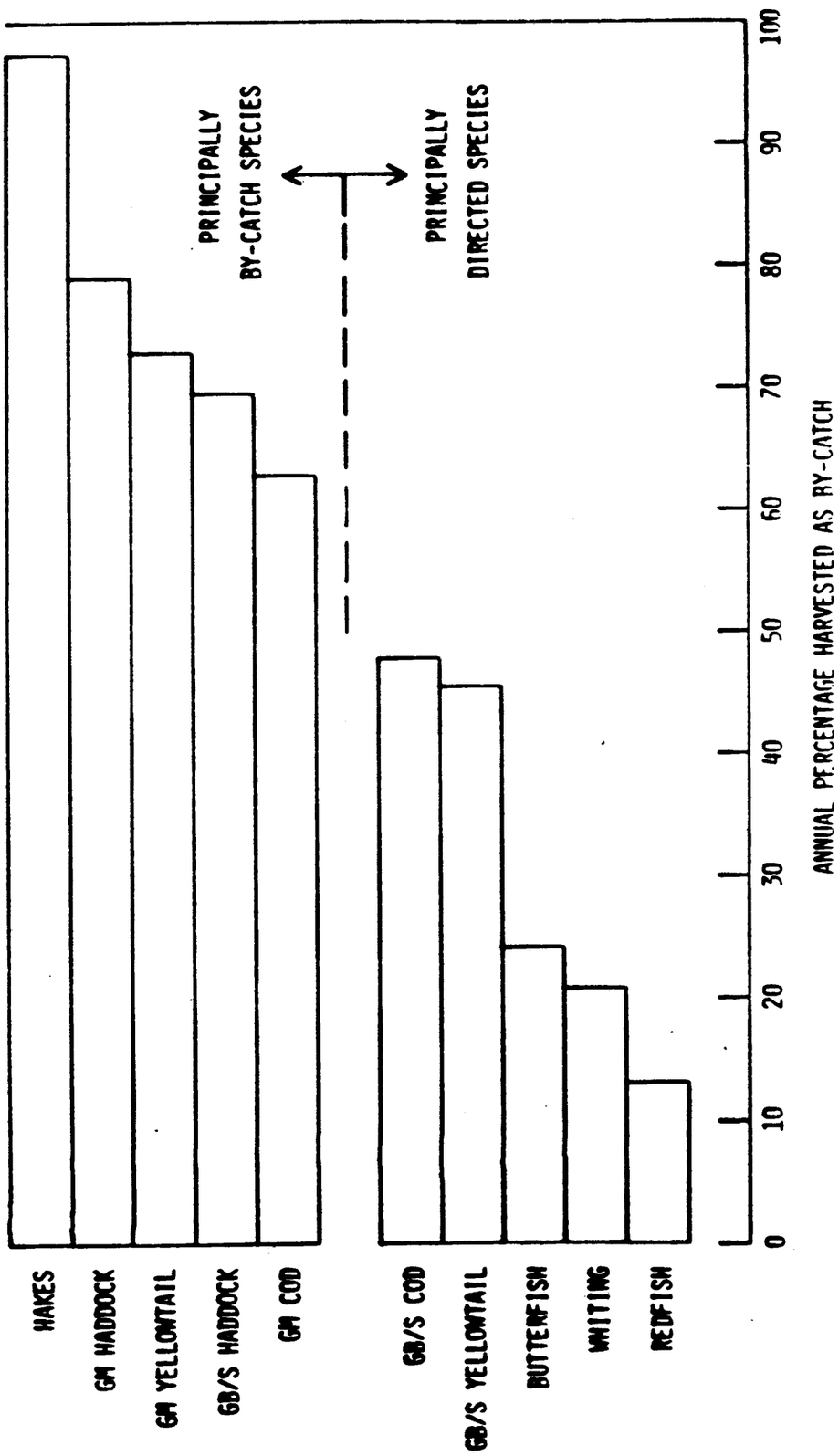
Figure 3A10



Source: NEFC Weigh Out Data

Figure 3A11

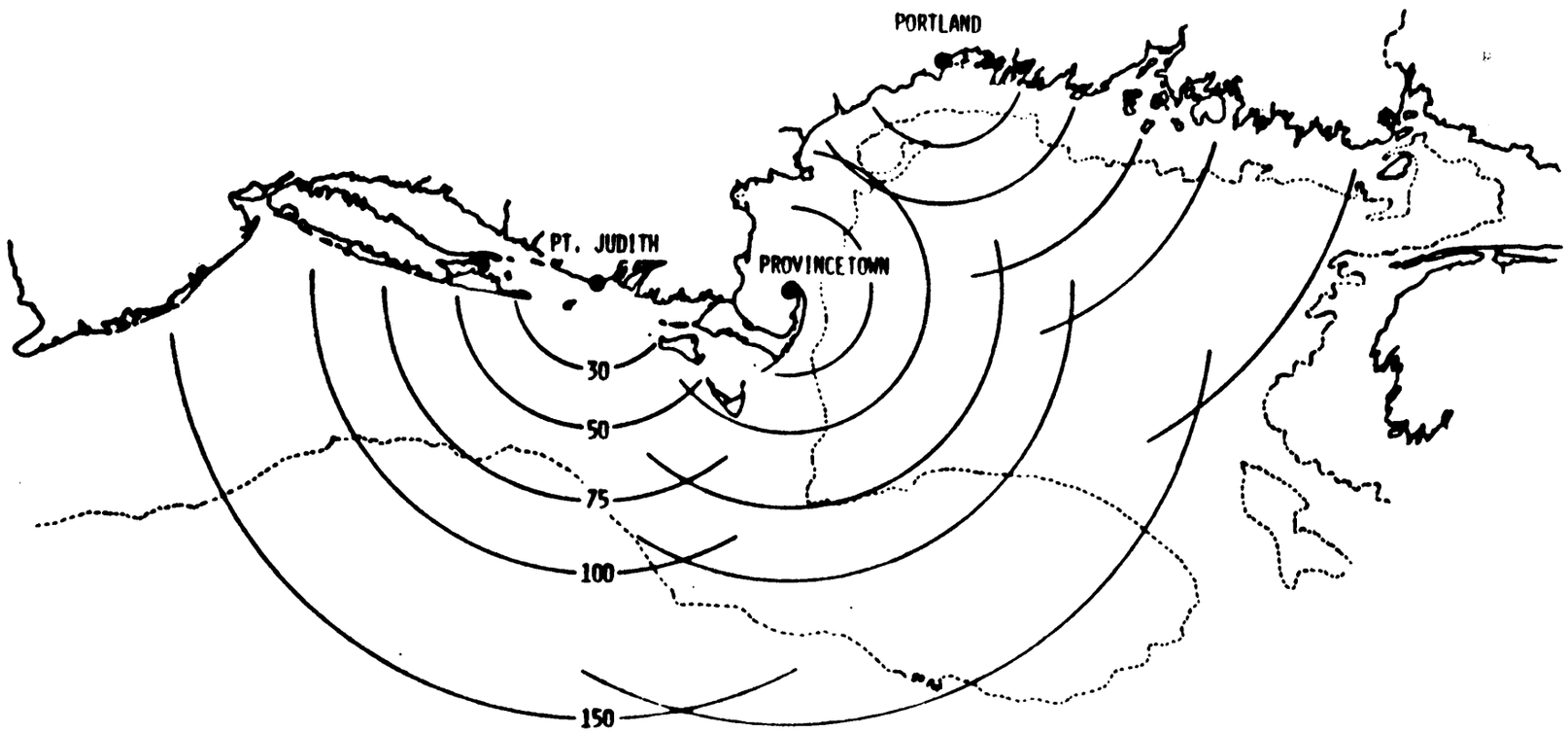


Illustration of the fishery range of vessels from various ports along the New England coast.

Rockland took nearly 95% and 75%, respectively, of their landings from the central-western Maine coast and the offshore Gulf of Maine (Statistical Areas 512, 513 and 515). Boston and Gloucester took about 87% and 96% of their landings from Massachusetts Bay and northern Georges Bank (SA 513, 514, 521-523). Provincetown took 95-99% from adjacent fishing areas (SA 514 and 521); New Bedford, 88% from Georges Bank (SA 521-526). Newport took 93-97% of its landings from Georges Bank and Southern New England waters (SA 521-526 and 537-539); Point Judith, 95% from Southern New England (SA 537-539 and 611).

The foregoing discussion has shown the importance of port of landing location in terms of trip catch composition and potential fishing areas. Such importance is further illustrated by comparing the most important species for each port (Table 3A1). The most valuable species change as we look down the coast: other flounder (mostly American plaice and witch flounder) and haddock in Portland and Rockland; cod, haddock and other flounder in Gloucester and Boston; yellowtail, cod and flounders in New Bedford and Provincetown; yellowtail-butterfish in Point Judith and yellowtail-summer flounder-scup in Newport. The flounders, including American plaice, winter flounder, witch flounder and yellowtail, are a mainstay throughout New England. State landings in 1984 indicate a similar catch composition in New England, except that cod has replaced haddock in importance, and show that summer flounder is the most important state species to the south (Table 3A2), New York to North Carolina.

§3A2 Switching Among Species Fisheries, Seasonal and Historical

Involvement in several multi-species fisheries during the year can be observed in the annual landings of groundfish vessels. A look at Point Judith otter trawls is presented in Figure 3A12 for 1979, ordered by increasing size (all greater than 5 GRT) from front to back. Recall that butterfish is landed in Point Judith late in the year, whether singly or with other species (see Appendix 3A.1), yet most of the approximately 60 trawls caught some butterfish (Figure 3A12). Additionally, every vessel catching butterfish appears to catch scup, which is generally harvested during the middle of the year, a pattern that is found in 1973 and 1976 as well. Finally, it is obvious from the figure that virtually all of these vessels are landing winter flounder (winter flounder) regardless of size, whereas the larger vessels are landing higher levels of yellowtail.

Gloucester vessels (Figure 3A13) that land redfish also land pollock, which is expected because these species were shown to be caught together (Figure 3A3; see Appendix 3A.1 for 1979). However, many of those landing silver hake appear to be small vessels while larger vessels land redfish-pollock, implying that two distinct fleets are operating at the same time. Meanwhile, nearly all of the Gloucester vessels are landing cod and haddock, especially the large vessels. The picture for Gloucester is similar in 1973 and 1976. All of the New Bedford vessels are involved in yellowtail and winter flounders, (Figure 3A14) but the larger vessels are involved more heavily in cod. By 1979, cod and haddock had become relatively more important for all vessels. Vessel graphs other than those displayed here (i.e., 1972, 1976, 1981, Portland, Rockland, Provincetown, Boston and Newport) are included in Appendix 3A.2 and basically confirm the view of each port given previously by the trip graphs.

Table 3A1

Relative Importance (Percent) of Groundfish Species to Total Port Revenues, 1982:

PORTLAND		GLOUCESTER		NEW BEDFORD		PT. JUDITH	
Flounders	29	Cod	25	Yellowtail	15	Yellowtail	27
Haddock	14	Haddock	22	Cod	13	Butterfish	14
Cod	12	Flounders	14	Winter Fl.	8	Silver Hake	11
Pollock	8	Pollock	6	Haddock	4	Winter Fl.	10
Redfish	6	Redfish/ Silver Hake	6	Flounders	2	Summer Fl.	9
ROCKLAND		**BOSTON**		**PROVINCETOWN**		**NEWPORT**	
Flounders	22	Cod	34	Yellowtail	28	Yellowtail	22
Haddock	19	Haddock	24	Cod	21	Summer Fl.	8
Redfish	16	Flounders	6	Flounders	14	Scup	6
Cod	7	Pollock	6	Winter Fl.	11	Cod	5
Pollock	5	Redfish	5	Silver Hake	5	Winter Fl.	5

SOURCE: NMFS State Landings

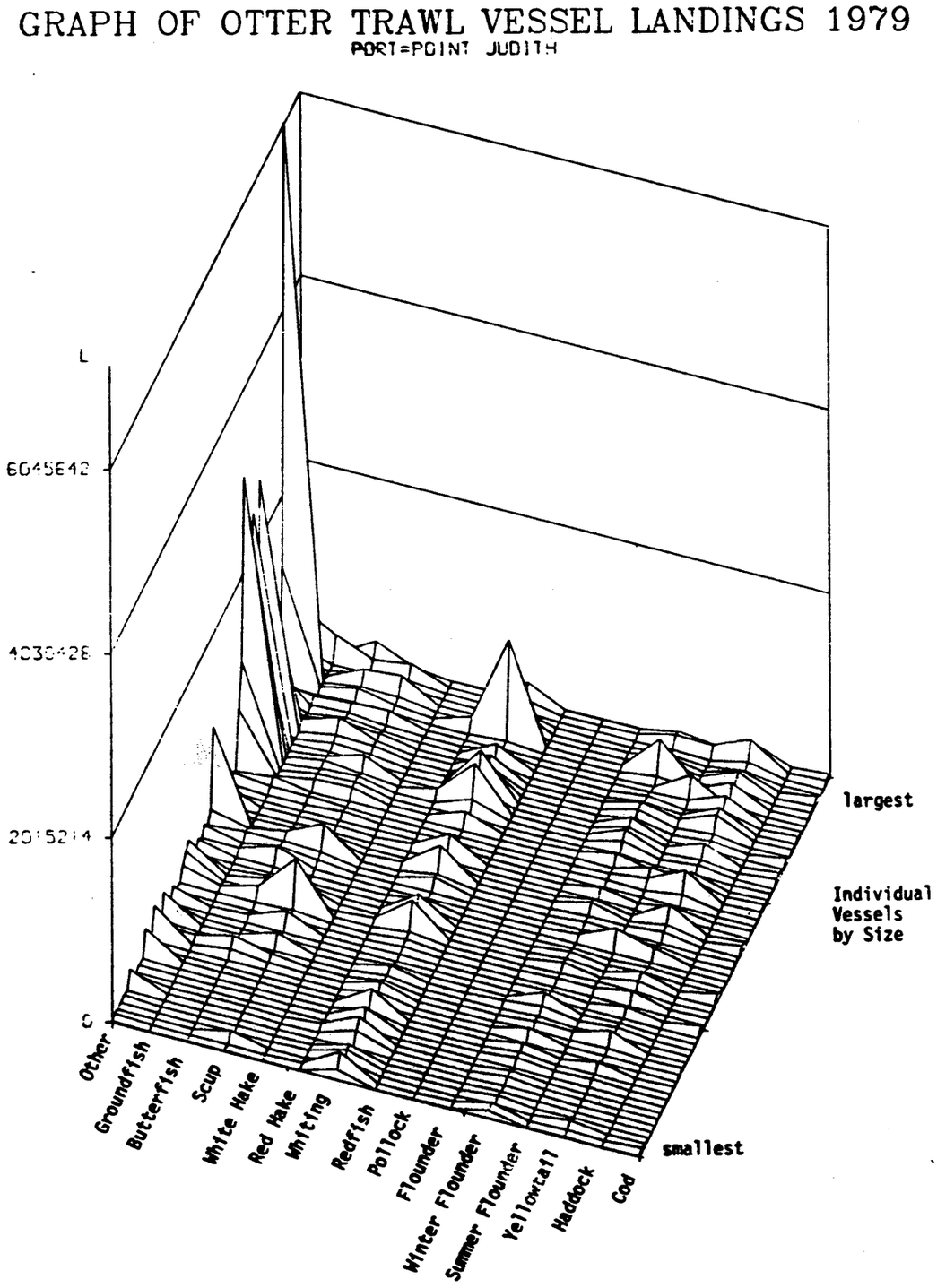
Table 3A2

Percent Total State Revenues, 1984:

MAINE		NEW HAMPSHIRE		MASSACHUSETTS		RHODE ISLAND	
Am. Plaice	6	Am. Plaice	11	Cod	15	Yellowtail	12
Witch Fl.	5	Cod	11	Yellowtail	10	Butterfish	11
Cod	5	Witch Fl.	6	Winter Fl.	8	Summer Fl.	9
Haddock	4	Pollock	5	Haddock	7	Winter Fl.	7
Lobster	58	Lobster	58	Scallops	25	Lobster	29
CONNECTICUT		**NEW YORK**		**NEW JERSEY**		**VIRGINIA**	
Winter Fl.	8	Summer Fl.	13	Summer Fl.	7	Summer Fl.	18
Yellowtail	7	Yellowtail	9	Scup	4	Scup	2
Summer Fl.	2	Scup	8	Whiting	3	Bluefish	1
Butterfish	1	Whiting	6	Surf Clams	36	Scallops	56
Lobster	75	Lobster	21	Scallops	24	Surf Clams	20
NORTH CAROLINA		**DELAWARE**		**MARYLAND (OCEAN)**			
Summer Fl.	76	Bluefish	11	Summer Fl.	6		
Scup	8	Summer Fl.	2	Ocean Quahog	42		
Bluefish	5	Red Hake	1	Surf Clams	38		
Butterfish	1	Lobster	87	Swordfish	9		
Scallops	7						

SOURCE: NMFS State Landings

Figure 3A12

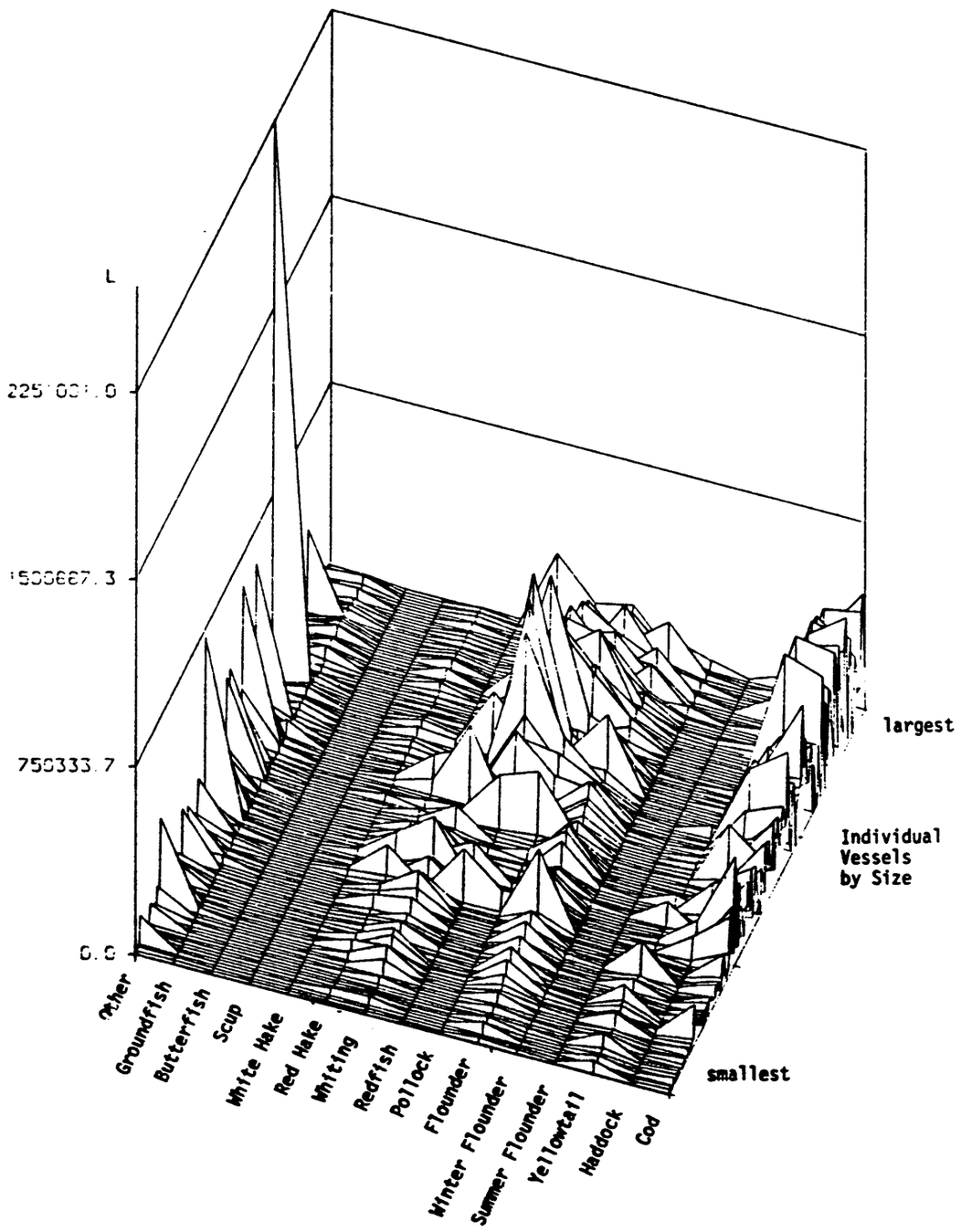


Source: NMFS/NEFC Commercial Fishery Data Base

Figure 3A13

GRAPH OF OTTER TRAWL VESSEL LANDINGS 1979

PORT=GLOUCESTER



Source: NMFS/NEFC Commercial Fishery Data Base

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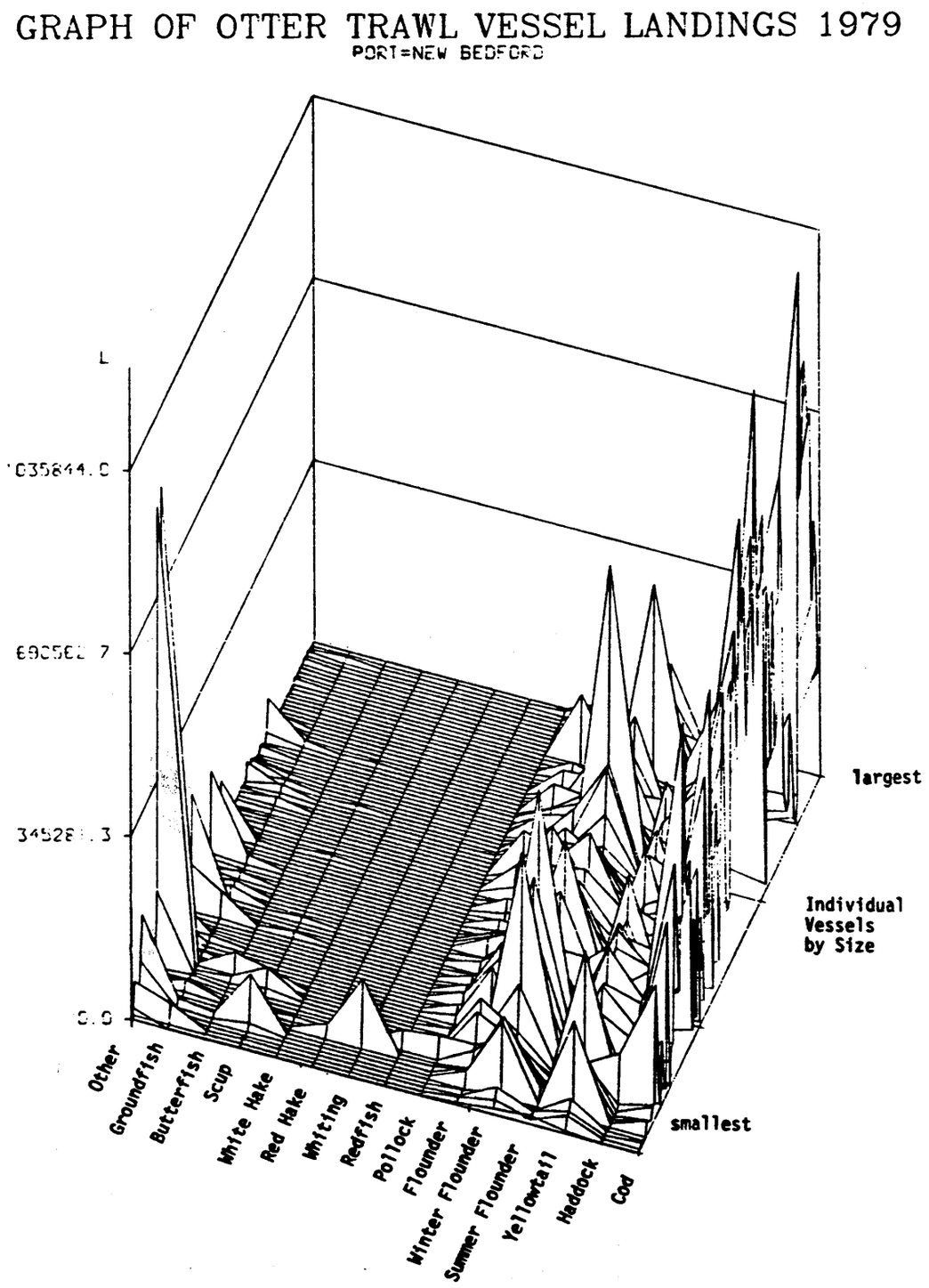
Figure 3A14



Source: NMFS/NEFC Commercial Fishery Data Base

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The category including all species other than those listed on Figures 3A12, 3A13, 3A14 and Appendix 3A.2 (leftmost column) is an important component of otter trawl landings. This component consists mostly of squid, shrimp, herring, mackerel and menhaden, but even sea scallops and lobster, depending on the port of landings. Otter trawls may direct effort towards species such as squid, shrimp and herring by using various mesh sizes and trawl configurations, whereas landings of sea scallops and lobster are most likely by-catches on flounder trips. Additionally, sea scallop dredges land groundfish by-catches (see §3B2 for landings by gear). Finally, dogfish landings but not discarded dogfish catches are included in the Other category, and large amounts of the latter may influence the application of effort on groundfish.

Switching among species fisheries can occur not only seasonally, but across the years as well. A series of graphs showing groundfish landings by port from 1973 through 1982 may be found in Appendix 3A.3. These graphs illustrate the same species fishery composition for major ports with trip and vessel graphs for 1973-1976-1979-1982 above. Therefore, port by port species landings during 1980-1983 will be highlighted. In Maine, Washington, Hancock and Knox counties have each landed around one and two million pounds of groundfish a year recently, with cod, flounder (other than yellowtail, summer flounder and winter flounder), pollock and white hake composing 90% of the catch. Rockland has continued its replacement of declining redfish landings with cod, haddock, other flounder, pollock and white hake, increasing total groundfish landings to 22 million pounds in 1982. Landings have concentrated in Lincoln, Sagadahoc and Cumberland counties recently to the point where more than 50% of the 2 to 4 million pounds landed in each are other flounder. Portland landings have continued to increase to 36 million pounds in 1982 while switching away from redfish; cod, haddock, other flounder and pollock landings are all higher than redfish now. York county landings of groundfish dropped precipitously from 11.4 to 3.5 million pounds from 1978 to 1982, half of that loss was pollock, but they still consist mostly of cod, other flounder, pollock and white hake. New Hampshire landings in 1981-1982 ranged from 5 to 6 million pounds and were composed mainly of cod, haddock, other flounder and pollock.

The port of Gloucester has maintained landings at the 90 million pound level, relying on cod, haddock, other flounder and pollock while the redfish and silver hake fisheries have remained at low levels. Boston has fallen to the 26 million pound range for the first time since 1978, with almost 50% of landings being cod in 1982, and another 33% composed of haddock and pollock. Plymouth, Scituate, Sandwich and Provincetown continue as cod and flounder (everything except summer flounder) ports, landing nearly 30 million pounds among them. Provincetown also lands over a million pounds of silver hake. In 1982, Chatham landed 22 million pounds of groundfish and almost 80% of it was cod, which has been typical for this port. The rest of Cape Cod, landing over one million pounds, depends on cod, winter flounder and scup. Squid had also been an important species but dropped by an order of magnitude to 17 thousand pounds. Martha's Vineyard landed 5.5 million pounds of groundfish in 1982, almost 80% of that was cod and winter flounder. In New Bedford, groundfish landings were nearly 80 million pounds, just short of a ten-year-high of 83 million in 1980. Substantial increases in both cod and yellowtail led the recovery from a poor 1981; winter flounder remained steady but haddock continued to fall.

Newport landings have hovered around 20 million pounds during 1980-1982, with yellowtail and winter flounder as the most important species, followed by scup and butterfish and cod. Point Judith has continued to increase its groundfish landings, up to 47 million pounds in 1982, on the strength of silver hake, butterfish and yellowtail, with winter flounder, scup and squid remaining important. Connecticut landings during 1980-1982 (from the Connecticut Department of Environmental Protection) ranged from 1.5 to 3.9 million pounds and consisted primarily of yellowtail and winter flounders. Recent landings in New York, at about 16-18 million pounds, have been somewhat similar to Point Judith with yellowtail, silver hake and scup accounting for more than half, but as much summer flounder being landed as winter flounder and squid replacing butterfish in importance. Once down to New Jersey, with recent annual groundfish landings of 23-25 million pounds, southern species such as summer flounder and scup, but also silver hake and squid, predominate. Summer flounder, scup and squid have accounted for 90% of the 7-10 million pounds of groundfish in Virginia and Maryland.

§3A3 Substitution of Species in Markets

Substitution among groundfish at the various market levels takes place within two major groups of species; roundfish such as cod and pollock, and flatfish or flounders. Across these groups substitution may or may not occur within certain product types (e.g., whole vs. fillets, fresh vs. frozen). A description of species substitution in the marketplace may be found in §3C2 Product Type by Species.

SUBPART B: THE HARVESTING SECTOR

§381 History of Exploitation

Of the groundfish species, fishing for cod has the longest history. The fishery around New England was conducted with handlines from the early 17th century through the late 19th century. Trawl lines and dory fishing were introduced to the fishery about 1850, and by 1879 the harvest had reached about 91.9 million pounds. Annual landings during the first half of the 20th century were erratic, averaged about 33 million pounds per year and exhibited a general declining trend during the 1950's.

Beginning around 1950 there were numerous technological advances in vessels and gear employed in the cod fishery by U.S. fishermen. A substantial number of distant-water foreign vessels also started fishing in the western North Atlantic during the 1960's. Domestic and foreign landings of cod from the Gulf of Maine and Georges Bank and South increased to more than 150 million pounds in 1966 and subsequently declined to about 100 million pounds average from 1970 through 1984.

The haddock fishery began during the mid-1880's with most of the landings directed to the fresh fish market near the major New England ports. Annual landings prior to 1921 averaged about 68.3 million pounds; but subsequent improvements in refrigeration, markets and fishing methods increased the importance of this species. Domestic landings peaked in 1929 at over 289 million pounds.

The haddock fishery was fairly stable from 1935 to 1960, with average total landings of about 114.6 million pounds. Sharp increases in abundance in the early 1960's attracted substantially increased foreign and domestic fishing effort, which resulted in a brief period of very high landings. Total haddock catches peaked in 1965 at 341 million pounds and then rapidly declined. With sharply reduced stock abundance during the early 1970's, catches reached a low of only 11.2 million pounds in 1974. Landings then quintupled to 55 million pounds during 1980-1981, but have steadily declined to 26 million pounds in 1984.

Yellowtail flounder were relatively unexploited prior to 1935, but concurrent with a decline in the abundance of winter flounder, the Southern New England yellowtail fishery developed rapidly. This fishery has exhibited two apparent cycles, with peaks in the 1940's and 1960's of about 77 million pounds, and low catches during the 1950's and 1970's of only about 4.4 to 6.6 million pounds. The Georges Bank fishery developed more slowly and large catches were not made prior to 1961. This fishery expanded rapidly during the 1960's, peaking at over 46 million pounds in 1970 and subsequently declining through the late 1970's. The catch from the Cape Cod grounds has been consistently low and fairly stable since 1935 at about 4.4 to 6.6 million pounds. Total yellowtail landings had increased to over 72 million pounds in 1983, but fell to 39 million pounds in 1984.

Commercial landings of summer flounder have varied widely in the past. In 1964, U.S. commercial fishermen landed over 11 million pounds of summer flounder. Annual landings decreased to a low of approximately six million pounds in 1969, but have generally increased since then to over 40 million pounds in 1984.

Winter flounder (blackback) were of little economic importance until about 1910. The small market demand before then was satisfied by catches with traps or small beam trawls. Increasing demand led to the introduction of the European otter trawl around 1915, and the yearly commercial catch rose to 15.4 million pounds soon thereafter, at which time this species was the principal flounder landed. Catches continued to rise to about 51 million pounds in 1930. After 1930, the commercial catch dropped considerably, but currently runs about 32 to 39 million pounds annually. Substantial foreign catches of winter flounder peaked at 15.2 million pounds in 1969, but have declined to insignificant levels since 1977.

Historic landings of American plaice from the 1940's through the 1960's were variable from less than 4.4 to over 11 million pounds as landings of winter and yellowtail flounder waxed and waned. American plaice catch has averaged 8 million pounds per year from 1965 to 1977, with the U.S. landing 85% of that catch. The 1977 U.S. catch of 15.6 million pounds was 2.3 times this 13 year average, possibly reflecting greater demand for this species as a result of declining yellowtail, because foreign catch did not increase proportionately. Since 1977, domestic landings continually increased to 33.5 million pounds in 1982, but dropped to 23 million pounds in 1984.

The reported U.S. commercial catch of witch flounder (gray sole) in 1937-1977 has ranged from a low of 2.6 million pounds in 1961 to a high of 11 million in 1937. The last year when foreign catch of witch flounder was of any consequence was in 1975 when it reached half a million pounds. U.S. landings then rose continually and reached a new peak of 14.6 million pounds in 1984.

The commercial fishery for sand dabs (windowpane), a small, thin bodied flounder began because of the food shortage during World War II. Most of the fish were landed by Connecticut and New York vessels; New York landings reached about 0.4 million pounds in 1944 and 1945 but, after the war, demand dropped and the fishery stopped. Fishermen began landing sand dabs again in 1975, mostly at New Bedford and possibly due, in part, to a declining yellowtail fishery. Total landings did reach nearly 5 million pounds in 1976, had declined to 2.4 million in 1982, and have rebounded to 4 million pounds in 1984.

The pollock fishery has been largely incidental in nature, because there has never been a fishery of any prominence directed specifically toward pollock as there has been for cod, haddock and redfish. Significant past events affecting the cod fishery in general have also had an impact on the harvesting of pollock. During the early 1900's, a rapid increase in landings of pollock may be attributed to the introduction of the otter trawl in 1905. Increases in catch during the 1920's are not too evident, since they were probably dampened by World War I and the Depression. Sharp increases in U.S. landings occurred from 1930 to 1935, followed by a period of fluctuation from 1935 to 1960 reflecting World War II, and finally subsequent declines and upswings due to changes in pollock abundance and the availability of other primary species. Domestic landings have generally risen since 1970 to a historic high of 39.7 million pounds in 1981, declining to 31 to 32 million in 1983, and back up to 39.5 million pounds in 1984.

The fishery for redfish literally rose out of non-existence in the early 1930's; prior to this, the minimal quantities landed in no way competed with cod and haddock. In the mid-1930's, a new quick-freezing process was developed and the species was marketed as "ocean perch" in the Midwest and South where the taste of yellow perch was familiar. Thus, redfish landings in New England jumped from an average of 209,000 pounds in the period 1931-1933 to 17 million pounds in 1935. The peak year for landings from all areas was 1951 when over 258 million pounds were landed. Since then, U.S. landings from all areas have generally declined with less than 19 million pounds landed in 1982, 13.3 million pounds in 1983, and 12.3 million pounds in 1984.

Silver hake were of little commercial importance prior to the early 1920's because they spoiled easily and there were more valuable species available. Some were caught incidentally to catches of more important species and a small amount was sold as food or bait. Beginning in the early 1920's, a market developed for fried fish sticks and silver hake became a target species for that product. The demand for silver hake as a food fish increased in the 1930's and an otter trawl fishery, mostly of vessels less than 50 gross tons, developed in the U.S. at that time and has persisted to the present.

Total landings of silver hake increased steadily from 1931 (10.8 million pounds) to 1955 (145 million pounds). During the period 1956 to 1961, the total U.S. catch of silver hake averaged about 134.5 million pounds. Beginning in 1962, the distant water fleets of the foreign fisheries, principally the Soviet Union, began to heavily exploit the stocks of silver hake offshore on Georges Bank and in the Southern New England/Mid-Atlantic shelf waters. The foreign catches, when combined with those of the U.S., increased the total catch dramatically, to a peak of almost 882 million pounds in 1965. Thereafter, the total catch declined to an average of about 255 million pounds per year between 1973 and 1976. In 1978, foreign catch was reduced to a quarter of the previous year under the FCMA and has generally declined since then, amounting to only 2 million pounds in 1982. Domestic landings fell 31% in 1979 and remained steady; 36.6 million pounds were landed in 1982, 46.2 million in 1984.

White hake has for decades been an important food fish along the eastern Maine coast. While the white hake fishery far to the east might at times be characterized as a "directed fishery", as indeed it has been for some fishermen from Maine, those markets around Boston and farther south were supplied by hake taken as a by-catch of the cod or haddock or possibly the flounder fishery. White hake catches, mostly domestic, have generally been increasing in recent years to 14.9 million pounds in 1984.

Most red hake have been devoted to industrial purposes, landed usually with silver hake; although, some commercial landings and recreational landings south of New York use red hake for food. Industrial fisheries for red hake were established at Gloucester, Point Judith and New Bedford. After peak landings in the late 1950's, development of the Peruvian anchovy fishery depressed red hake prices and landings dropped precipitously by 1962. Then, in 1963, the Soviet fleet initiated a directed fishery for red hake, capitalizing on the dense concentrations found on southwest Georges. Foreign catches, in the majority until an 80% drop in 1977, have declined to almost nothing in 1982. Domestic landings, fluctuating annually since 1974, have dropped to less than 5 million pounds in 1982, 1983 and 1984.

Butterfish probably have contributed significantly to U.S. commercial fisheries only since the early 20th century. Landings of this species from the New York Bight area peaked in the late 1930's to early 1940's, when landings of food finfish in this region were at their maximum during recent history. The average U.S. catch of butterfish from 1964-1977 was 4.2 million pounds. A significant but unknown amount is taken by industrial fisheries, especially in southern states. The development of the butterfish export industry in 1978 has resulted in a sharp increase in domestic landings, an increased importance of the fishery in Rhode Island, and a larger proportion of the domestic catch being taken in the FCZ. Foreign landings of butterfish were first reported in 1963, and the foreign fishery for this species, which is dominated by the Japanese, soon outgrew the U.S. commercial fishery. Much of the Japanese catch of butterfish is taken in conjunction with the Loligo squid fishery. Foreign landings dropped in 1977 to about 30% of the previous year, and continued to decline to just under one million pounds in 1982. Meanwhile, domestic landings increased overall to 19 million pounds in 1982, fell to 9.8 million pounds in 1983, and rose to 26 million pounds in 1984.

Scup has greatly contributed to the commercial and sport fisheries of Southern New England and the Mid-Atlantic. Commercial scup landings from the region have declined steadily from 50 million pounds in 1960 to 16 million in 1976. Overall, scup landings have recently stabilized and stand at 17.7 million pounds in 1984.

The squid fishery of the northwest Atlantic off the United States was, until the mid-1960's, a small, relatively insignificant bait fishery pursued only by domestic fishermen, and landings never totaled more than a few million pounds. Exploitation of the squid resource in Statistical Areas 5 & 6 increased when foreign fishing began in 1964 when USSR trawlers reported small incidental catches. When Japan and Spain entered the fishery in 1967 and 1970, respectively, catches increased more rapidly with a reported 1971 total catch of 49 million pounds, ten times that caught by the U.S. alone in 1963 (the last year of sole domestic harvest). During 1972, trawlers from eleven countries operating in the fishery harvested 107.4 million pounds, a 119% increase over 1971. The U.S. was ranked sixth that year among the eleven nations harvesting squid. Total catch for both Loligo and Illex combined peaked in 1973 at 125 million pounds and then gradually declined during the next three years to 103.6 million pounds harvested in 1976. Since implementation of the FCMA in 1977, foreign catch has generally declined and was at 17.4 million pounds in 1982, whereas domestic catches have been erratic but reached 35 million pounds in 1982 (including joint ventures).

As alluded to in the descriptions of species exploitation above, foreign catches have been effectively reduced since the FCMA in 1977. By 1979, total foreign catches were down to 20-25% of their 1976 levels. A comparison of U.S. and foreign catch by fishing area and from 1975 to 1982 has been presented in Section 2A1. In 1982, the largest foreign landings of groundfish species from the FCZ were of cod, haddock and pollock, mostly by Canada.

§3B2 Gear and Vessels in the Fishery

Much of the discussion in Subpart A revolved around the groundfish gears: otter trawls, line trawls and gillnets. Table 3B1 presents the latest information available to illustrate that New England groundfish are, in fact, mostly caught by these three gears. The otter trawl is overall the most important groundfish gear type, catching more than 95% of haddock, (all) flounders, silver hake, redfish and butterfish, as well as almost 85% of cod. Gillnets and line trawls are important as groundfish gears because of the amounts of cod, and especially for gillnets, hakes and pollock caught. For all other gears combined, the only important groundfish species landed is scup, mostly by fish traps. Four percent of summer flounder landed by other gear in 1982 is by purse seines; one percent of yellowtail and winter flounder, by scallop dredges and Danish seines.

The number of otter trawl vessels in New England averaged 582 from 1970 to 1976. With the advent of the FCMA this number began to rise, especially during 1979 (Figure 3B1), and stood at 986 otter trawls in 1983. This is an average increase of 10% per year. Separately 44% of the total 302 vessels added to the fleet by 1981 were new, and 169 were existing vessels which either switched gear, moved to New England, or were newly acquired used vessels.

§3B3 Landings and Revenues

The most recent landings and values of groundfish and other managed species are shown in Table 3B2 (from Fisheries of the United States, 1984). Cod is the most valuable of the groundfish species and is an important segment of the total value in nearly every New England port. Of the groundfish, the flounders and haddock are also quite valuable, albeit more so for particular ports. For instance, haddock is very important in the northern ports such as Portland, Gloucester and Boston, although New Bedford relies on haddock revenues as well. Alternatively, the flounder group is more important to the southern ports (i.e., the south shore of Massachusetts and Cape Cod, New Bedford, Newport and south). Scup and swordfish are valuable alternatives, but more to the south. In New England, sea scallops have again fallen behind lobsters in 1984 as the most valuable fishery in the region.

Looking again at the most prolific groundfish gear, otter trawls, we observe that total value has until recently been increasing (Figure 3B2). The total deflated value of New England otter trawl landings has only managed to hold its own during this period (solid line). Given the increasing numbers of otter trawls shown in Figure 3B1, one might expect that deflated value per otter trawl has fallen. In fact, even undeflated value fell during 1979-1980 (Figure 3B3), and deflated value remained flat in 1981-1983. Indices of deflated gross value per otter trawl by GRT class found in Figure 3B4 indicate that the decline has hit all vessel sizes. Thus, potential financial problems for the fleet exist, but an analysis of net returns is required to better ascertain the status of the fleet and is examined in Section 3B4.

Table 381

RELATIVE IMPORTANCE OF INDIVIDUAL GEAR TYPES IN HARVESTING INDIVIDUAL DEMERSAL FINFISH SPECIES (Various years)

	Percent of Total New England Landings Taken By:															
	Otter Trawl (%)				Gillnet (%)				Line Trawl (%)				Other (%)			
	1970	1977	1979	1982	1970	1977	1979	1982	1970	1977	1979	1982	1970	1977	1979	1982
Cod	84.3	86.0	81.5	84.0	4.1	8.9	8.8	13.0	9.3	4.4	7.1	1.0	2.3	0.7	2.5	1.0
Haddock	94.1	94.4	96.4	97.0	0.6	4.3	3.3	2.0	5.0	1.1	0.2	0	---	0.2	0.1	0
Yellowtail Flounder	99.9	99.2	95.8	99.0	0.1	0	0	0	---	0	0	0	---	0.8	4.2	1.0
Fluke	100.0	98.7	98.3	93.0	---	---	0	0	---	0	0	---	0	1.2	1.7	6.0
Other Flounders	99.8	99.2	98.8	98.0	0.1	0.6	0.3	1.0	---	0.1	0	0	0	0.4	1.0	1.0
Whiting	100.0	99.6	99.6	100.0	---	0.4	0.2	0	---	0	0	0	---	0	0.2	0
Red & White Hake	84.8	60.1	71.2	70.0	5.2	33.8	25.3	29.0	10.0	6.1	3.1	1.0	---	0	0.3	0
Pollock	89.6	60.9	52.6	69.0	7.2	37.0	42.8	31.0	1.7	2.1	3.8	0	1.5	0	0.8	0
Ocean Perch	100.0	99.8	99.8	99.0	---	0.2	0.2	0	---	0	0	0	0	0	0	0
Scup	92.1	89.3	62.2	51.0	---	---	0	0	---	0	0.7	---	8.9	10.7	37.1	49.0
Butterfish	99.1	97.9	97.4	99.0	---	---	---	0	---	---	0.1	---	0.9	2.1	2.5	1.0

Source: NMFS weigh-out files

0 = less than .05 of a percentage

Figure 3B1

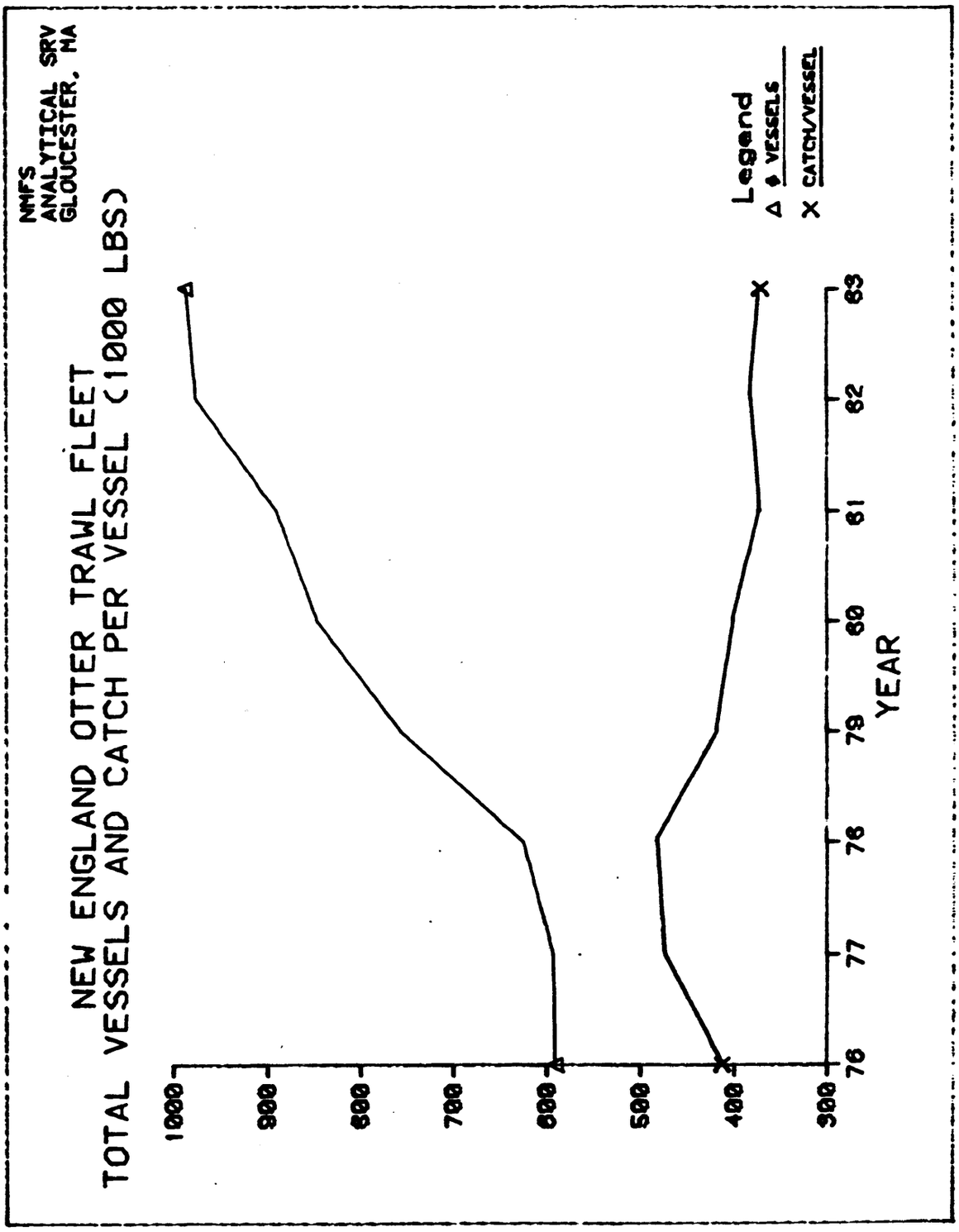
NMFS
ANALYTICAL SRV
GLOUCESTER, MA
NEW ENGLAND OTTER TRAWL FLEET
TOTAL VESSELS AND CATCH PER VESSEL (1000 LBS)
Legend
Δ # VESSELS
X CATCH/VESSEL
1000
900
800
700
600
500
400
300
76
77
78
79
80
81
82
83
YEAR

Table 3B2

U.S. COMMERCIAL LANDINGS, BY SPECIES, 1983 AND 1984 (1)

Species	1983		1984		5-year average (1979-1983)
Fish	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars	Thousand pounds
Bluefish	16,718	2,576	12,713	2,382	15,719
Butterfish	10,601	3,310	26,026	7,056	10,745
Cod	112,474	37,928	96,775	36,143	106,994
Cusk	4,277	980	3,939	1,026	4,119
Flounders:					
Blackback	32,989	15,795	31,362	20,948	33,428
Fluke	35,276	22,940	40,204	27,635	30,223
Yellowtail	72,903	35,307	39,292	28,258	46,569
Other	46,002	23,973	43,824	29,220	45,540
Haddock	32,563	18,969	25,997	18,352	45,958
Hake:					
Red	4,767	578	5,024	549	5,523
White	14,140	2,235	14,919	2,551	11,870
Mackerel	6,418	1,337	6,835	1,018	6,019
Ocean Perch	13,289	3,498	12,333	3,550	21,787
Pollock	30,820	5,386	39,536	6,439	34,940
Scup	18,783	8,744	18,505	8,775	20,308
Sea Trout (Gray)	17,543	7,759	19,726	7,541	25,765
Striped Bass	1,679	2,984	2,697	3,816	3,148
Swordfish	11,940	31,883	12,831	37,063	9,599
Whiting	37,498	6,962	46,214	6,867	36,081
Ocean Quahog	35,232	10,753	38,812	11,829	34,937
Surf Clams	55,938	24,914	70,243	34,334	44,881
Lobster	44,206	106,766	43,967	114,348	39,056
Sea Scallops	20,478	111,529	18,427	97,675	26,460
Squid	33,459	10,053	30,948	7,157	16,120

(1) Landings are reported in round (live) weight for all items except univalve and bivalve mollusks, such as clams, oysters, and scallops, which are reported in weight of meats (excluding the shell).

Figure 3B2

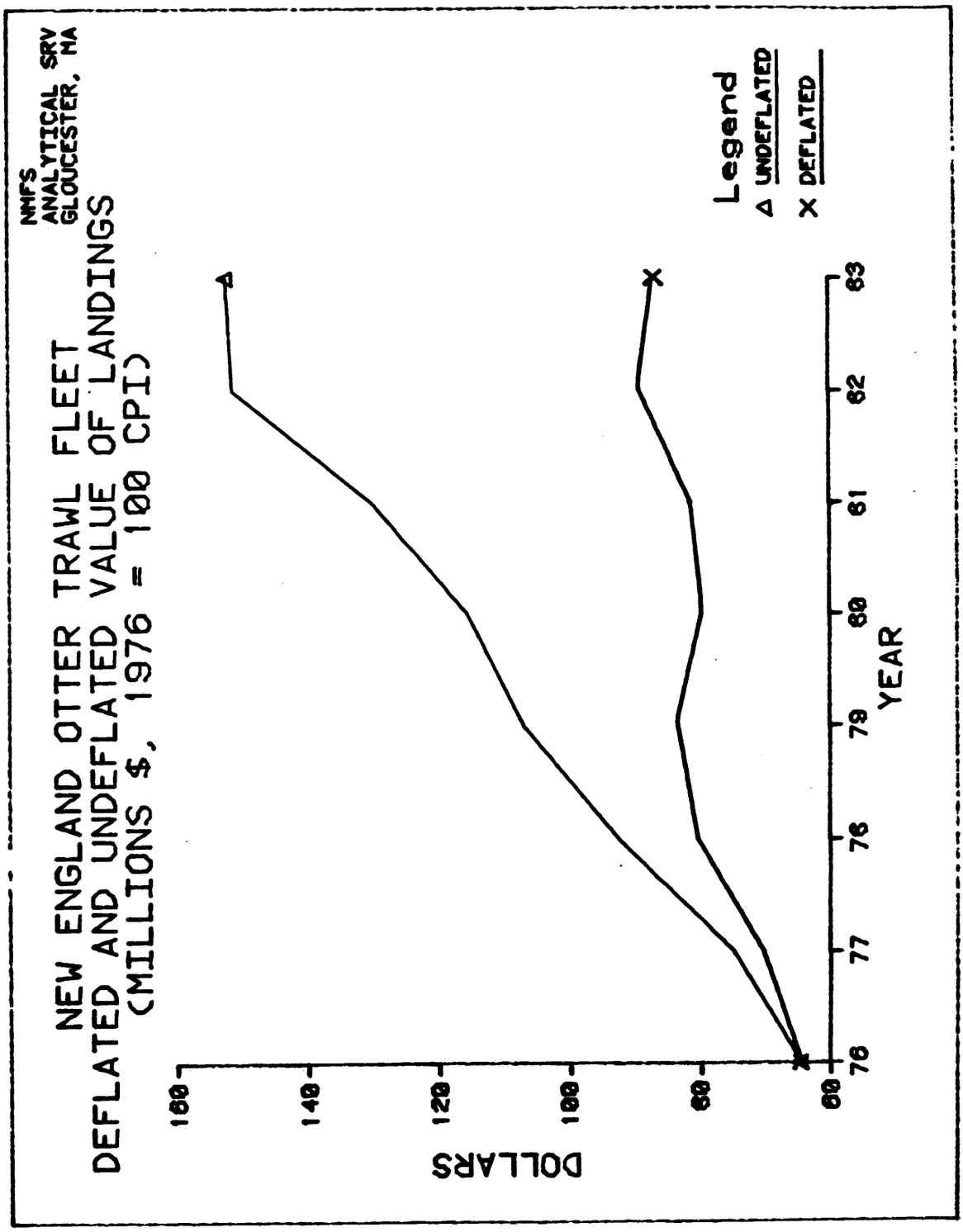
NMFS
ANALYTICAL SRV
GLOUCESTER, MA
NEW ENGLAND OTTER TRAWL FLEET
DEFLATED AND UNDEFLATED VALUE OF LANDINGS
(MILLIONS $, 1976 = 100 CPI)
Legend
Δ UNDEFLATED
X DEFLATED
DOLLARS
YEAR
160
140
120
100
80
60
76
77
78
79
80
81
82
83

Figure 3B3

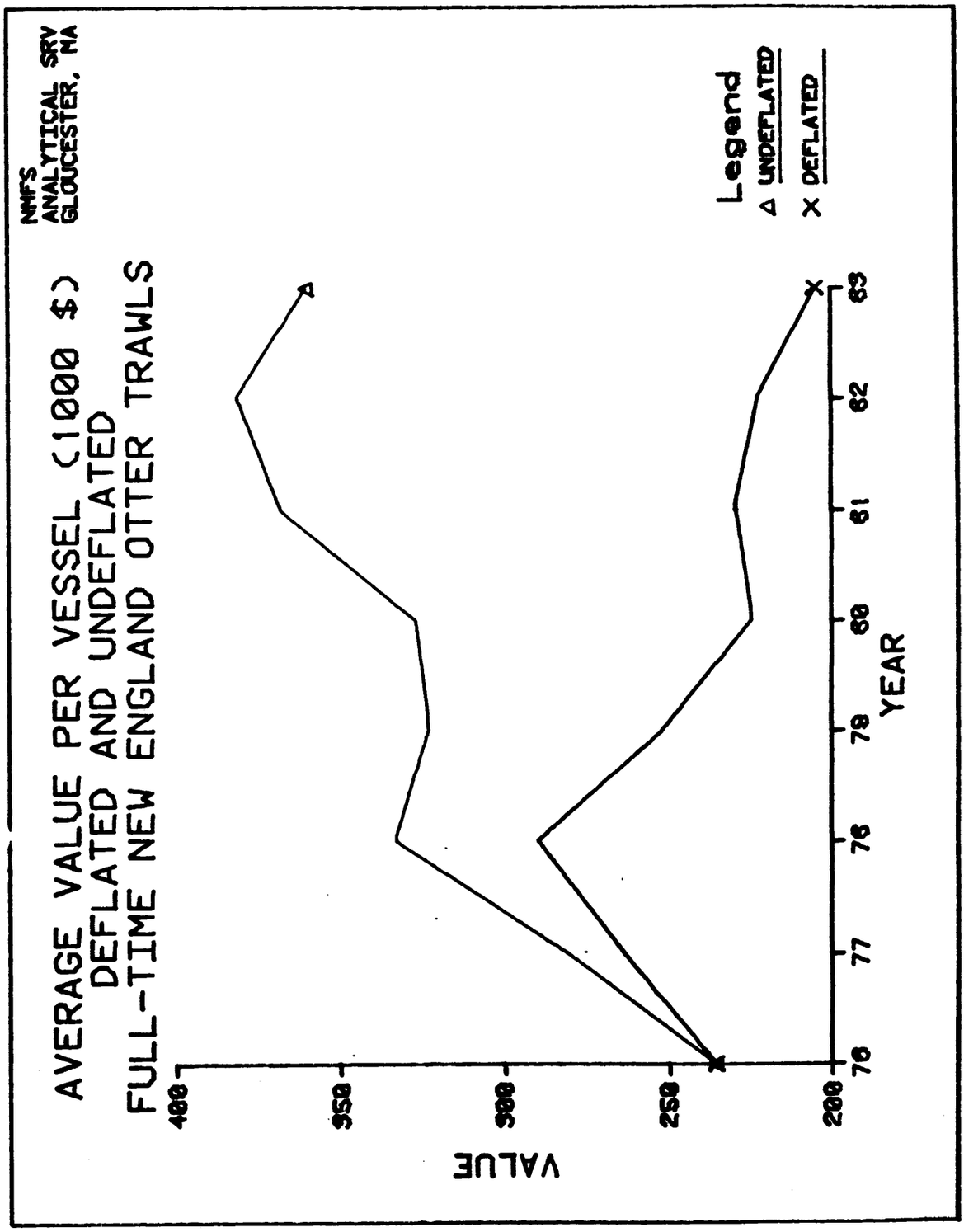

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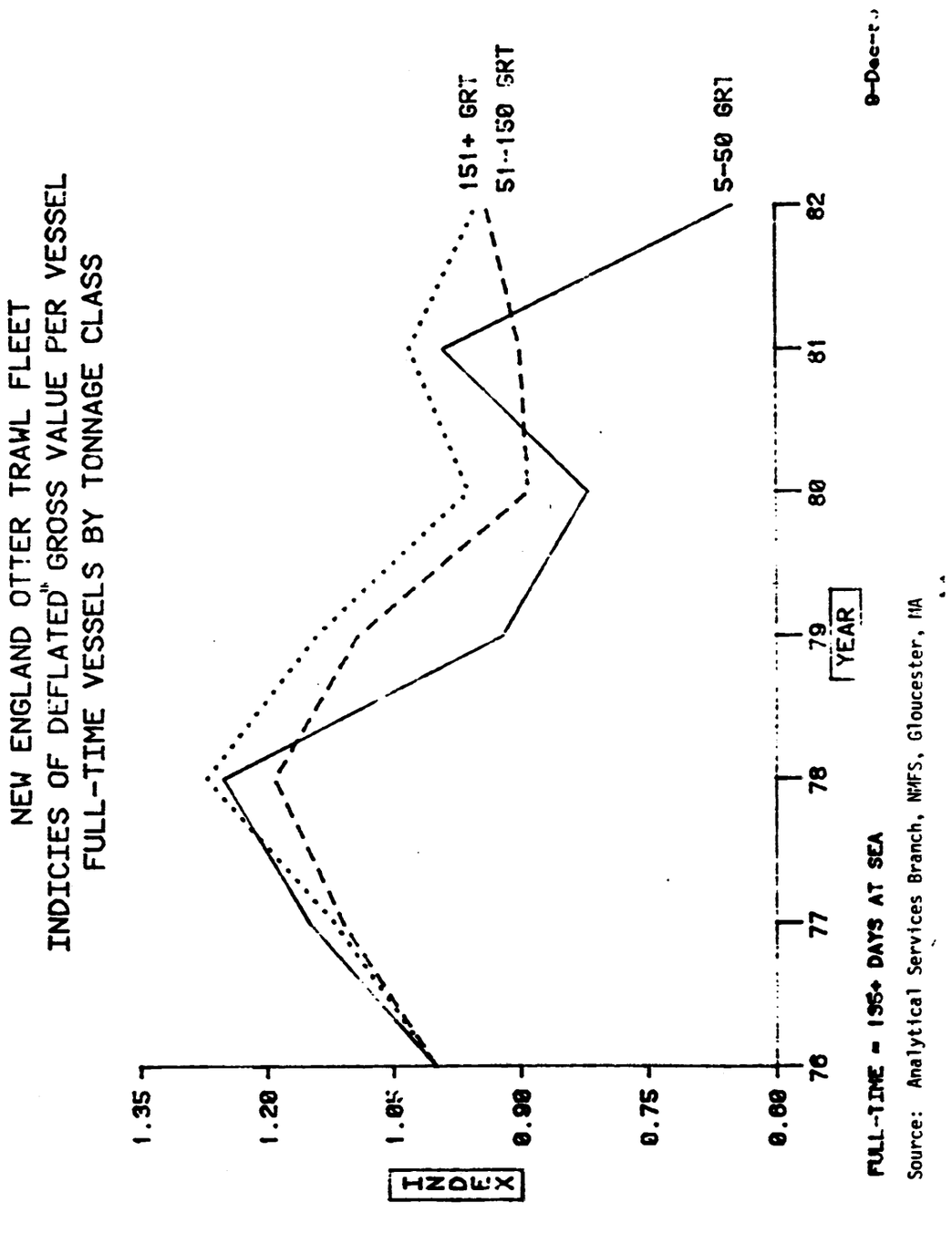
Figure 3B4

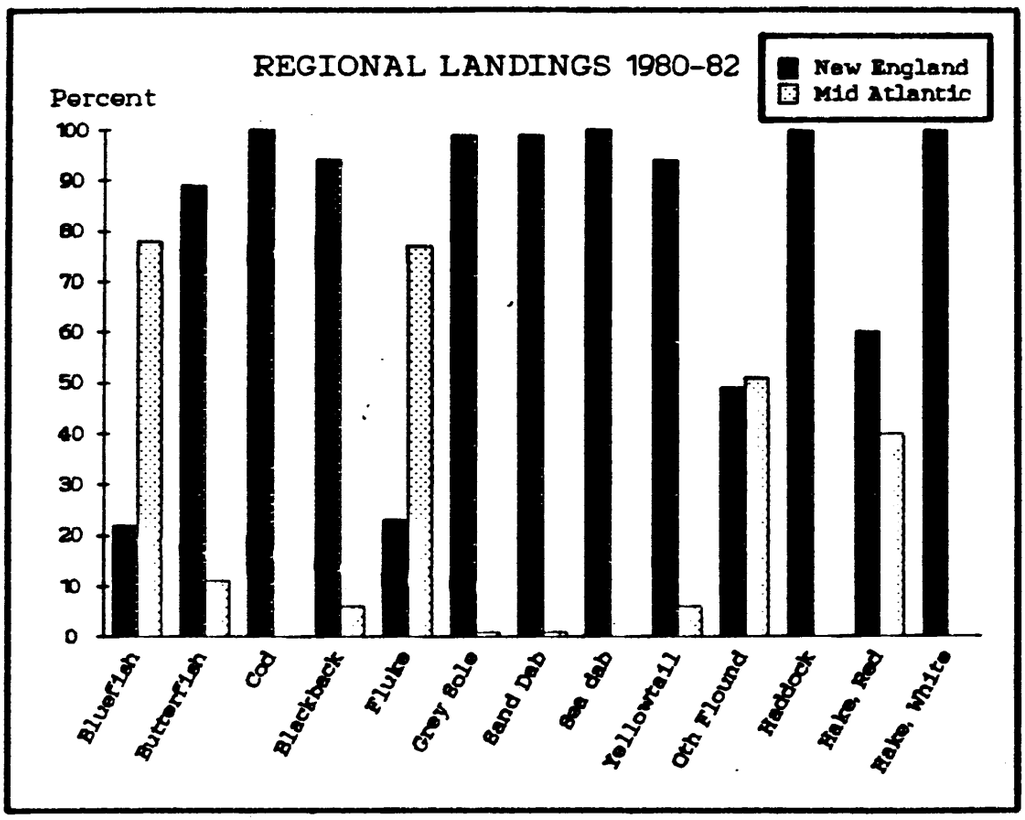

NEW ENGLAND OTTER TRAWL FLEET
INDICIES OF DEFLATED GROSS VALUE PER VESSEL
FULL-TIME VESSELS BY TONNAGE CLASS
151+ GRT
51-150 GRT
5-50 GRT
INDEX
1.35
1.20
0.90
0.75
0.60
76
77
78
79
80
81
82
YEAR
FULL-TIME = 195+ DAYS AT SEA
Source: Analytical Services Branch, NMFS, Gloucester, MA

Comparative landings between New England (except Connecticut) and the Mid-Atlantic (New York, New Jersey, Maryland and Virginia) from 1980 to 1982 may be found in Figure 3B5 (from State Landings, Maine to Virginia) and for 1984 in Table 3B3 (from state landings Maine to North Carolina). In terms of percent of total landings of groundfish species from Maine to Virginia, the New England region produces an overwhelming majority of butterfish, cod, winter flounder, witch flounder, sand dabs, American plaice (sea dabs), yellowtail, haddock, white hake, redfish (ocean perch) and pollock (dark bars). Additionally, New England produces the majority of red and silver hake. The Mid-Atlantic region dominates the fishery for summer flounder and produces the majority of scup and, as a group, squid. Table 3B4 shows regional dependence on species for 1984. The major fishery in each region as percent of value is sea scallops (26%) and lobster (30%) in the Mid-Atlantic and New England respectively; the major groundfish fishery is summer flounder (fluke) at 17% in the Mid-Atlantic and cod (10%) in New England.

Landing seasonality is discussed for the major ports in Sections 3A1 and 3A2 for the years 1973, 1976, 1979 and 1982. Graphs of average monthly landings during the period 1980-1983 are included in Appendix 3B. Washington, Hancock and Knox counties in Maine show marked seasonality, with their landings of cod, other flounder, pollock and white hake coming mostly around the summer months. Rockland seems to show higher landings of haddock and white hake later in the year, while other flounder is caught year-round, and redfish, the primary species, slows down somewhat during winter. Lincoln, Sagadahoc and Cumberland counties display summer seasonality, especially for the primary species other flounder, while cod is early in the summer and white hake is later in the summer. Silver hake landings in Sagadahoc peak in the early fall. Portland lands high levels of redfish all year but especially in the summer. Both Portland and York counties land similar species, but illustrate the difference between a large and small port. Both port areas land cod and haddock in early summer and white hake late in summer, but York county landings of other flounder peak in summer while those in Portland are high nearly year-round. Pollock landings in both ports peak in November and December. New Hampshire landings show similar patterns; cod and other flounder in summer, pollock in winter.

Cod and haddock landings in Gloucester peak during May-June and August-September, respectively. Other flounder is fairly constant, and pollock peaks in November and December. Redfish appear in summer, and silver hake appear in the fall. Cod and haddock are heavy all during the summer (May-September) in Boston. Lower levels of redfish peak in summer, and pollock is constant with some increase in winter. The ports surrounding Cape Cod Bay follow a seasonal pattern in the summer, landing cod and all flounders except summer flounder, but extending more towards the end of the year than seen in Maine, especially for yellowtail and winter flounder. In addition, Provincetown lands silver hake and pollock in the fall and winter, respectively. Chatham cod landings peak in summer, May to August. Barnstable and Dukes Counties' landings are mainly in the summer, consisting of winter flounder, scup and squid with a second peak of winter flounder in the fall. Dukes County also lands cod and yellowtail during two seasons, early spring and fall. Cod and yellowtail landings in New Bedford are heavy all year, although yellowtail is stronger during the second half of the year. Conversely, haddock landings are higher in the first half of the year. Winter flounder demonstrates the now familiar spring and fall seasons.

Figure 3B5


REGIONAL LANDINGS 1980-82
New England
Mid Atlantic
Percent
100
90
80
70
60
50
40
30
20
10
0
Bluefish
Butterfish
Cod
Blackback
Flukе
Grey Sole
Sand Dab
Sea dab
Yellowtail
Oth Flound
Haddock
Hake, Red
Hake, White

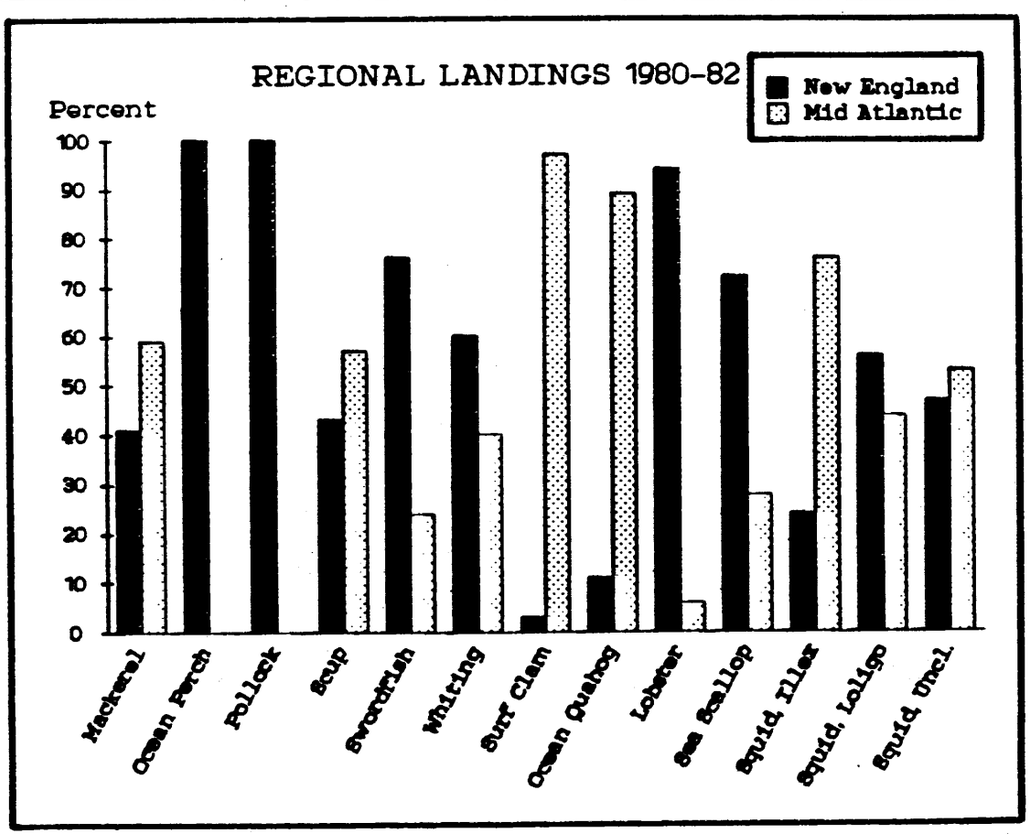

REGIONAL LANDINGS 1980-82
New England
Mid Atlantic
Percent
100
90
80
70
60
50
40
30
20
10
0
Mackerel
Ocean Perch
Pollock
Scup
Swordfish
Whiting
Surf Clam
Ocean Quahog
Lobster
Sea Scallop
Squid, illex
Squid, Loligo
Squid, Unc.

Table 3B3

REGIONAL LANDINGS & REVENUES (thousands) FOR 1984

Species	MID-ATLANTIC 1000lbs.	%	NEW ENGLAND 1000lbs.	%	TOTAL 1000lbs.	%
Bluefish	8362	80	2140	20	10502	100
Butterfish	2004	8	24021	92	26025	100
Cod	917	1	95858	99	96775	100
FLounder-Oth.	7	1	492	99	499	100
Fl-Blackback	1595	5	30892	95	32487	100
Fl-Fluke	33656	85	6094	15	39750	100
Fl-Gray Sole	141	1	14505	99	14646	100
Fl-Plaice	15	0	22536	100	22551	100
Fl-Windowpane	88	2	3947	98	4035	100
Fl-Yellowtail	3106	8	35941	92	39047	100
Haddock	5	0	25992	100	25997	100
Hake, Red	1324	26	3700	74	5024	100
Hake, White	16	0	14903	100	14919	100
Herring	41	0	72040	100	72081	100
Mackerel	3646	53	3189	47	6835	100
Ocean Perch	0	0	12333	100	12333	100
Pollock	16	0	39487	100	39503	100
Scup	9933	56	7724	44	17657	100
Swordfish	1881	42	2594	58	4475	100
Whiting	13235	29	32979	71	46214	100
Ocean Quahog	35564	92	3248	8	38812	100
Surf Clam	62368	89	7875	11	70243	100
Lobster	2460	6	41507	94	43967	100
Sea Scallop	6067	35	11100	65	17167	100
Squid, Illex	7044	96	265	4	7309	100
Squid, Loligo	10842	46	12549	54	23391	100
Squid, Uncl.	48	33	96	67	144	100

Table 3B4

REGIONAL LANDINGS & REVENUES (thousands) FOR 1984

Species	MID-ATLANTIC $1000	%	NEW ENGLAND $1000	%
Bluefish	1575	1	422	0
Butterfish	701	1	6355	2
Cod	565	0	35578	10
FLounder-Oth.	3	0	97	0
Fl-Blackback	753	1	21342	6
Fl-Fluke	21054	17	6297	2
Fl-Gray Sole	61	0	10988	3
Fl-Plaice	5	0	14919	4
Fl-Windowpane	22	0	1359	0
Fl-Yellowtail	1893	1	26265	7
Haddock	2	0	18350	5
Hake, Red	194	0	355	0
Hake, White	5	0	2546	1
Herring	6	0	3620	1
Mackerel	413	0	605	0
Ocean Perch	0	0	3550	1
Pollock	3	0	6432	2
Scup	4976	4	3167	1
Swordfish	6297	5	7716	2
Whiting	2630	2	4237	1
Ocean Quahog	10677	8	1152	0
Surf Clam	30733	24	3601	1
Lobster	7374	6	106974	30
Sea Scallop	32377	26	62478	18
Squid, Illex	775	1	55	0
Squid, Loligo	3129	2	3127	1
Squid, Uncl.	11	0	25	0
TOTAL	126234	100	351612	100

Newport landings of cod, yellowtail and winter flounder are fairly continuous throughout the year with some typical small peaks (yellowtail in July-August). However, other species such as butterfish (September-December), silver hake (June-August) and scup (May) are highly seasonal. The only constant in Point Judith is yellowtail landings; while silver hake, winter flounder and scup start up sometime in spring and continue through fall, and butterfish is landed from September to December. In New York, yellowtail and scup provide landings throughout the year; summer and winter flounder surge in May and last until the end of the year; silver hake provides landings through winter; and squid peaks in June and July. New Jersey landings are all seasonal. Silver hake and scup are winter fisheries; summer flounder peaks in January-March and September-October; red hake peaks in December-January and April-May; and squid is landed in summer. Maryland's summer flounder landings are primarily from November to January. Virginia's summer flounder landings basically start in November but last until April; scup landings run from January to April; and squid landings are high from May to September.

§3B4 Costs

Data on the net returns of the otter trawl fleet have been reported by the Analytical Services Branch (NMFS Regional Office) for the two major groundfish ports, Gloucester and New Bedford.[1] Indices of net returns are presented in Figure 3B6 and show continual declines since 1978, except for the 151 GRT plus class in Gloucester in 1980-1981 and to a lesser extent New Bedford otter trawls in 1982. This contrasts with the upturn in gross returns shown for all New England otter trawls in 1981 (Figure 3B4). The reason for this reversal is easily observed by looking at fuel cost as a percent of gross stock in Gloucester, for example (Figure 3B7), which has doubled from 1978 to 1981 for all gear classes, but has leveled-off in 1982 and 1983. Additionally, interest expense as a percent of boat share has been increasing at about the same rate in New Bedford, for instance, (Figure 3B8), although 1982-1983 data indicate that that trend has at least stablized. All this has resulted in depressed debt coverage ratios (Figure 3B9), or the number of times the boat share covers the mortgage, and a generally unhealthy financial position for the fleet.

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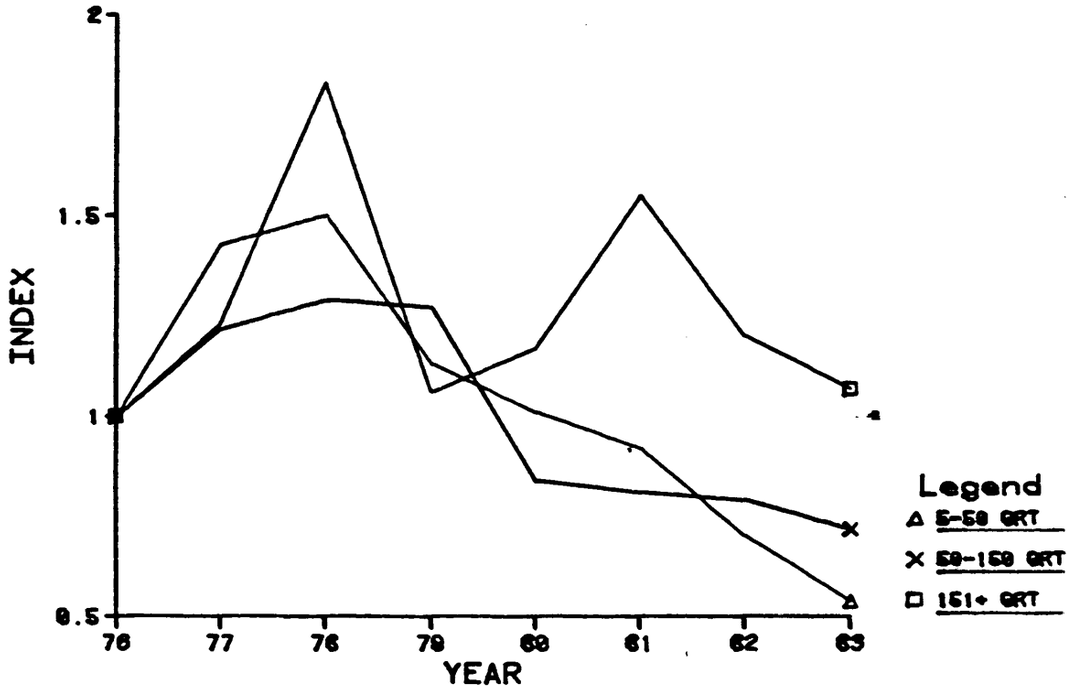
[1]The following four figures each contain graphs with different scales for Gloucester and New Bedford.

Figure 3B6

NMFS
ANALYTICAL SRV
GLOUCESTER, MA

NEW ENGLAND OTTER TRAWL FLEET
INDICIES OF DEFLATED NET RETURNS TO LABOR, CAPITAL,
AND MANAGEMENT - GLOUCESTER, MASS.



NMFS
ANALYTICAL SRV
GLOUCESTER, MA

NEW ENGLAND OTTER TRAWL FLEET
INDICIES OF DEFLATED NET RETURNS TO LABOR, CAPITAL,
AND MANAGEMENT - NEW BEDFORD, MASS

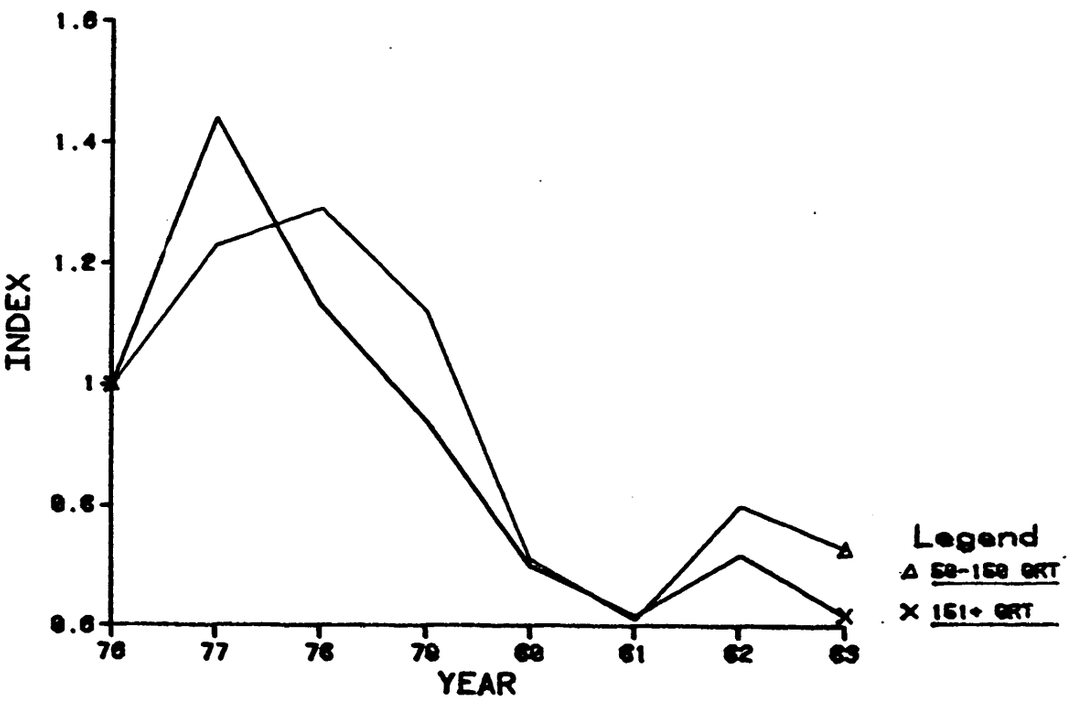


Figure 3B7

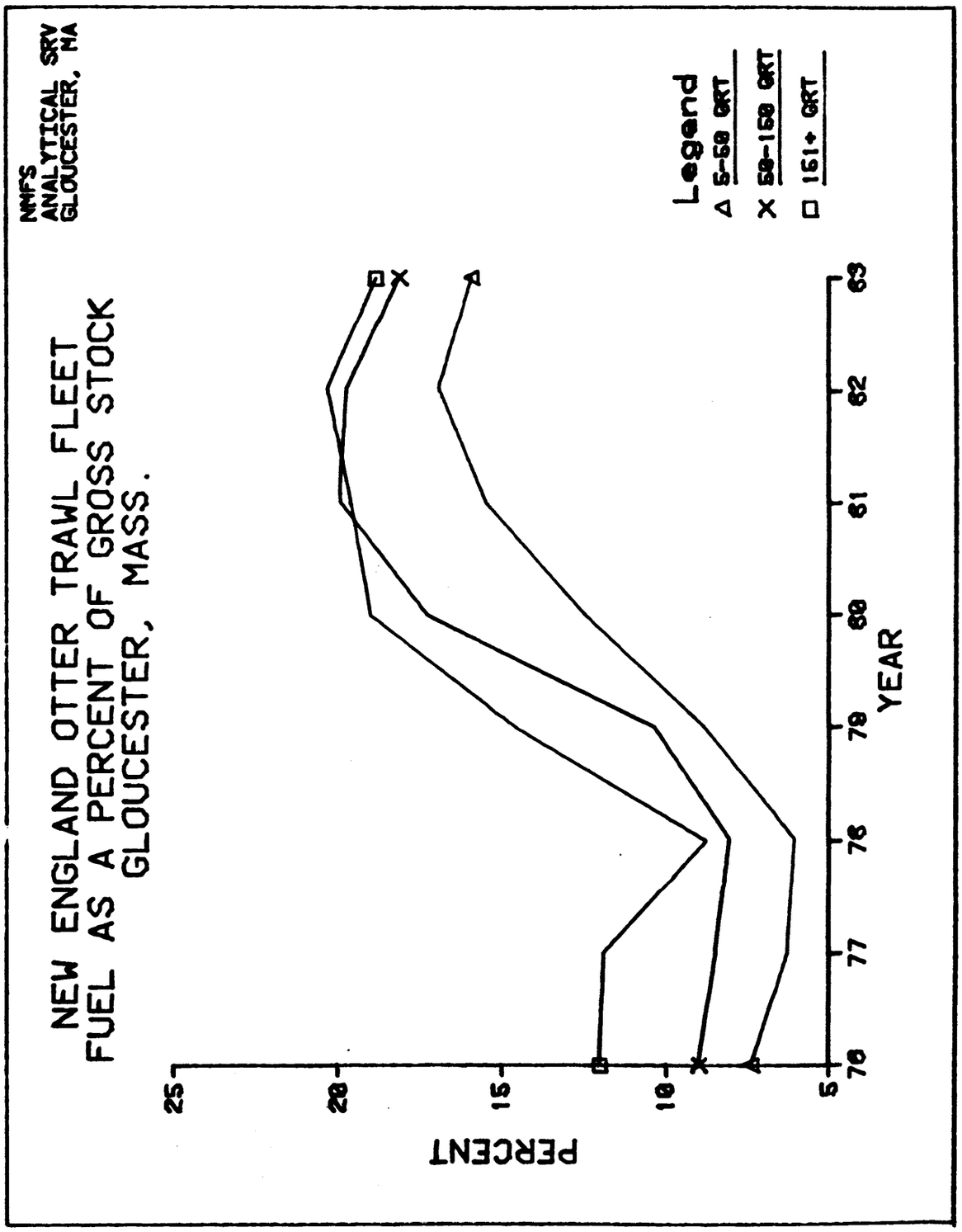

NMFS
ANALYTICAL SRV
GLOUCESTER, MA
NEW ENGLAND OTTER TRAWL FLEET
FUEL AS A PERCENT OF GROSS STOCK
GLOUCESTER, MASS.
Legend
5-50 GRT
50-150 GRT
151+ GRT
PERCENT
25
20
15
10
5
70
77
78
79
80
81
82
83
YEAR

Figure 3B8

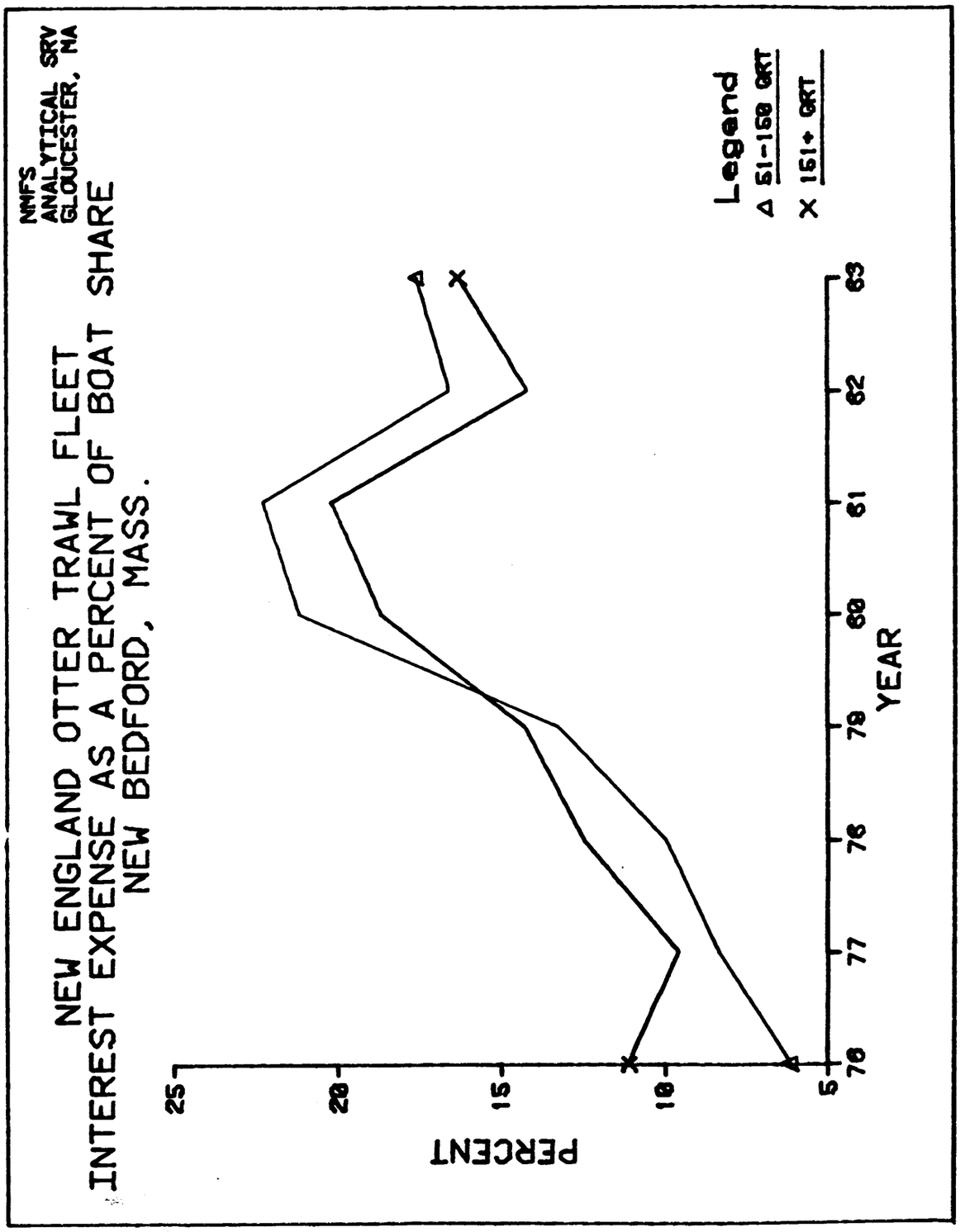
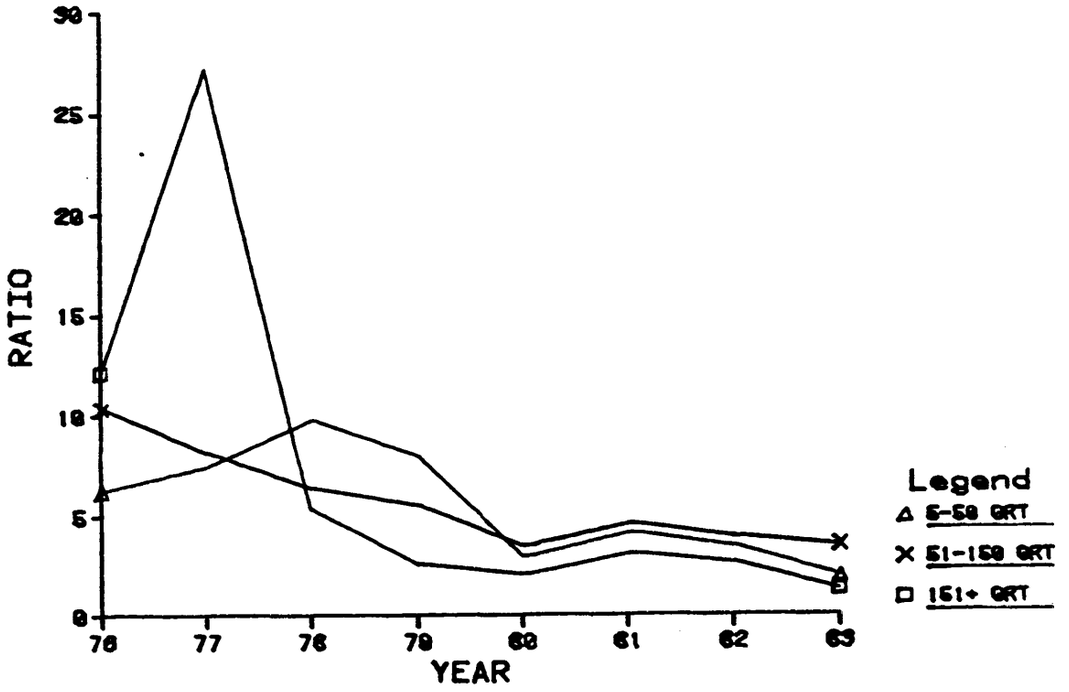

NMFS
ANALYTICAL SRV
GLOUCESTER, MA
NEW ENGLAND OTTER TRAWL FLEET
INTEREST EXPENSE AS A PERCENT OF BOAT SHARE
NEW BEDFORD, MASS.
Legend
Δ 51-150 GRT
X 151+ GRT
PERCENT
25
20
15
10
5
YEAR
70
77
78
79
80
81
82
83

Figure 3B9

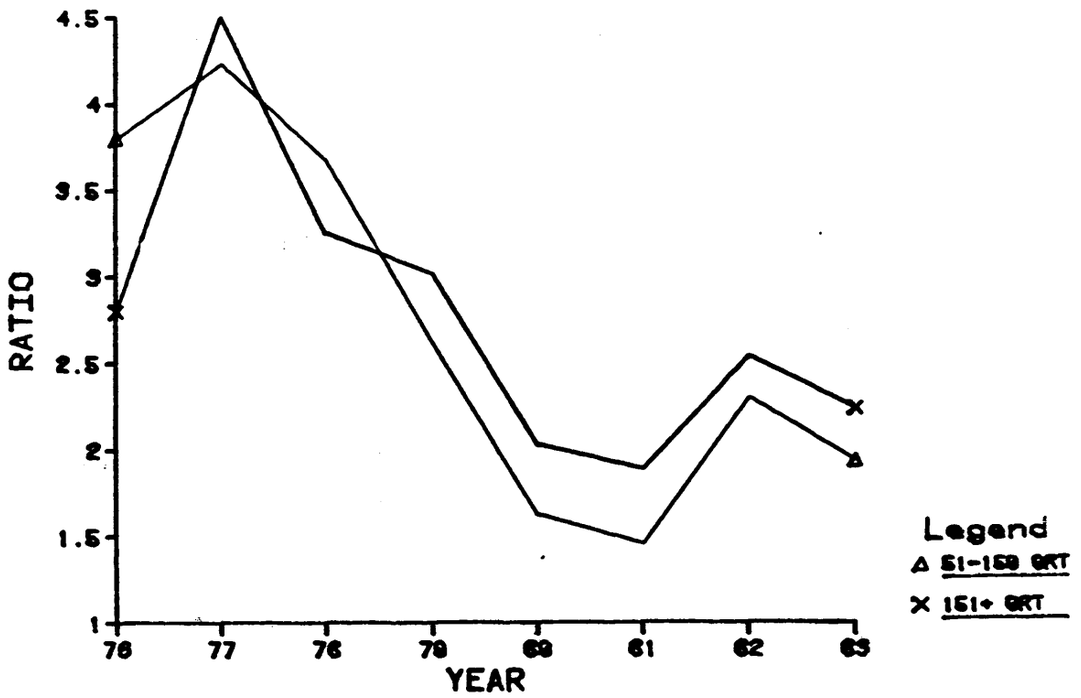
NMFS
ANALYTICAL SRV
GLOUCESTER, MA

NEW ENGLAND OTTER TRAWL FLEET
DEBT COVERAGE RATIOS
GLOUCESTER, MASS.



NMFS
ANALYTICAL SRV
GLOUCESTER, MA

NEW ENGLAND OTTER TRAWL FLEET
DEBT COVERAGE RATIOS
NEW BEDFORD, MASS.



8/30/85

SUBPART C: PROCESSING AND MARKETING

§3C1 Processing

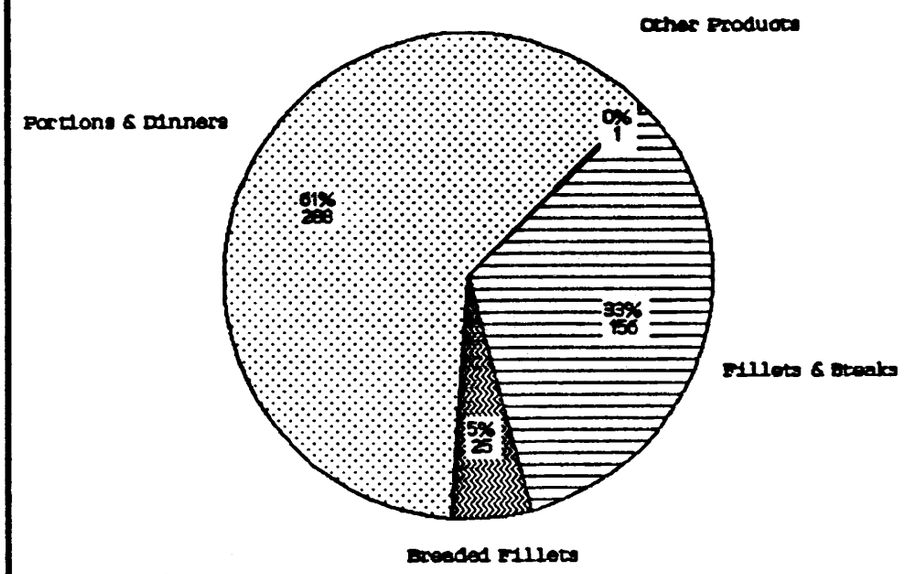
There were 136 groundfish processing plants in the eastern U.S. in 1979 (Georgianna & Dirlam, 1983). Eighty-three of these firms were located in New England. Of these, 49 produced only fresh fish products, 21 produced fresh and frozen products and 8 produced only frozen products. Total sales from these plants were about $470 million. About one-third of this amount was comprised of fresh and frozen fillets and steaks made largely from domestic landings, and two-thirds were sticks and portions made almost entirely from frozen imported fish (Figure 3C1). Salted and cured groundfish products comprised less than one percent of New England's groundfish production. Flounder fillets comprised 43% of the total value of fillets, cod 23%, haddock 16%, ocean perch 5%, pollock 4% and other species 9% (Figure 3C2). None of the fish sticks and portions are classified according to species, but the majority of these products are made from imported cod blocks and slabs.

The processing of fresh fish products produced about $170 million in sales, provided about $50 million of added value to fish products, and employed about 2,000 people. Processing and marketing of fresh fish has developed differently than for frozen fish because of the limited shelf life of fresh fish products. It is characterized by great flexibility at the processing level and inflexibility at the distribution level. Two of the differences between fresh and frozen fish production are: (1) the plants which produce only fresh fish products tend to be smaller than those which produce either a mix of fresh and frozen or only frozen products; and (2) fresh plants generally handle a wider variety of species. Processors buy most of their raw fish from fishermen, but where this supply is limited, processors depend on brokered fish for a major part of their supply. Most of this fish is imported from Canada, but a fair amount is also trucked from Gloucester, Maine and Cape Cod to processing centers such as New Bedford and Boston.

Frozen fish processing has less flexibility at the processing level but more flexibility at the distribution level. Frozen fish plants are generally larger and have more capital equipment than fresh fish plants. Higher levels of capital equipment require higher rates of capacity utilization and more careful production planning. Although frozen groundfish can be obtained in large quantities from Canada and Europe, frozen fish processors must meet specific product requirements of their buyers and cannot always substitute different varieties of fish as inputs. Frozen fish processors generally handle a smaller variety of species than fresh fish processors (Georgianna and Dirlam, 1983).

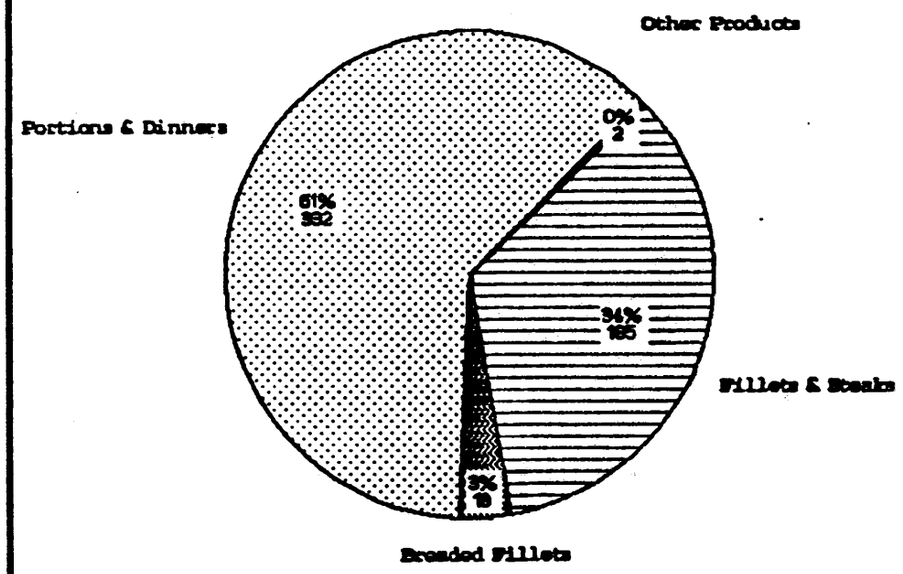
Most frozen fish products are imported from large, vertically-integrated foreign processing companies. Very often secondary processing such as cutting the fish into portions, breading and battering are completed within the U.S. An estimated 60% of imported frozen products are sold directly by foreign processors to large supermarkets or chain restaurants. The remaining portion is generally sold through a network of brokers to wholesaler/distributors who supply smaller retailers.

Figure 3C1
VALUE OF NEW ENGLAND GROUNDFISH PRODUCTS 1979
Million Dollars



Source: Processed Fishery Products, 1979, NMFS

Figure 3C1
VALUE OF NEW ENGLAND GROUNDFISH PRODUCTS 1983
Million Dollars

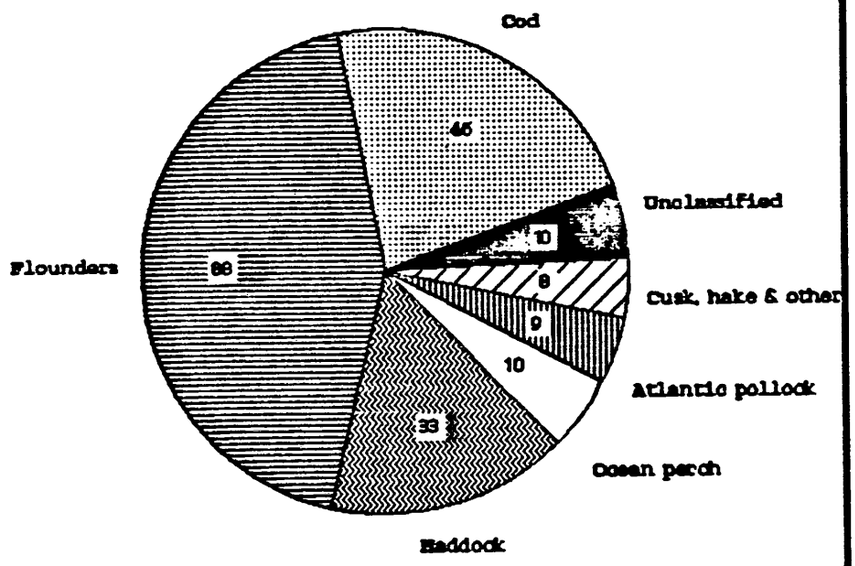


Source: Processed Fishery Products, 1983, NMFS

Figure 3C2

VALUE OF FILLET & STEAK PRODUCTION BY SPECIES 1979

Million Dollars

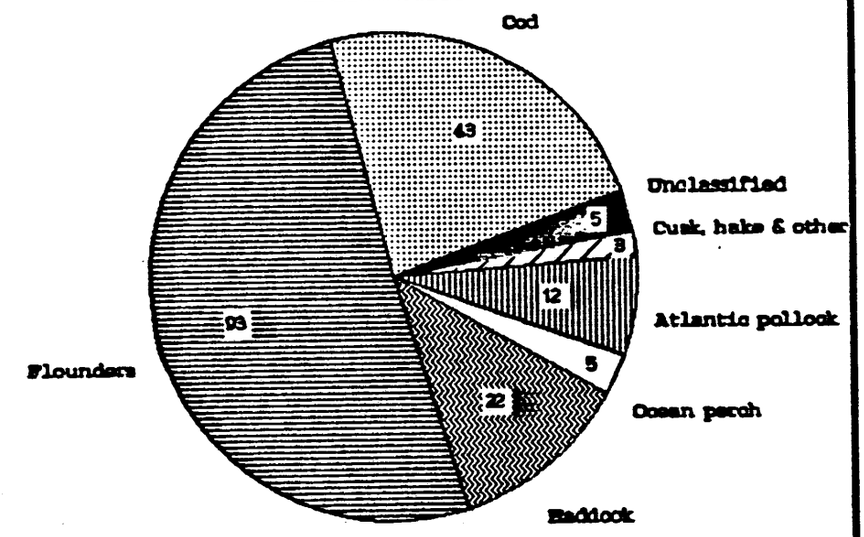


Source: U.S. Production of Fish Fillets & Steaks, Annual Summary 1979, NMFS

Figure 3C2

VALUE OF FILLET & STEAK PRODUCTION BY SPECIES 1983

Million Dollars



Source: U.S. Production of Fish Fillets & Steaks, Annual Summary 1983, NMFS

Processing Activity by Area

To a large extent, the variety of fish processed in any area is determined by the landings at that port. Some other factors important in determining the mix of fish processed in an area are the area's proximity to markets, its location along transportation routes to other processing centers, and the cost of its labor and manufacturing space.

New Bedford is the largest producer of fresh groundfish products. As recently as 1970, over 90% of New Bedford's processed groundfish were flounders. Georgianna (1983) found that while most yellowtail flounder was processed in New Bedford, winter and other flounder are often trucked to New York for processing. However, as flounder landings declined, many New Bedford plants processed more cod and haddock. In 1979, New Bedford plants processed an estimated 42 million pounds of cod and haddock and 61 million pounds of flounders. It is not known how much fish is trucked into New Bedford for processing, but because New Bedford's production of fresh groundfish products exceeds its landings, it is a net importer of raw fish from other New England ports. New Bedford's processing plants have a reputation for being modern and engineered to produce high quality products. Many of its plants have filleting machines which are most efficient for high volume production.

Boston's share of New England groundfish landings has declined steadily since the mid 1960's. Boston landings for 1983 were only 24% of what they were in 1964. This drop in landings has been attributed to the lower cost of processing fish and the greater number of fishermen in other ports. Much of the fresh groundfish now processed in Boston is imported by truck from Canada. The major species processed in Boston are haddock, cod and pollock. Historically, Boston plants processed most of the cod landed in New England. More recently there has been a shift in cod processing to New Bedford. In 1979, Boston plants produced 49% of New England's fresh cod products and New Bedford 40%. From 1976 to 1979, relatively large amounts of drawn pollock (4-6 million pounds) and haddock were trucked into Massachusetts, presumably to Boston. Boston plants also handle a wide variety of other species to supply the restaurant trade, both locally and nationwide. An estimated 50% of their sales are derived from species other than groundfish.

Gloucester plants process mainly ocean perch, cod, haddock and silver hake. However, most of the fresh cod and haddock processed in Gloucester is for local markets. The balance is trucked to Boston or New Bedford, rather than processed locally. In contrast, most of the ocean perch and silver hake landed in Gloucester is processed locally but sold to markets in the South and Mid-West.

Portland contains about two-thirds of the major processing plants in Maine. About one half of all the processing plants now operating in Maine began since the passage of the FMCA in 1976. In recent years, there has been a trend in production away from frozen products towards the production of fresh products, largely because of the decline in ocean perch landings and the greater landings of other kinds of groundfish locally. In addition to increases in the production of fresh cod, haddock, flounder and pollock fillets, there has been an increase in the production of fresh rather than frozen ocean perch fillets.

The Fulton Market plays an important role in both the processing and distribution of groundfish products. From 1974 to 1979, more drawn cod was trucked to Fulton from Maine, Canada and Rhode Island than to Massachusetts.

Processing Capacity

In a 1975 survey of fifty-four New England processors, most of whom processed groundfish, Smith and Peterson found that the most important constraint to plant expansion plans was the scarcity of raw fish supplies. Other constraints to expansion, in the order of their importance, were labor costs, capital costs and environmental regulations. There is no reason to believe that the relative importance of these factors has not substantially changed since 1975.

Although the processing industry can physically process all the groundfish likely to be landed in New England, ex-vessel prices for fresh groundfish products may suddenly drop when landings exceed the capacity of fresh markets to absorb them at the normal price. Using a modified peak-to-peak method, Georgianna and Ibara identified several instances when early summer landings exceeded market capacity for fresh cod, haddock, flounder and pollock in recent years. They argue that the resultant 25% drop in ex-vessel prices caused a significant loss in fishermen's revenues (see Figures 7B3 and 7B4).

§3C2 Product Types by Species

Cod

Most of the cod marketed in the U.S. is imported in frozen blocks and is further processed into either frozen fillets or breaded and battered portions. Most cod portions are sold to fast food restaurants. Domestically caught cod generally gets sold as fresh fillets. In 1983 U.S. production of Atlantic cod fillets was 30 million pounds compared to imports of 183 million pounds. About 60% of the U.S. produced fillets were fresh and 40% were frozen.

Haddock

About 20% (1983) of the haddock consumed in the U.S. is caught by domestic fishermen. Haddock is almost always sold in fillets, both fresh and frozen. Most of the domestically caught haddock is sold fresh. In addition to being trucked down from the Canada, fresh fillets are also air shipped from Iceland and Norway. Larger haddock fillets command a slightly higher price than do smaller ones.

Flounder

Most of the U.S. supply of flounder is imported. Canada provides almost 90% of this imported flounder and most of this is American plaice which is sold either as flounder or sole. Although a small amount, about 12%, of fresh flounder is trucked to U.S. markets, almost all flounder is imported as frozen boneless fillets. Most U.S. caught flounder is filleted, although headed and dressed flounder is provided by many suppliers.

A number of flatfish are usually sold as flounder while others are usually marketed as sole. Winter Flounder and dabs are sold both as flounder and as sole. The confusing differences among species and market categories creates an opportunity for cheaper species to be mislabeled as more expensive ones before they reach the consumer. Most consumers are not aware of precisely which flatfish species are sold as flounder and which are sole, however, they generally regard sole as the superior product.

SPECIES SOLD AS FLOUNDER AND SOLE

Species	Flounder	Sole
Atlantic		
Winter flounder, blackback		
Lemon sole - over 3.5 lbs.		X
under 3.5 lbs.	X	
Gray sole, witch flounder		X
American plaice, dab	X	X
Windowpane, sand flounder	X	
Summer flounder, fluke	X	
Yellowtail flounder	X	
European Dover sole		X
Pacific		
Arrowtooth flounder	X	
Dover sole		X
Petrale sole		X
Rex sole		X
Rock sole		X
Yellowfin sole		X
English sole		X

Greenland turbot

Although Greenland turbot is not caught by U.S. fishermen, it competes directly with frozen groundfish products in U.S. markets. Because it is a flatfish, it can be used as a substitute for either flounder or sole. Almost all of the turbot imported into the U.S. is in the form of frozen boneless fillets.

Ocean perch

Almost all of the landings of ocean perch go into the production of fillets. In 1983 about 54% of the catch of Atlantic ocean perch was used in the production of fresh fillets and 46% in the production of frozen fillets. Domestic landings provided only about 6% of the supply of ocean perch products consumed in 1983. Of the remaining 94%, 1% was imported whole, 9% in frozen blocks and 83% was imported in the form of fillets.there is an increasing amount of fresh ocean perch fillets trucked in from Canada or airshipped from Iceland. The largest market for ocean perch is in the Midwest where it was

originally used as a substitute for fresh water perch. Smaller fillets are generally preferred by food service buyers.

Silver Hake

Because of its relatively low price, the demand for silver hake is strong in lower income consumer groups in both the Northeast and Midwest. In 1984 about 66% of the silver hake products were made from imported frozen blocks. Almost all of the remaining 34%, which is domestically landed, is sold in the round to local markets in the Northeast. Most New England landings not sold locally are shipped to Fulton's for sale to retailers. Surplus silver hake is sold at a discount in the Mid-Atlantic region but there is no market for silver hake south of Virginia (Earl Combs, Inc. 1977). A very small amount is filleted and sold locally in both New England and the Mid-Atlantic and there is also a small market for smoked silver hake in the Mid-Atlantic region. In 1983 all the production of frozen silver hake products from domestic landings took place in Massachussetts.

Cusk

Cusk's high quality and limited abundance restrict its distribution to local New England markets. Most cusk is sold as fresh fillets as a lower priced substitute for cod and haddock.

Ocean Catfish

Also known as wolffish, has similar abundance and product characteristics as cusk, however, because of lower consumer acceptance, it is sold at a slightly lower price than is cusk.

Production and Marketing of Squid, Mackerel, Butterfish & Scup

Butterfish

From 1970 to 1978 about 74% of the world supply of butterfish came from the Atlantic. Before 1978, most butterfish was landed and processed by foreign vessels for consumption in their domestic markets. In 1978 about 80% of the butterfish landed in the U.S. was used for human consumption. Most of this was sold as whole fish, either fresh or frozen. A small amount, less than 2%, of edible butterfish products consisted of smoked butterfish. Generally the largest amount of domestically consumed butterfish are used in smoked products which are mainly sold in New York, New Jersey and Pennsylvannia. Most of the remaining 20% of domestic landings was used as bait.

Since 1978 almost all of the growth in U.S. butterfish landings has been shipped to Japanese markets. Most of this fish, 89% by weight in 1984, has been landed and processed in Rhode Island. Because the production of frozen butterfish consists mainly of sorting and grading, most of the landings can be processed by a few large operations. The main requirements for processing butterfish, besides having an available market, are bulk offloading

facilities, packaging machinery, freezing capacity and a ready, economical supply of labor. Any future increases in butterfish landings will probably go to foreign markets, both because domestic consumption of any non-major food fish such as butterfish is difficult to increase and because U.S. processors are increasingly able to meet the quality standards of foreign markets.

Scup

Most of the scup landed in New England is either dressed or sold in the round to markets in New York, Philadelphia and Baltimore. Some scup is sold as a substitute for black drum in the southeast. An increasing portion of scup is sold to local markets in New England. A large part of the demand for scup comes from ethnic communities.

Squid

Increased ability to export domestic squid has caused an expansion of U.S. processing and harvesting of squid. Processing at sea has been carried out by foreign vessels participating in joint ventures with U.S. harvesters. At the same time, domestic processors have increased the amount of squid they supply both to export markets and to the developing domestic market.

According to the Mid-Atlantic Fishery Management Council's proposed Amendment #1 to the Fisheries Management Plan for Atlantic Mackerel, Squid, and Butterfish (August 1983), there are 29 firms which process squid. Eleven of the firms are in Massachusetts, eight in Rhode Island, seven in Virginia, one each in Maine, New York and New Jersey. New England companies are the largest producers of frozen squid on the Atlantic Coast, while New York and New Jersey companies produce smaller amounts of canned and frozen squid. Most of these firms make products, primarily groundfish, in addition to squid. The main requirements for processing squid are freezer space and labor.

Products made from squid are rings and strips, skinned tubes, and whole squid. The rings and strips may be breaded and pre-fried. These products may also be marinated, canned or simply frozen. Frozen squid dominates the foreign market, although there is also a limited market for fresh squid. Squid which is frozen whole at sea is generally superior to squid frozen ashore because it does not have as much time to deteriorate before processing. Shoreside product may also be used in squid rings and strips.

The primary markets for squid are in Spain, Italy, Portugal and Japan. Depending upon the strength of U.S. dollar and alternative supply of squid, exports could continue to increase. At present, the domestic market for squid is mostly limited to ethnic groups, however there are currently efforts to expand it through the Saltonstall/Kennedy Program.

Mackerel

Atlantic mackerel have been harvested off the Northeast Atlantic coast for over a century. The commercial catch of Atlantic mackerel is landed from Maine to North Carolina with the greatest portion of the catch being landed in New Jersey and New York. Most mackerel is sold whole or dressed. Smaller amounts are filleted, salted or pickled, canned, or smoked. There is very little information collected by NMFS about mackerel processing. Although

reported landings for Atlantic mackerel were 5.8 million pounds in 1981, NMFS processed fish products data included only about 6,000 pounds of mackerel products for that year. Canadian statistics show that the U.S. exported 309,000 pounds of fresh, whole or dressed mackerel worth $93,000 and 1,096,000 pounds of frozen, whole or dressed mackerel worth $408,000 to Canada in 1981. In turn, Canada exported 1,832,000 pounds of frozen whole or dressed mackerel valued at $447,000 to the U.S.

The domestic market for whole, fresh mackerel seems to offer little potential for expansion, possibly because of consumer resistance to dark, oily fish such as mackerel. Foreign markets are limited by unstable demand, export duties and the availability of alternative supplies. Foreign at-sea processing through joint ventures may provide domestic fishermen greater opportunity for increasing the harvest in the future because of more direct access to foreign markets than is available to shoreside processors.

§3C3 Distribution

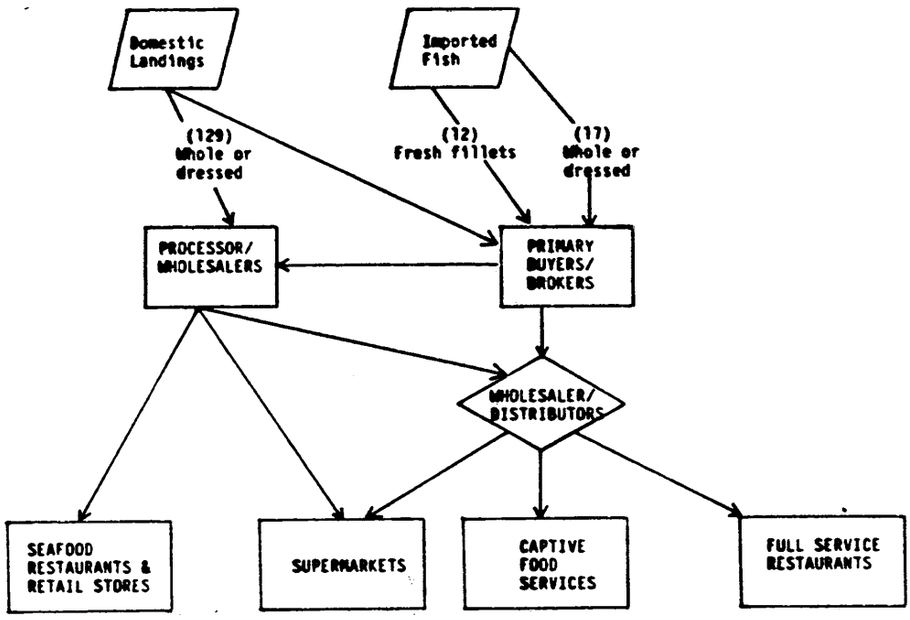
There are two fairly distinct distribution systems for Atlantic groundfish products (Figure 3C3), one for fresh groundfish products and another for frozen products. Most frozen Atlantic groundfish are imported from Canada, Iceland or Norway and are sold in large volumes nationwide to retail stores, large fast food restaurants and captive food services. Captive food services consist of cafeterias and other food services provided at business locations, hospitals, schools and other public and private institutions. In 1984, about 76% of Atlantic groundfish products were imported (Figure 3C4). Most of the fresh groundfish, about 88% by product weight in 1984, is from domestic landings and is sold in the Northeast to seafood restaurants, retail chain stores and more expensive full service restaurants. The final markets in which fresh and frozen groundfish most often compete are supermarkets, captive food services and seafood restaurants. It is not known how the availability of frozen groundfish affects the demand for frozen groundfish, however, fresh and frozen groundfish products have several different characteristics which tend to lessen direct price competition between them.

The limited shelf life and supply of fresh fish determine the way it is distributed from the fishermen to the retail level. Because fresh fish must reach the consumer within two weeks from when they are caught, they cannot be inventoried in the same way as frozen products. As a result, processors ship a large amount of fresh fish directly to the final markets. Even the largest fresh fish processors in Boston sell directly to individual restaurants. Although there are a few fresh fish brokers, they do not perform the same function as frozen fish brokers. Fresh fish brokers arrange shipment of whole fish and species that are not locally available from primary buyers to New England processors. These services are particularly important to Boston processors who must have a complete product line to sell directly to restaurants and retail stores. These processors must depend on brokers to provide swordfish, shrimp, salmon oysters and other fish.

Figure 3C3

DISTRIBUTION OF ATLANTIC GROUNDFISH PRODUCTS
(Final Product Weight in Million Pounds - 1981)

FRESH FISH DISTRIBUTION SYSTEM



FROZEN FISH DISTRIBUTION SYSTEM

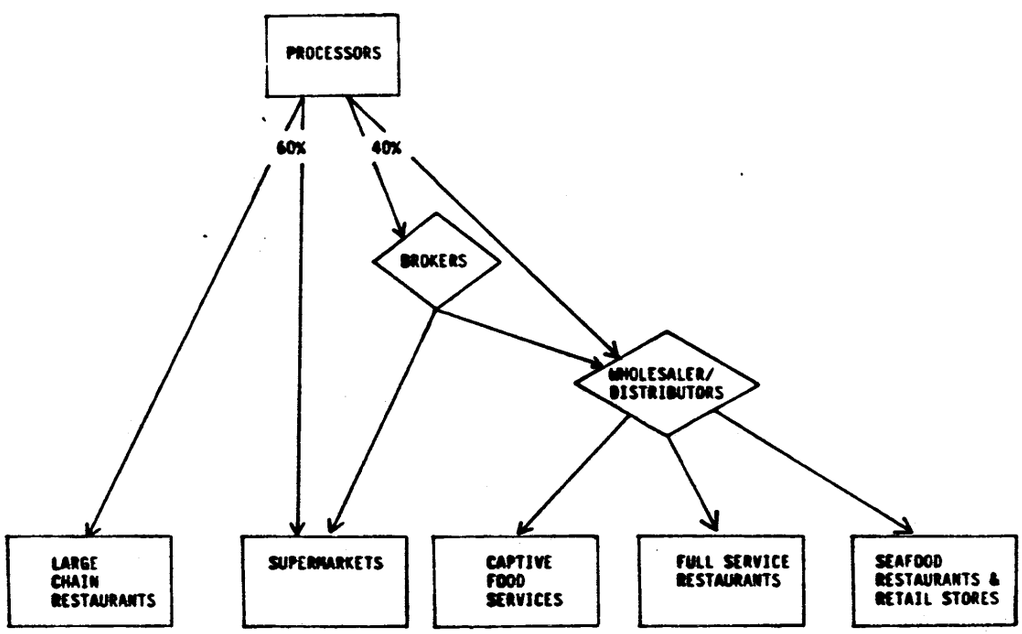
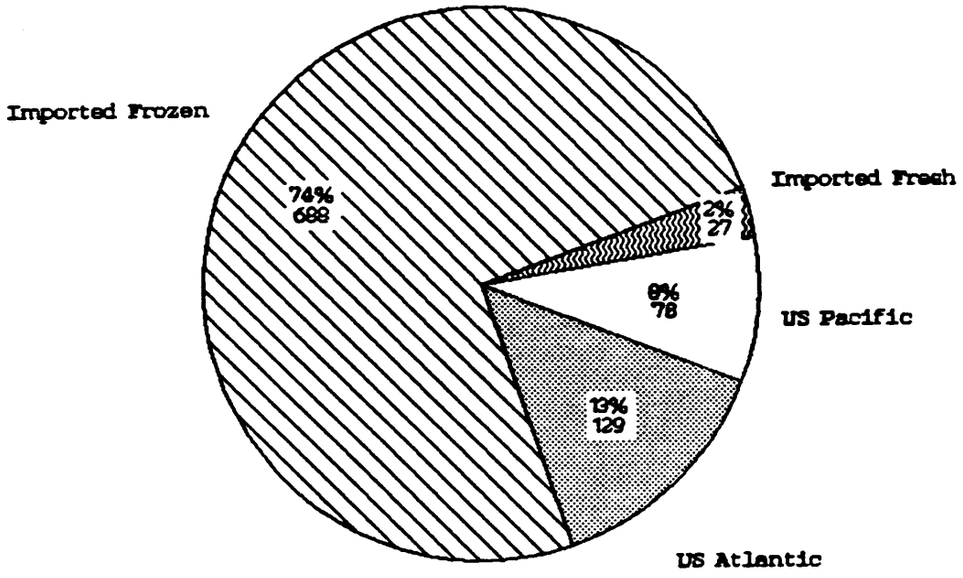


Figure 3C4

US GROUNDFISH PRODUCTS BY SOURCE 1981

Thousand Pounds Product Weight

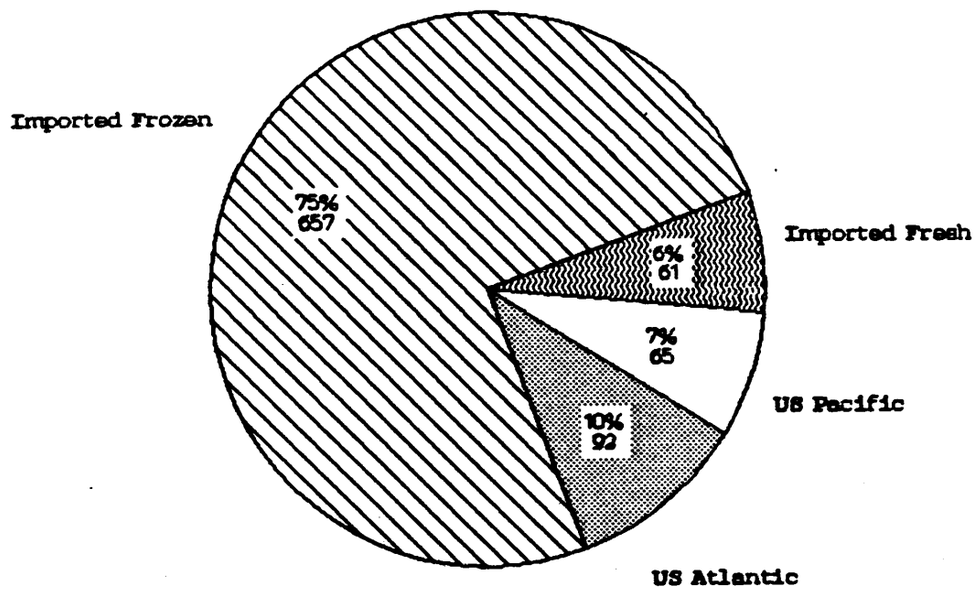


Sources: Fisheries of the United States 1981, NMFS
Canadian Fisheries Exports, December 1981

Figure 3C4

US GROUNDFISH PRODUCTS BY SOURCE 1984

Thousand Pounds Product Weight



Sources: Fisheries of the United States 1984, NMFS
Canadian Fisheries Exports, December 1984

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The most recent, systematically collected information about the geographic distribution of fresh New England groundfish products was gathered in 1964-1965 (Gaston & Storey). At that time, an estimated 50 to 60% of fresh fish were sold in New England, 30 to 40% in New York, Pennsylvania and Ohio and 5 to 15% in other out-of-state markets.

Frozen groundfish products (1) generally cost less than fresh products, (2) are more available in measured portions, (3) are more available year-round, and (4) are more available outside of the coastal areas of the U.S. Fresh groundfish products (1) are generally considered superior in taste to frozen products if the freshness is maintained until it reaches the final consumer, (2) are bought by restaurants and retail stores that want to offer their customers a superior product or something different than what they might find in most restaurants or retail stores, and (3) are more expensive to carry because of spoilage and variability in quality.

The distribution system for frozen fish is similar to that of many processed food products. It is larger than the distribution system of fresh fish both because there is a much larger supply of frozen fish and because frozen products have a much longer shelf life. Most frozen fish products are imported from large vertically integrated foreign processing companies. Very often secondary processing, such as cutting the fish into portions, breading and battering, are completed within the U.S. An estimated 60% of imported frozen products are sold directly by foreign processors to large supermarkets or chain restaurants. The remaining portion is generally sold through a network of brokers to wholesaler/distributors who supply smaller retailers. Brokers differ from wholesalers in that the main services provide by brokers is locating the product and arranging shipment. They generally do not take legal possession of the product. In addition to providing frozen fish products to wholesaler distributors, brokers also provide frozen products to fresh fish processors who sell directly to retailers.

Wholesalers of fish products may handle fish as only a small part of their overall business. Much of the fish that goes through wholesalers is handled by institutional wholesalers who provide their customers with a number of services ranging from assembling many different products for shipment in order to minimize transportation costs to menu planning. Meat distributors and wholesalers are also an important distribution channel for both fresh and frozen fish products. Distributors of meat products can easily handle frozen fish products because they usually have their own refrigerated transportation system which allows them to deliver the products to existing customers at very little additional cost. When possible, some wholesalers buy their fish products directly from processors rather than from brokers.

§3C4 Market Organization

The final markets for groundfish products can be divided into three groups, public food services which include all types of restaurants from fast food chains to seafood restaurants, captive food services and retail stores such as seafood stores, grocery stores and supermarkets. These market segments consume 47%, 17% and 36% of groundfish products respectively (Figure 3C5). Each of these market sectors has different product requirements (Table 3C1).

The public food service market requires "a firm white-fleshed fish with a bland delicate flavor and no 'fishy' odor so that it appeals to the widest range of customers" (Kirby Commission, 1982). These product requirements are especially important to chain restaurants because chain restaurants strive to maintain a consistent level of quality which the consumer can identify throughout all the chain's outlets. Chain restaurants are an important market segment because they are a growth area for fish products and they sell 40% of all fish in the public food service sector. The species most often used by this sector are cod and flounder.

In the captive food sector, where cost is often more important than flavor, texture and appearance, ocean perch, pollock and silver hake are important species. However, some quality conscious segment of this market, such as school lunch programs, prefer cod. In the retail segments, cod, haddock and flounder dominate the demand for fillets while pollock and ocean perch are popular in portions and prepared dinners. Market substitution of one kind of fish product for another most often takes place between species used within a particular market segment (Table 3C1).

§3C5 Foreign Trade

Imports

The United States is the world's largest single market for groundfish products. In 1984, the U.S. imported 909 million pounds of groundfish products valued at about 912 million dollars. Of these, fresh products comprised 6% of the total quantity and 5% of the total value. Frozen fish products comprised 88% of both the quantity and value of imports and other products comprised 6% and 7% of the value.

For the domestic groundfish harvesting industry, perhaps the most significant trend in imports is the large increase in the amount of fresh groundfish products imported to the U.S., primarily from Canada. Between 1978 and 1984, the amount of whole, fresh fish imported from Canada has increased ninefold the amount of fresh fillets has increased 350% (Figure 3C6). Both fresh fish fillets and fresh products made from imported whole fish compete directly with products made from domestically landed fish. The Canadian government is actively seeking to increase the export of Canadian cod products to the U.S. to absorb large projected increases in Canadian landings. In addition, Norway, Denmark and Iceland can be expected to increase their effort to market cod in the U.S. because of major market collapses in Nigeria and Brazil. However, these countries will have to improve the quality of much of their cod products before they can compete in the U.S. fillet market.

Figure 3C5

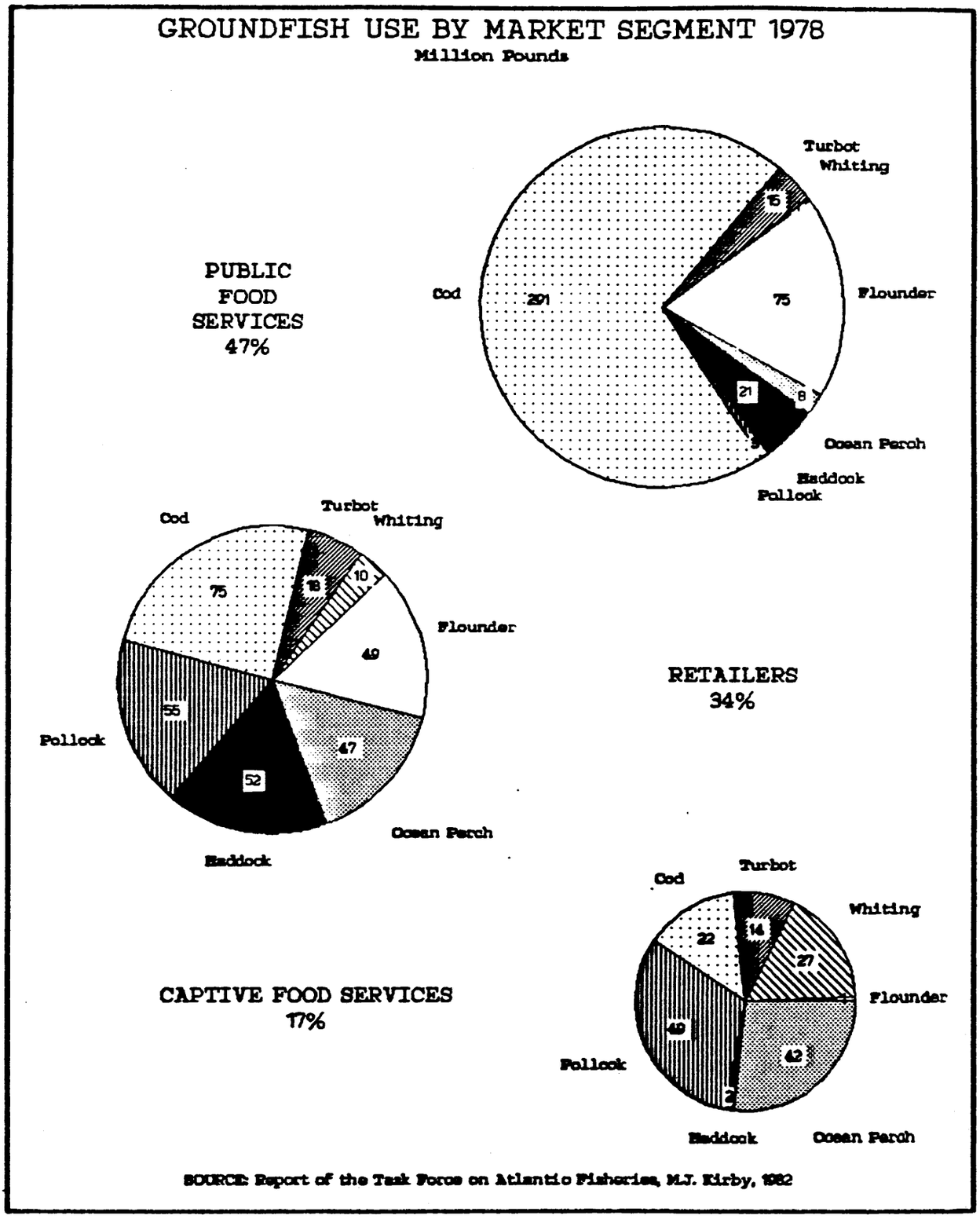

GROUNDFISH USE BY MARKET SEGMENT 1978
Million Pounds
PUBLIC FOOD SERVICES 47%
Cod
291
Turbot
Whiting
15
Flounder
75
Ocean Perch
8
Haddock
Pollock
21
RETAILERS 34%
Cod
75
Turbot
Whiting
18
10
Flounder
49
Ocean Perch
47
Haddock
52
Pollock
55
CAPTIVE FOOD SERVICES 17%
Cod
22
Turbot
14
Whiting
27
Flounder
42
Ocean Perch
2
Haddock
49
Pollock
SOURCE: Report of the Task Force on Atlantic Fisheries, M.J. Kirby, 1982

TABLE 3C1

Orientation of U.S. Market Segments

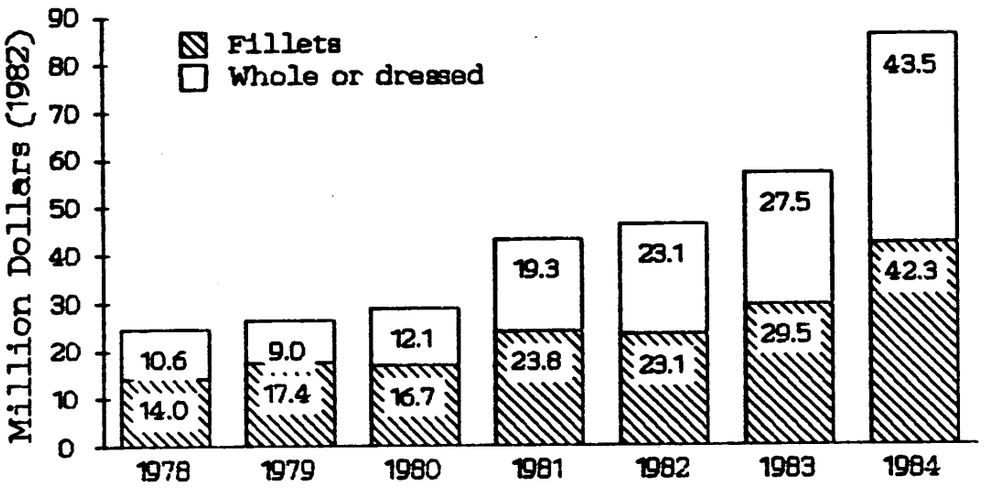
Segment	Market Share	Orientation	Primary Species Form
Public Food Service	46%	High quality/customer specifications; Relative price indifference; Limited species substitution	Cod portions Cod fillets Flounder fillets
Retail	36%	Price-oriented; Frozen; branded items in frozen form; wide species acceptability in fillets; Fresh; quality-oriented	Pollock sticks; all other in fillets
Captive Food Service	18%	Least quality concern; prime interest in price; Species substitution	Pollock sticks; Cod

Source: Report of the Task Force on Atlantic Fisheries, M.J. Kirby, 1982

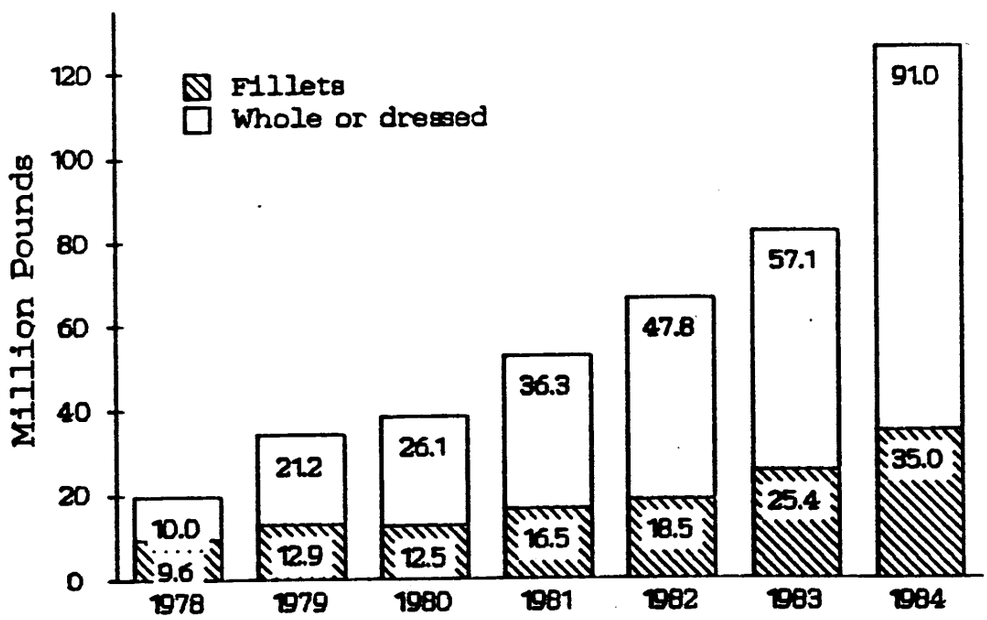
Figure 3C6

IMPORTS OF FRESH GROUNDFISH FROM CANADA

VALUE



QUANTITY



SOURCE: Canadian Fisheries Exports, Government of Canada

The largest negative change in the imports of groundfish products has been the steady decline of imported frozen blocks and slabs. The quantity of imported frozen groundfish blocks declined 21% from 406 million pounds in 1978 to 317 million pounds in 1984. This decline has probably been caused by a general decline in consumer demand for frozen fish relative to other fish and food products and a strong U.S. dollar in 1981 and 1981 which made imported fish more expensive relative to domestic food products.

Exports

From the way export statistics for fish products are organized it is impossible to determine the quantity or value of Atlantic groundfish products which are exported from the U.S. The only groundfish products identified by species are dressed and salted pollock of which totaled 415,000 pounds worth $452,000 in 1984.

SUBPART D: THE RECREATIONAL SECTOR

§3D1 Overview of Recreational Fisheries

Regional and National Economic Value

There are substantial recreational fisheries for many of the species involved in the commercial multi-species trawl fisheries of the Northwest Atlantic. These recreational fisheries are economically valuable to the Mid-Atlantic and New England regions, particularly in the coastal communities, and they are important to the millions of recreational anglers from both coastal and inland states.

Specifically, the 1980 National Survey[1/] estimated that 7.7 million participants (See Figure 3D1) generated in excess of 1.2 billion dollars of retail sales in pursuit of recreational fishing in the Mid-Atlantic and New England regions.[2/] In the New England region the 1980 retail sales associated with marine recreational fishing are estimated at over $243 million, in the Mid-Atlantic region sales are closer to one billion dollars (Table 3D1). The greatest expenditures were for boat fuel, food and private transportation. The value added figure for New England is estimated over $100 million and near $450 million in the Mid-Atlantic. Wages and salary represent values of some $48 million for New England and $197 million for the Mid-Atlantic. Capital expenditures are close to $10 million for New England and over $40 million in the Mid-Atlantic (Table 3D1).

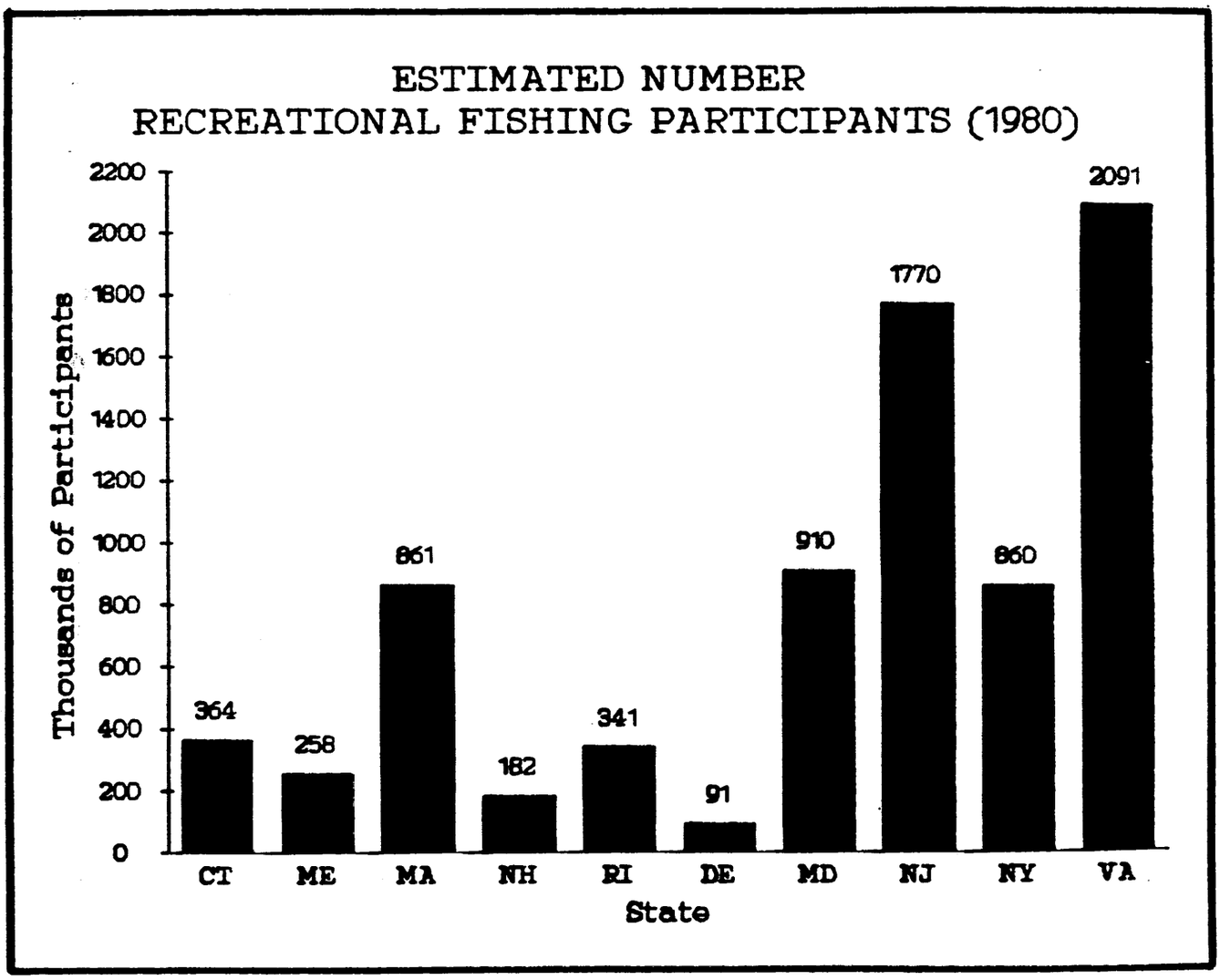
A specific breakdown of the New England proportion of this economic activity ($243,178,000) is found in Table 3D2. The Mid-Atlantic proportion ($996,010,000) is broken down in Table 3D3. Various industries which supply goods and services to marine recreational constituents at some market level (manufacturing, wholesale, retail) include those that produce fishing tackle, boats, outboard motors, boat fuels, trailers, bait, as well as providers of public transportation, restaurants and marina services. On the national level in 1980, the largest expenditures contributing to the approximate $4 billion in sales associated with marine recreational fishing were for boat fuel, transportation and food, according to 1980 results of a study conducted by Centaur Associates.[3/]

[1/]The NMFS' 1980 National Survey included a household survey which presents data collected from interviews of fishermen 12 years old and up as well as information provided by an adult on marine recreational fishing participation by persons younger than 12 years old. The Council is in receipt of preliminary 1981 and 1982 survey information but has not been authorized to use this data until the preliminary review period has been completed.

[2/]Another source of information on the number of salt water anglers is the National Survey of Fishing, Hunting, and Wildlife Associated Recreation conducted every 5 years by the Fish and Wildlife Service, U.S. Dept. of Interior and the Bureau of the Census, U.S. Dept. of Commerce. In 1980 this Survey estimates that there were 999,000 saltwater fishermen 16 years or older in New England and 2,047,000 fishermen in the Mid-Atlantic area.

[3/]"Economic Activity Associated with Marine Recreational Fishing in 1980" prepared for the Sport Fishing Institute by Centaur Associates, Inc., Washington, DC.

Figure 3D1



(Source: Preliminary 1980 National Survey)

New England Total: 2,006,000 participants

Mid-Atlantic Total: 5,722,000 participants

Combined Total: 7,728,000 participants

TABLE 3D1

Disaggregation of National Effects to Fishery Management Council Regions, 1980

Council	Retail Sales (x $1000)	Value Added (x $1000)	Employment (person-yrs)	Wages & Salaries (x $1000)	Capital Expenditures (x $1000)
New England	$243,178	$109,539	4,020	$ 47,988	$ 9,893
Mid-Atlantic	$996,010	$446,502	16,264	$196,505	$40,222

SOURCE: Economic Activity Associated with Marine Recreational Fishing in 1980, SFI/Centaur Associates, Washington, DC, 1983.

TABLE 3D2

Economic Activity Associated with
Marine Recreational Fishing in the New England Region:
Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut

	Sales (thousands of dollars	Value Added (thousands of dollars	Employment (person-years of dollars)	Wages and Salaries (thousands of dollars)	Capital Expenditures (thousands of dollars)
Fishing Tackle:					
Manufacturing	3,780	2,186	65	953	131
Wholesale	2,954	762	15	298	24
Retail	11,007	3,985	133	1,608	244
Boats:					
Manufacturing	11,612	5,003	228	2,474	223
Retail	17,613	3,397	124	1,742	124
Motors:					
Manufacturing	2,548	1,172	22	515	105
Retail	3,435	663	24	341	25
Trailers:					
Manufacturing	936	322	14	198	31
Retail	1,122	167	8	111	6
Marinas	29,163	8,903	314	7,235	732
Commercial Sportfishing Vessels	11,252	6,756	406	1,823	941
Food:					
Manufacturing	20,989	9,738	126	4,092	524
Wholesale	25,110	3,740	72	1,555	250
Retail	32,692	6,933	266	3,365	554
Restaurants	11,483	6,004	384	2,770	530
Lodging	11,001	7,153	354	3,055	870
Public Transportation	4,217	2,478	188	2,186	363
Private Transportation:					
Manufacturing	22,716	3,568	12	840	524
Wholesale	25,754	2,912	62	822	256
Retail	32,150	6,075	280	2,234	739
Bait	17,278	5,426	236	2,299	363
Boat Fuel:					
Manufacturing	28,436	4,463	15	1,052	657
Wholesale	37,750	4,265	93	1,209	378
Retail	47,130	8,909	411	3,254	1,085
Boat Insurance	3,379	1,655	40	676	-
Other	10,256	2,904	128	1,281	214
Total	243,178[1/]	109,539	4,020	47,988	9,893

1/ Retail trade only.

SOURCE: Economic Activity Associated with Marine Recreational Fishing in 1980, SFI/Centaur Associates, Washington, DC, 1983.

TABLE 3D3

Economic Activity Associated with
Marine Recreational Fishing in the Mid-Atlantic Region:
New York, New Jersey, Delaware, Pennsylvania, Maryland, Virginia

	Sales (thousands of dollars	Value Added (thousands of dollars	Employment (person-years of dollars)	Wages and Salaries (thousands of dollars)	Capital Expenditures (thousands of dollars)
Fishing Tackle:					
Manufacturing	15,342	8,825	262	3,848	529
Wholesale	11,927	3,078	59	1,202	96
Retail	44,439	16,087	536	6,493	986
Boats:					
Manufacturing	49,226	21,209	965	10,486	946
Retail	74,666	14,402	527	7,385	526
Motors:					
Manufacturing	10,802	4,967	95	2,181	447
Retail	14,560	2,812	103	1,445	105
Trailers:					
Manufacturing	3,969	1,367	59	841	131
Retail	4,757	710	33	473	26
Marinas	123,629	37,740	1,331	30,670	3,101
Commercial Sportfishing Vessels	39,073	23,460	1,411	6,329	3,269
Food:					
Manufacturing	84,741	39,317	509	16,520	2,116
Wholesale	101,382	15,101	291	6,276	1,010
Retail	131,993	27,991	1,074	13,586	2,236
Restaurants	46,362	24,239	1,553	11,182	2,140
Lodging	44,415	28,880	1,429	12,336	3,511
Public Transportation	17,025	10,004	759	8,825	1,467
Private Transportation:					
Manufacturing	91,715	14,404	50	3,391	2,116
Wholesale	103,979	11,759	250	3,318	1,034
Retail	129,805	24,528	1,131	9,018	2,982
Bait	69,760	21,907	952	9,282	1,595
Boat Fuel:					
Manufacturing	120,546	18,992	65	4,460	2,785
Wholesale	160,029	18,082	392	5,125	1,603
Retail	199,793	37,767	1,742	13,798	4,599
Boat Insurance	14,324	7,017	169	2,865	-
Other	41,409	11,927	517	5,170	866
Total	996,010[1/]	446,502	16,264	196,505	40,222

1/ Retail trade only.

SOURCE: Economic Activity Associated with Marine Recreational Fishing in 1980, SFI/Centaur Associates, Washington, DC, 1983.

Marine recreational fishing is a relatively expensive recreational activity particularly when the angler selects the party or charter boat mode for a fishing trip. It has been estimated that in 1981 the average total cost per fishing trip across all fishing modes was $36.85 on the Atlantic coast. The average total expenditures for a fishing trip on a party or charter boat was estimated to be about $59.06. It is important to note that the value of the anglers catch, regardless of the final disposition, may directly reduce the costs of the fishing trip.

Who, Why, When, Where

In 1981 a major effort was made to acquire and analyze social and economic information on marine recreational fishing on the Atlantic, Gulf and Pacific coasts for the NMFS.[4/] This study provides important regional information on recreational fishermen, their reasons for fishing, disposition of the catch and many other variables.

On the Atlantic Coast this study determined that marine recreational fishing is largely (72%) a male activity, predominantly (95%) white males, with minorities making up only about 5%. The average age of the Atlantic angler is 32 and he likely has 12 years of fishing experience. Some 71% of marine recreational fishing households have an annual income from $10,000 to $35,000; on the Atlantic coast some 67% of the anglers are employed full time and they fish for approximately 22 days per year. If the recreational fisherman is retired (some 6% of the total number of anglers), he fishes an average of 47 days per year.

In 1981, about 50% of these anglers stated "sport" (30%) or "to catch fish" (21%) as their reason for recreational fishing while about 35% gave "relaxation" as the primary reason. About 60% of these anglers report that they have a targeted species in mind when they go fishing with the balance of Atlantic anglers reporting no preference. Of those anglers reporting a preference, 22% indicated bluefish while 15% and 11% indicated summer and winter flounder, respectively, as the targeted species on their fishing trips.

The study also provides information which indicates that recreational fishing is a group-oriented activity involving friends and family on about 87% of the fishing trips taken on the Atlantic coast. When these anglers use party or charter boats, the average size of the group tends to be around 7 or 8 individuals; and when using private or rental boats the average size of the group is around 3 individuals.

Over 34% of the marine fishing households contacted reported owning one or more boats and about 85% of these boats were open or cabin motorboats; 63% of these boats were between 15 and 24 feet long.

4/"Socio-economic Aspects of Marine Recreational Fishing" prepared for NOAA/NMFS by KCA Research, Inc. May, 1983.

Along the Atlantic coast, anglers are reported to average approximately 23 trips a year across all recreational modes, although this figure is acknowledged to be biased in favor of the avid angler. For party/charter mode the average is about 11 trips. A 1975 state of Massachusetts study of recreational fishing concluded that resident boaters averaged approximately 19 trips a season and that the average across all modes was about 11 trips per season. The 1980 National Survey of Fishing, Hunting and Wildlife-Associated Recreation indicates that on a nationwide basis 12.3 million salt water anglers took almost 131 million trips or an average of almost 11 trips per angler.

The following data presents information on the average distance from home traveled by anglers to go fishing.

AVERAGE DISTANCE FROM HOME IN MILES BY FISHING MODE

Mode of Fishing	Altantlic Coast
Man-Made Structure	140.0 mi.
Beach-Bank	134.0 mi.
Party/Charter Boat	237.1 mi.
Private/Rental Boat	81.0 mi.
Total Average	137.0 mi.

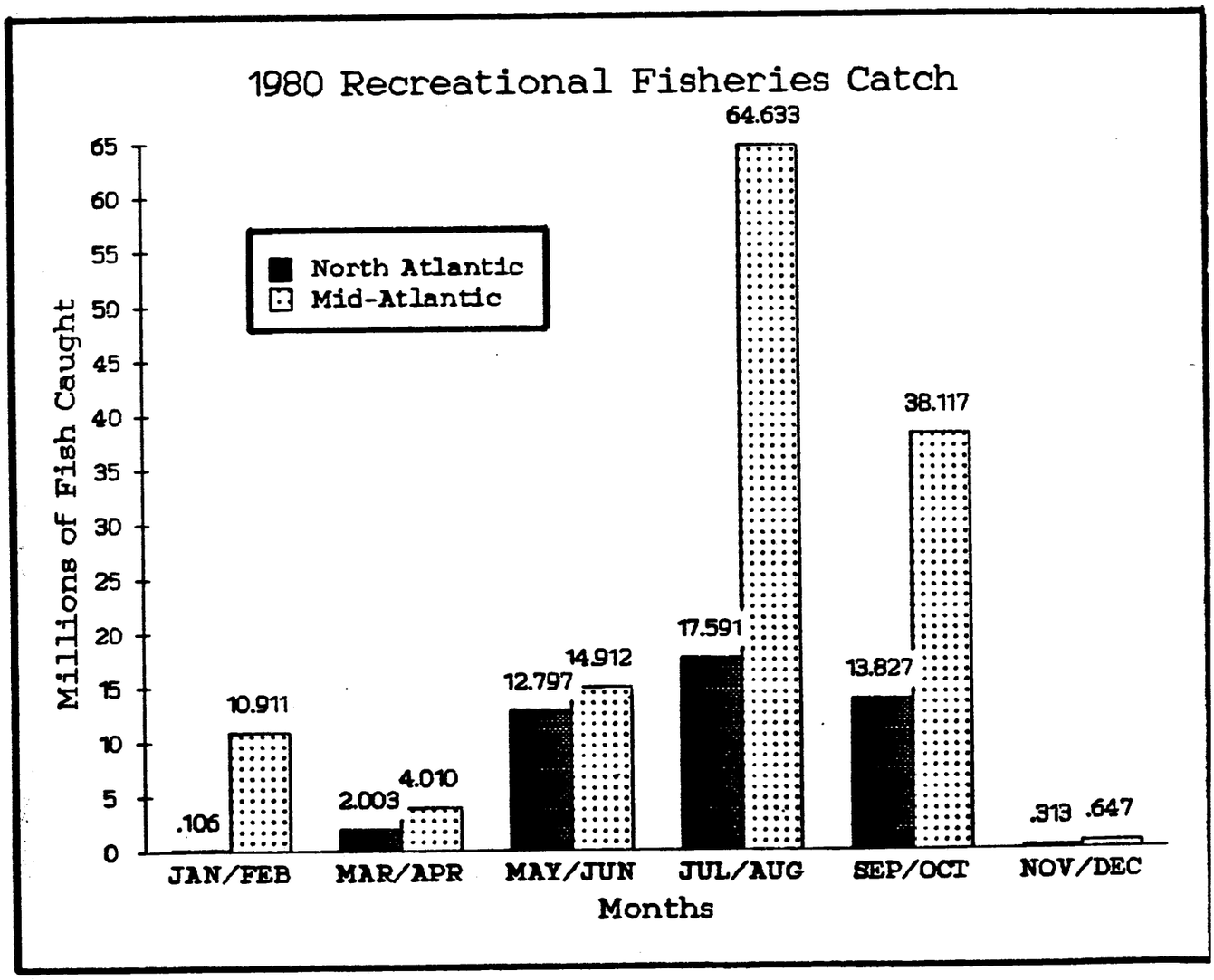
SOURCE: Socio-economic Aspects of Marine Recreational Fishing, KCA Research, Inc., 1983.

This information indicates that anglers using party and charter mode travel the furthest for their activity. The relatively long average distances travelled by anglers, across all modes, is an indication of the extent of the interrelationship between recreational fishing and tourism/vacations.

Recreational fishing in the New England area is a seasonal activity which peaks in mid-summer while there is only a minimum or no activity during the months of November through February. In the Mid-Atlantic, recreational fishing activity also peaks during the summer months but there is continued activity in the late fall and early winter months (Figure 3D2). The increased activity in the Mid-Atlantic in January may be explained by a substantial silver hake (whting) fishery off the southern Long Island and New Jersey coastlines which will occur if weather permits and the fish are available.

Review of the information provided in Figure 3D3 indicates that most of the recreational catch (numbers of fish) comes from "inland" marine waters ("Inland" refers to other bodies of saltwater besides the ocean which include sounds, inlets, tidal portions of rivers, bays, estuaries and other areas of salt or brackish waters.). The exceptions are silver hake, Atlantic mackerel and Atlantic cod. The territorial sea and offshore areas are also important recreational fishing areas for bluefish, scup, weakfish and, to a lesser degree, flounders.

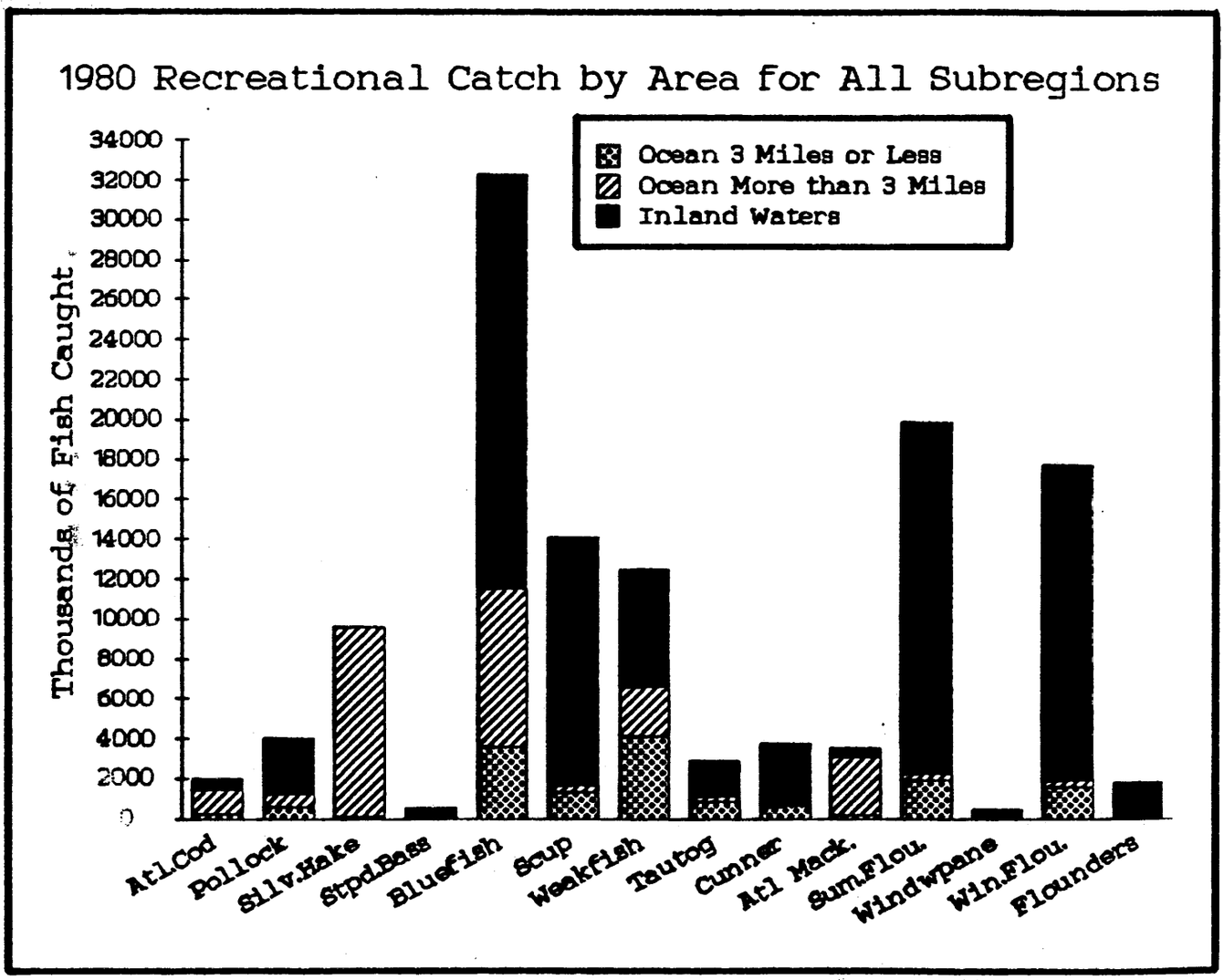
Figure 3D2



Source: Preliminary 1980 National Survey

8/30/85

Figure 3D3



Source: Preliminary 1980 National Survey

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Estimates of Catch and Disposition of Catch

Estimates of the weight[5/] of the 1980 New England and Mid-Atlantic recreational catch of individual species can be found in Figure 3D4. Estimates of the numbers of individual species caught by recreational anglers in New England and Mid-Atlantic areas are found in Figure 3D5. In both the Mid-Atlantic and New England, bluefish lead all other recreational species in total weight caught in 1980 with an estimated 115,712,000 pounds (52,487 mt). In New England, the recreational catch of cod and winter flounder are second and third in catch weight with an estimated 14,058,000 pounds (6,377 mt) and 10,379,000 pounds (4,708 mt) respectively. In the Mid-Atlantic, the catch of summer flounder and weakfish followed bluefish with 45,454,000 pounds (20.618 MT) and 40,029,000 pounds (18,157 mt) respectively.

An increasingly important variable with regard to the recreational fisheries appears to be the disposition of the catch which, until recently, has been poorly documented. Table 3D4 presents the percentage of the recreational catch kept as opposed to not kept for selected New England and Mid-Atlantic species. Table 3D5 shows the breakdown by percent of what happens to the recreational fish which are kept by the angler. It is clear from this information that most of the fish caught by anglers is kept predominately for eating purposes with the exception of Atlantic mackerel. In the case of Atlantic mackerel nearly 40% is given away by the angler. Presumably some of this mackerel is also eaten by the recipient.

5/The National Survey does not provide estimates of the weight of the total catch of individual species by recreational anglers. Consequently, a description of the derivation of these estimates from the National Survey is in order.

The National Survey uses a "complemented surveys" methodology, which consists of an intercept phase to collect information on species catch, numbers, weight, etc., and a household telephone survey phase, to gather information on recent number of trips, number of anglers per household, location and mode of trips, etc. Intercept information is combined with the household survey data to produce expanded estimates of total numbers of catch and partial estimates of the total weight of the catch. The survey provides an estimate of the total number and total weight of fish which is classified as Catch Type A, representing that portion of the recreational catch which was brought ashore in whole form and available for inspection. From Catch Type A data an average weight of the selected individual species was determined. This average weight was then applied to the remaining catch classifications which are: B.1 representing fish caught but used for bait, filleted or discarded dead before the intercept; and B.2 which represents fish fish caught but released alive. The assumption necessary for the estimates of the total weight of the recreational catch is that the average size of Catch Type A fish is representative of the average size of the fish in the other catch classifications.

TABLE 3D4

Percentage Distribution of Disposition of Catch: Atlantic Coast

Catch	Percent Kept	Percent Not Kept
Striped Bass	97.1	2.9
Bluefish	83.0	17.0
Codfish	69.2	30.8
Cunner-Tautog	48.6	51.4
Summer Flounder	58.3	41.7
Winter Flounder	82.0	18.0
Atlantic Mackerel	100.0	0.0

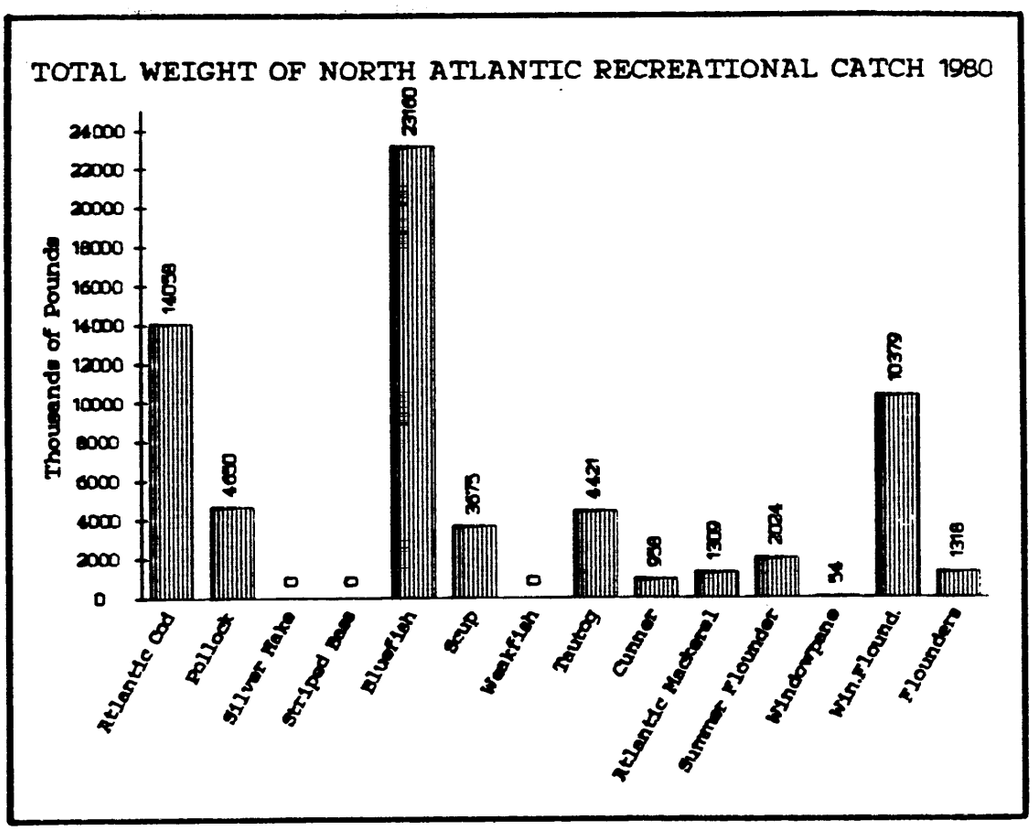
TABLE 3D5

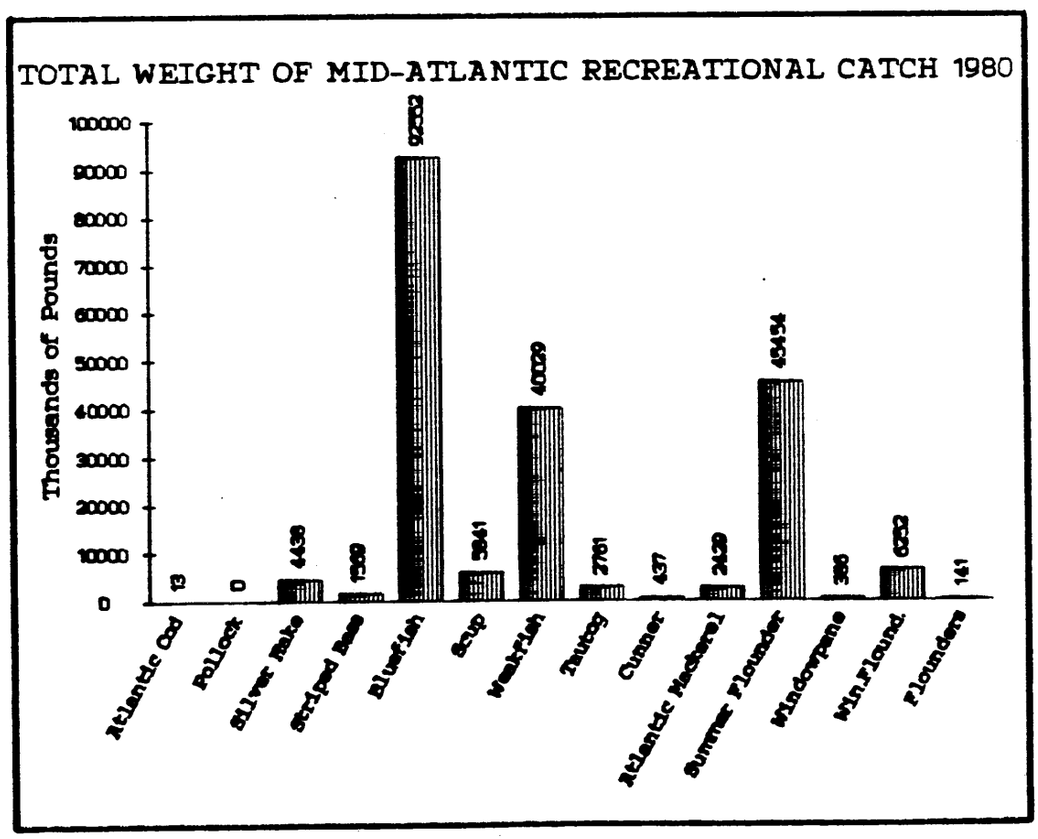
Percentage Distribution of Disposition of Fish Kept: Atlantic Coast

Category	% Eaten or Plan to Eat	% Thrown Away	% Used for Pet Food	% Sold	% Given Away	% Used for Bait	% Used for Other Purposes	% Plan to Use for Other Purposes	Total Percent
Striped Bass	96.8	0.0	0.0	3.2	0.0	0.0	0.0	0.0	100.0
Bluefish	69.5	1.2	0.1	0.6	26.5	1.6	0.1	0.4	100.0
Codfish	75.9	3.2	0.0	0.9	19.1	0.9	0.0	0.0	100.0
Cunner-Tautog	67.3	0.9	0.0	12.4	16.6	0.0	1.4	1.4	100.0
Summer Flounder	75.1	1.4	0.0	0.8	18.8	0.2	3.5	0.2	100.0
Winter Flounder	86.0	0.7	0.3	0.0	10.4	2.6	0.0	0.0	100.0
Atl. Mackerel	47.1	0.0	0.0	0.0	39.2	13.7	0.0	0.0	100.0

SOURCE: Socioeconomic Aspects of Marine Recreational Fish, KCA Research, Inc., Alexandria, Virginia. May, 1983.

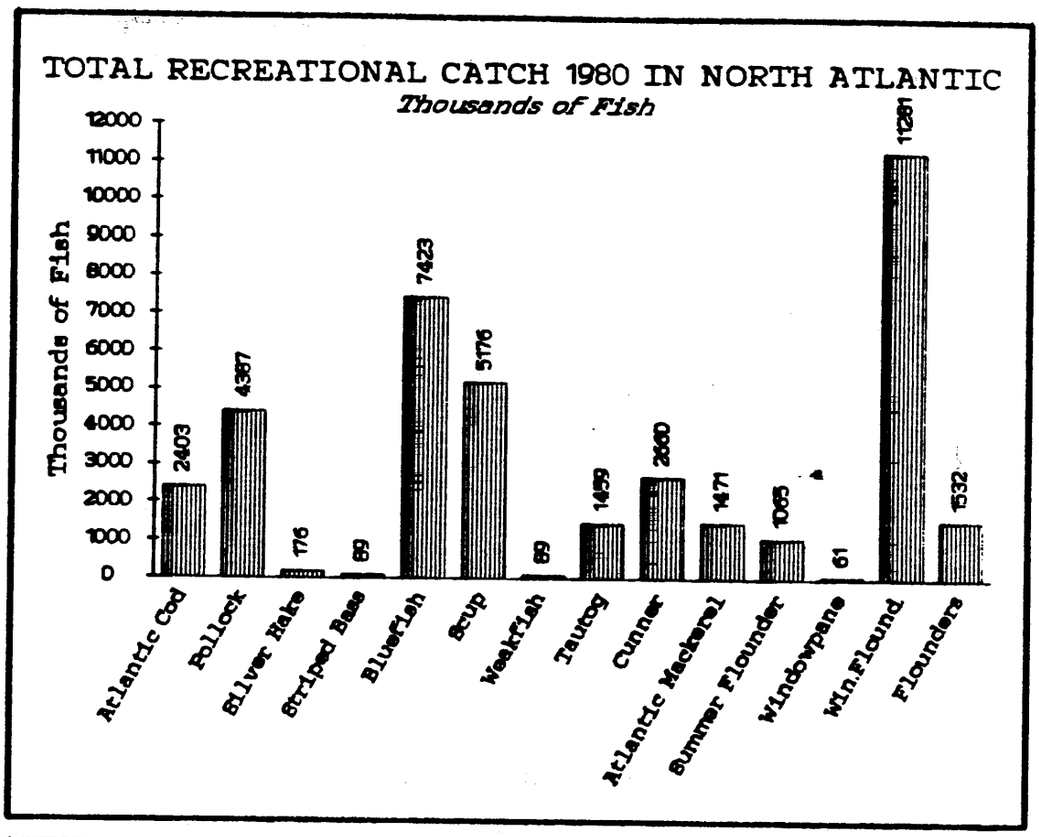
Figure 3D4

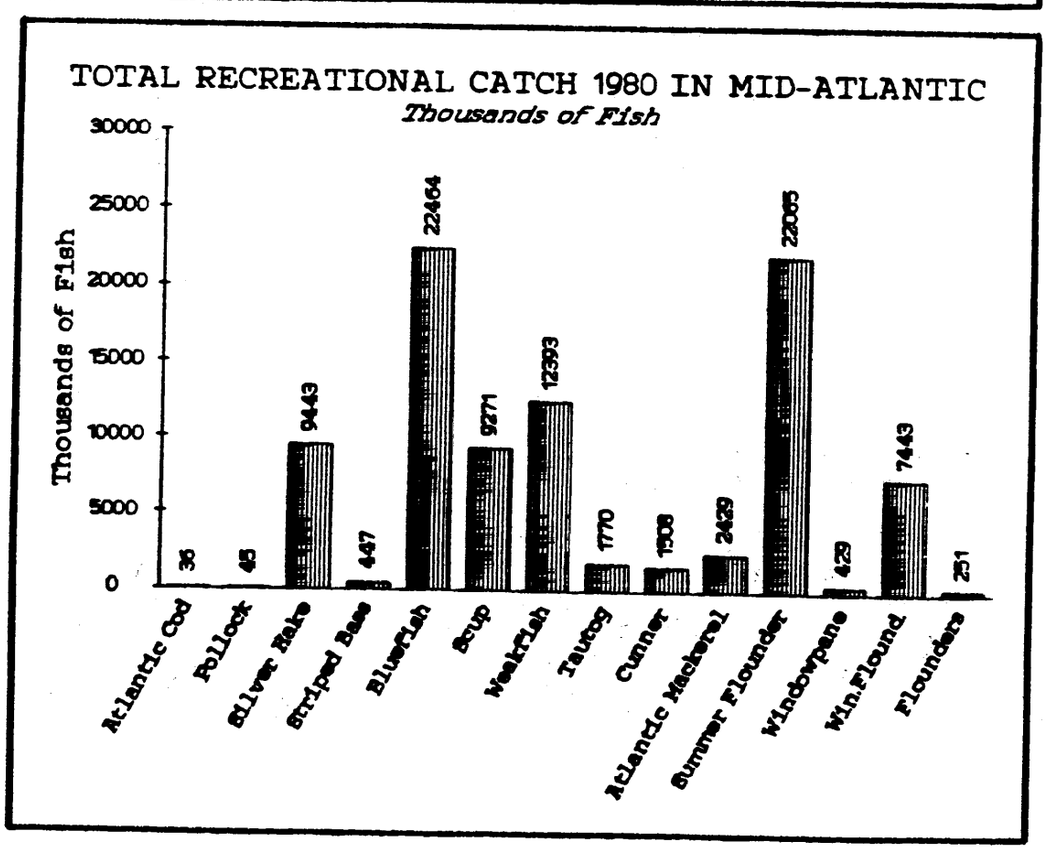




Sources: Preliminary 1980 National Survey

Figure 3D5





Source: Preliminary 1980 National Survey

With regard to those species for which a relatively high percent of the catch is not kept, most of this catch is reported to be returned to the ocean alive. For example, it is estimated of the 51% of cunner which is not kept, 44% is returned alive with another 33% being used for bait. For summer flounder, codfish, winter flounder and bluefish not kept, 97%, 68%, 94% and 90% respectively are returned alive.

Table 3D5 also indicates that cunner-tautog show the highest percentage sold by the angler at 12.4% followed by striped bass at 3.2%. For all other species kept by anglers, the amount sold is reported as less than 1%. The information presented here from the work of KCA Research, Inc., is based on 3,600 interviews with Atlantic coast rod and reel fishermen at the completion of their fishing trips. Advisors to the Council suggest that the percentages of the total catch of striped bass and bluefish and other species reported sold by rod and reel fishermen in the KCA Research findings may be significantly underestimated. It is recognized that in the process of selecting intercept sites to locate and interview recreational anglers, commercial fish buying locations or businesses may not receive high priority and this may account for some level of underestimation. However, while a considerable percentage of the total recreational catch of certain species may be sold, a great majority of recreational fishermen do not sell any portion of their catch (Pers. Communication - Tom Morrisey). It must also be acknowledged that the issues surrounding the distinction between recreational rod and reel and rod and reel fishermen who sell some or all of their catch, have been receiving increased attention by fishery management agencies (e.g., Mid-Atlantic Council Bluefish FMP).

One method to analyze in detail the recreational fisheries for species also part of the North Atlantic multi-species commercial trawl fisheries is to examine the fisheries by mode of recreational pursuit. In this way recreational fishing can be categorized by three modes: party/charter boats, private boats and shore-based angling (combining bank/beach and man-made). If available for each mode, the number of vessels and/or participants, economic information, species catch, participant profiles and seasonality will be analyzed.

§3D2 The Party/Charter Boat Sector

Party boats, also known as headboats, deep sea fishing boats or open boats are licensed passenger carrying vessels in which the passengers pay a set fee to be able to sit or stand along the rail and fish for whatever species on a particular fishing ground the captain determines, or for which the vessel or company formally advertises. Generally party boats fish for bottomfish, although in recent years a number of party boats have sought bluefish. Party boats are open to as many passengers as vessel capacity will allow up to the maximum number of individuals whereby the mechanics of angling can be practically and safely conducted. Reservations are not usually required. Party boats tend to be larger than charter boats with a passenger carrying capacity ranging anywhere from ten to well over one hundred people. The distinction between party and charter boats is not absolute since even the largest party boats may be chartered on occasion, and since charter boats may infrequently operate as open boats for certain occasions or during set times of the year.

The party boat industry is comprised of owners, operators, crew members, bait suppliers, marina operators, advertisers, tackle manufacturers, and others. It is loosely organized with some regional and national associations for boat owners and captains whose memberships have become more active with the implementation of the MFCMA. Among the major concerns of these organizations are persistent problems of gear conflicts as well as general fishery resource allocation issues at the state and federal level.

For the vast majority of party boat operators, their party fishing enterprise provides most of their income. Most operators view themselves as full-time professionals. The further north and east one goes along the Atlantic coast, away from the New York/Boston megalopolis, the less this generalization holds. This is largely related to the inhospitable northern climate and consequent shorter fishing season. Over the past few years 'whale watching' excursions have become popular and an added source of revenue. Various party boats in the New England area commit time to this activity and a few operations have had new vessels built specifically for this purpose.

The party boat operation is similar to shore-based small businesses in that sole proprietorship and wholly-owned corporations are the dominant forms of financial organization. Party boat operations are usually a family business. A 1979 study conducted for the NEFMC[6/] showed that fully 40% of interviewed New England party boat operators were the second generation of the family involved in the business, and evidence suggests that this pattern holds throughout the Mid-Atlantic region as well. Increasing numbers of party boat businesses have become multi-vessel operations, which implies that at least for some operators the business is financially rewarding.

The size of the party boats vary anywhere from 30 feet to over 120 feet. Passenger capacity, availability of fish, and captain's experience are important factors in determining the economic success of the party boat. Weather is another important determinant of a party boat's profitability. The number of passengers a vessel can reasonably carry sets the upper limit on the potential gross revenue of a boat.

The recent trend has been toward construction of vessels ranging in size from 80-120 feet, constructed of aluminum or steel, and with sufficient power to achieve speeds of over 20 knots. These vessels not only are capable of generating higher potential revenue, but also afford greater comfort, seaworthiness, lower maintenance costs than wooden vessels, and have a greater fishing ground range.

For the most part, party boat fishing is by rod and reel. Tackle is rented from the vessel or brought by the angler. The species targeted depends on seasonal abundance and the operator's ability to locate the fish. Figure 3D10 indicates that party and charter boats catch a significant portion of the total number of codfish caught by recreational fishermen in New England in 1980. Bluefish and pollock also appear to be important to some party boat operations in New England. It is also known that north of Cape Cod, haddock

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6/"Description of the Recreational Fisheries for Cod, Haddock, Pollock and Silver Hake off the Northeast Coast of the U.S." report to the New England Regional Fishery Management Council by L.E. Nicholson and R.P. Ruais, April, 1979.

is highly prized by some anglers using party boats, although the catch is relatively infrequent (which explains why this species is included in the 'other species' category of the National Survey). Cusk is another important species to party and charter operations north of Cape Cod and, in recent years, wolffish or catfish has also become a somewhat important species. Review of 1980 National Survey data presented in Figure 3D10b would indicate that in the Mid-Atlantic, party and charter boats caught most of the recreationally caught silver hake, and that weakfish, bluefish, and Atlantic mackerel are also important recreational species to the party and charter boat industries. Anglers fishing on party or charter boats nationwide are much more likely to be successful in catching fish on a given trip than when fishing by any other recreational mode, according to National Survey data.

Charter boats tend to be smaller than party boats, under forty feet in length and with a smaller carrying capacity than party boats. In general, they have shorter seasons and are less likely to provide an operator with full time employment and income. This is especially true the further north and east the operation is located. Charter boats are more likely to pursue gamefish or big game species although some operators may pursue bottomfish on a regular basis. The species to be pursued and the length of the trip are usually decided by the captain or the chartering party with seasonal availability and limitations of the vessel and gear as the major constraints.

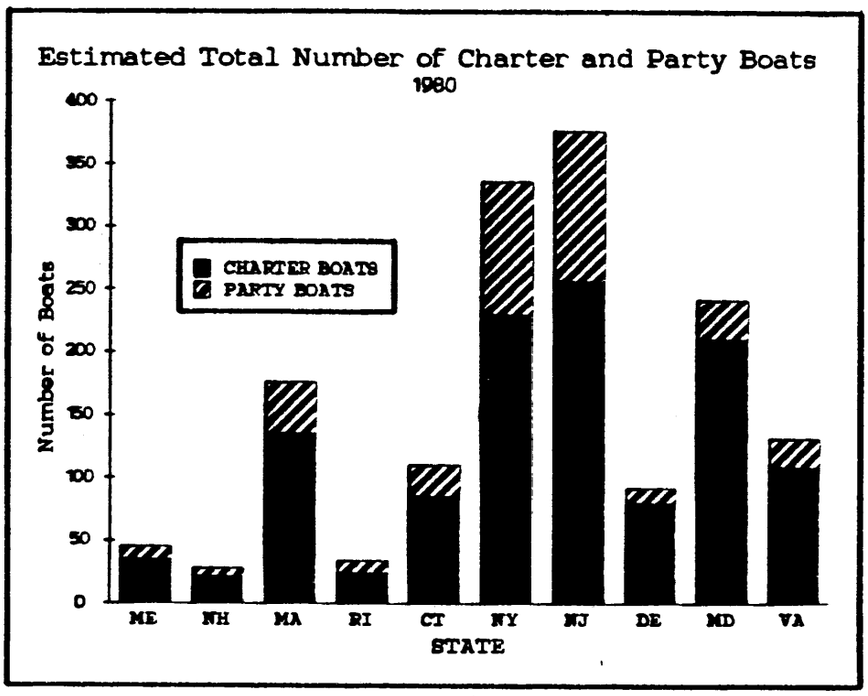
Charter boats tend to have more horsepower per registered ton than party boats, resulting in higher speeds and less steaming time to the fishing grounds. The boats are usually constructed of wood or fiberglass. Charter boats are usually equipped with outriggers and rod and reels are they usually supply all other necessary tackle or bait for their patrons. In addition to fishing for most of the same species sought by party boats, charter boats also fish for highly prized big game species such as tuna, swordfish, and marlin.

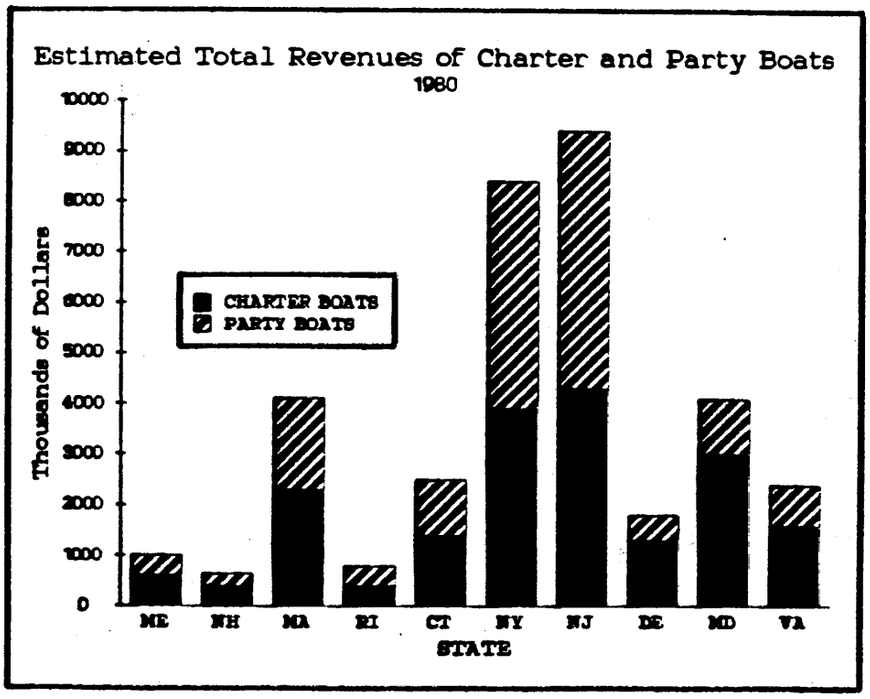
The cost of chartering a fishing vessel varies and may be substantial. For the several hundred dollars the angler pays, he choses his fishing companions, and has a direct relationship with the captain of the boat. Generally charter boats are hired for less than ten people. A vessel which offers to carry six or fewer passengers need not comply with rigorous Coast Guard inspection requirements as do vessels with a greater carrying capacity. It has been estimated that some 90% of the charter fleet is made up of vessels of six passenger capacity or less (1979, Nicholson and Ruais).

Accurate estimates of the number of vessels performing as charter boats at any given time are difficult to produce. Technically, any size private recreational vessel on a given fishing trip could be considered a charter boat if passengers are contributing or required to pay an amount greater than the expense of the trip. Further, it is known that some unlicensed private boat owners often subsidize their annual vessel costs (winter storage, fuel, maintenance, etc.) by charging other anglers or friends for fishing trips. The extent of either above situation is not known.

The number of charter and party boats in the Mid-Atlantic and New England regions as estimated in the 1980 National Survey varies, with the highest number in New York and New Jersey, followed by Massachusetts and Maryland (Figure 3D6a). Recent discussions with New England state officials and individuals knowledgeable about the party and charter boat industry indicate that the actual number of active charter and party boats today is lower than the National Survey data figures for 1980. Specifically, it has been

Figure 3D6





Source: Economic Activity Associated with Marine Recreational Fishing in 1980, prepared for SFI by Centaur Associates, Inc., Washington, DC.

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indicated that New Hampshire has 14 active party and charter boats (pers. comm., Ray Gilmore), Massachusetts has 181 party and charter boats (pers. comm., Randy Fairbanks), Rhode Island has some 64, approximately 34 of which are active (pers. comm., Mario Pagano), Connecticut has 54 charter and party boats (pers. comm., Bob Sampson), and Maine has 65 (written comm., Clement Walton). These numbers do not reflect the private recreational boats which may occassionally operate as charter boats. The 1980 National Survey estimate of the total number of party and charter boats for all of the New England states differs from the sum of the current estimates provided by state officials and advisors by only 15 vessels overall. The total revenues estimated in the Survey parrallel the distribution of the estimated numbers of vessels, with the highest revenues in New York and New Jersey (Figure 3D6b).

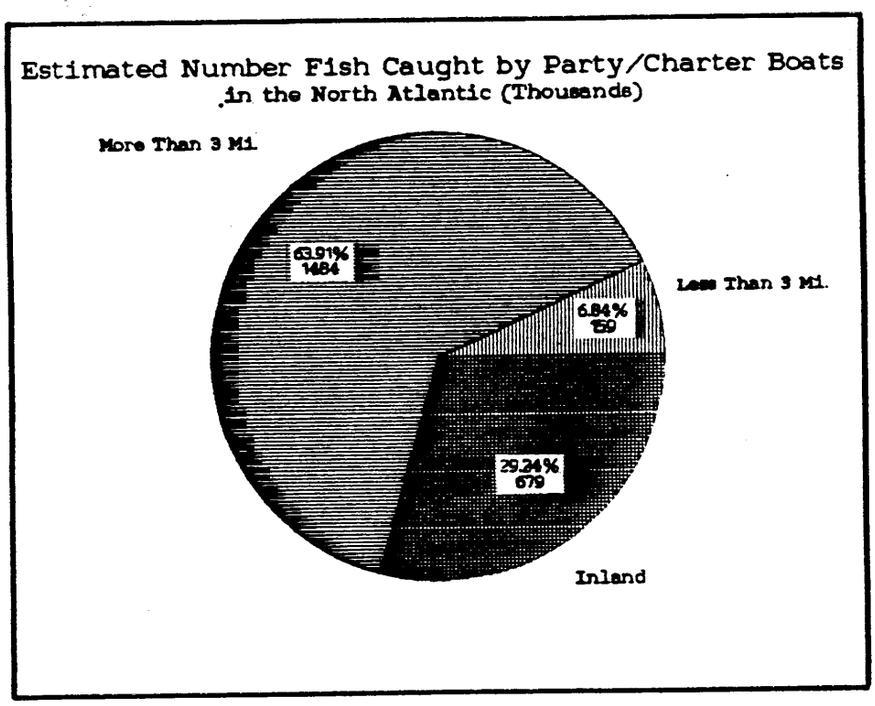
According to the 1980 National Survey, of the total number of fish caught by party and charter boats fishing in the North Atlantic, 64% are estimated caught outside of three miles from the coast, while 7% are caught inside of three miles from the coast. Approximately 29% of the party and charter boat catch in New England comes from inland waters (Figure 3D7a). In the Mid-Atlantic area the party and charter boat catch is also largely offshore with the remaining catch more evenly divided between territorial sea and inland waters (Figure 3D7b).

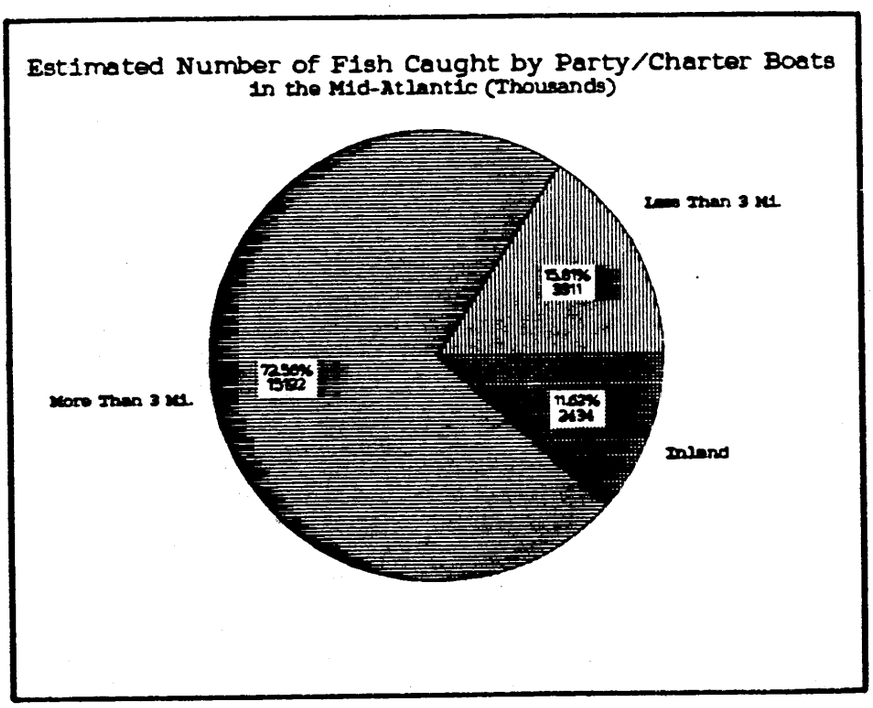
In the North and Mid-Atlantic in 1980 it is estimated that party and charter boats caught nearly 35% of the total weight of the recreational catch (Figures 3D8a, 3D8b). In the North Atlantic only 9% of the total number of fish caught recreationally is by party and charter boats, while in the Mid-Atlantic this mode accounts for only 20% of the total recreational catch in terms of numbers of fish (Figures 3D9a, 3D9b). The differences in percentage of total number and percentage of total weight demonstrate that fewer, but larger fish are caught by party and charter boats than by private and rental boats.

§3D3 The Private/Rental Boat Sector

Several sources suggest that private recreational boating has been a steadily increasing leisure activity over the last few decades in both marine and fresh water. Private boats of all sizes and types participate in marine recreational fishing along the coastal marine and tidal waters of the Eastern U.S. during the peak boating season. The introduction of fiberglass boat construction and mass production have had a dramatic effect on the recreational boating industry, particularly with regards to the sale of trailerable size boats. Coast Guard annual boating statistics show that over the last five years there continues to be a gradual increase in the number of boats which may be spending a portion of their time recreationally fishing in marine waters.

Figure 3D7





Source: Preliminary 1980 National Survey

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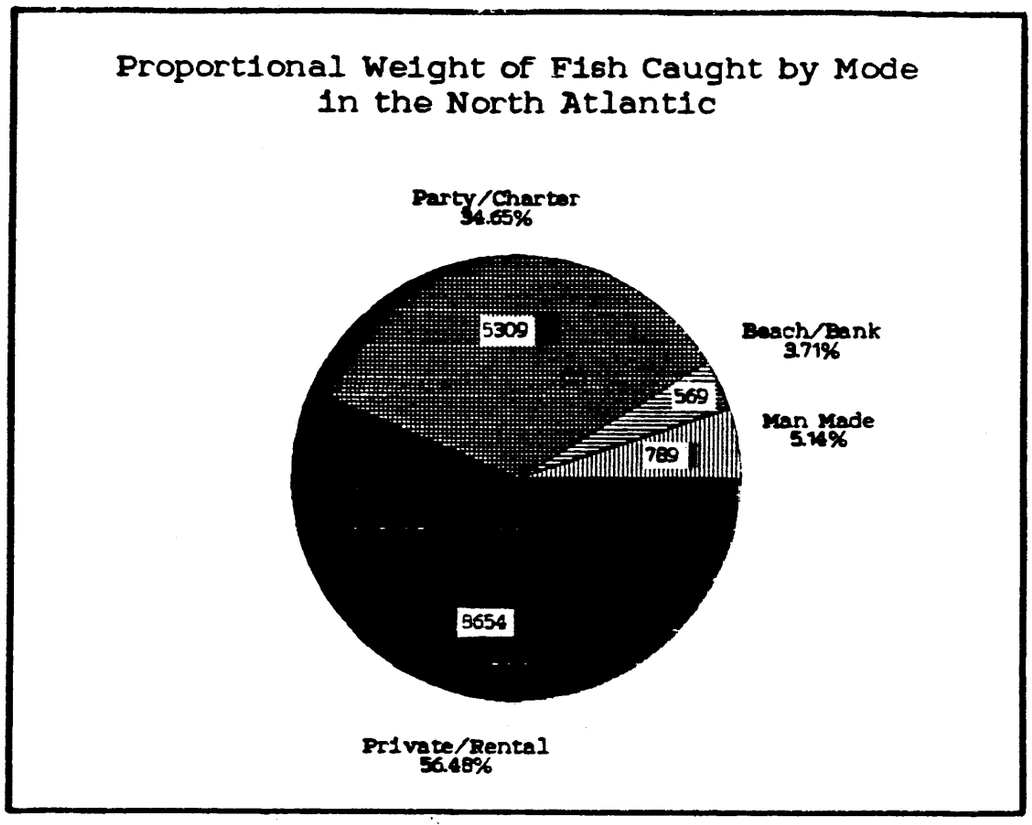
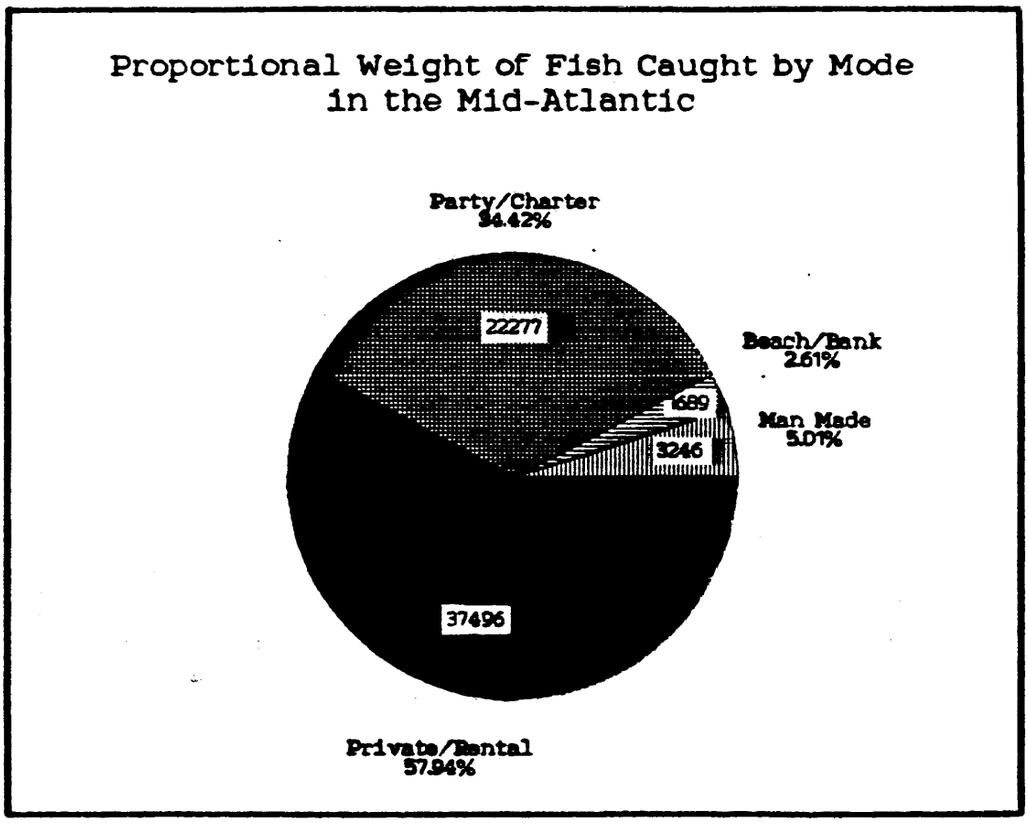


Figure 3D8



Source: Preliminary 1980 National Survey

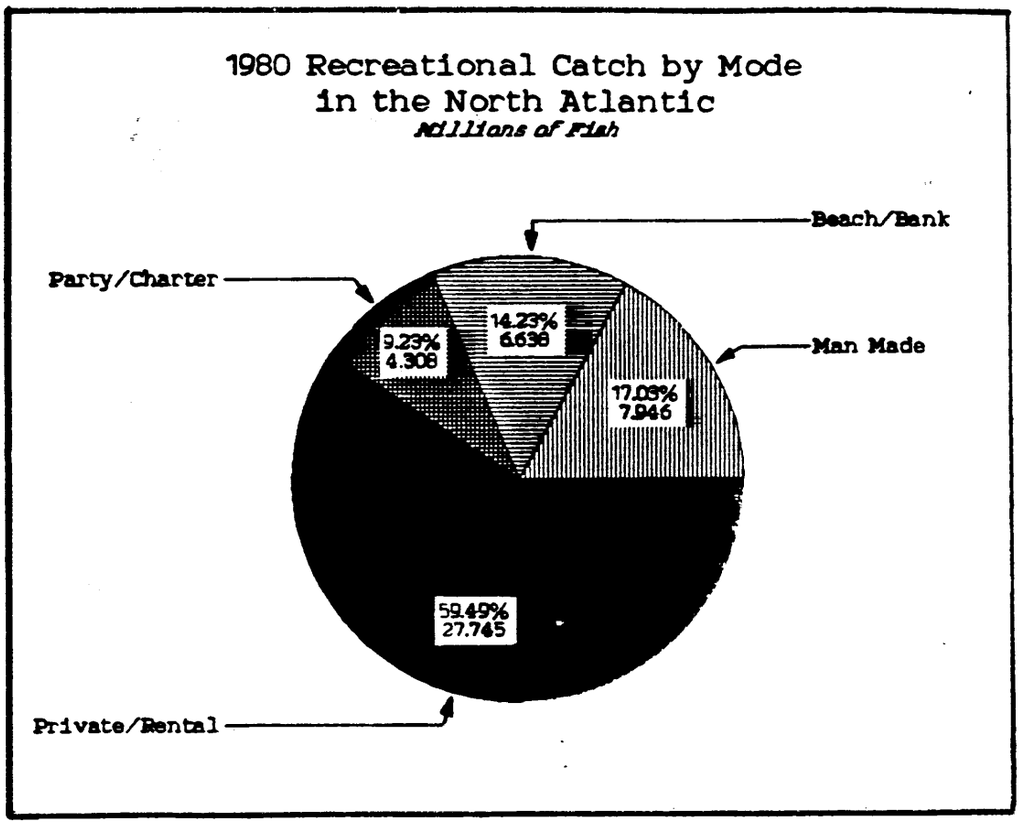
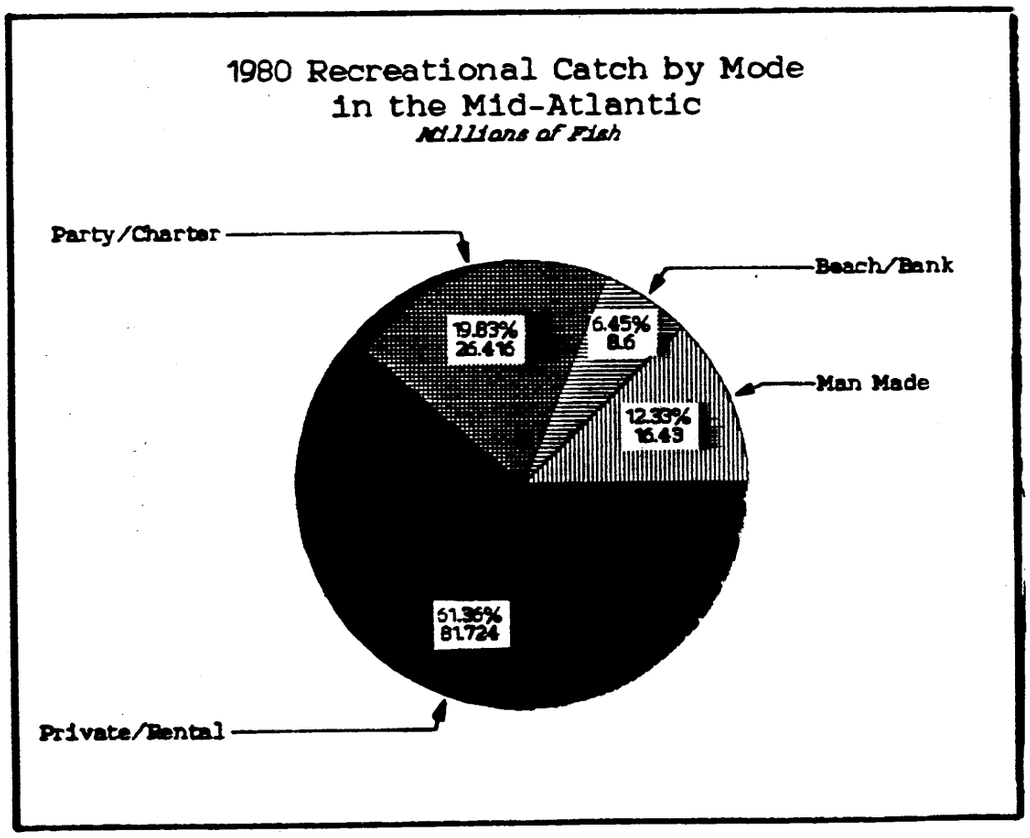


Figure 3D9



Source: Preliminary 1980 National Survey 8/20/85

It is currently not possible to derive an accurate count of the total number of private and rental boats which engage in recreational fisheries for species which are associated with the Atlantic demersal finfish complex. Part of the difficulty is due to the fact that some anglers transport their boats considerable distances. The 1983 KCA Socio-Economic Survey estimated that the average distance traveled by private recreational boaters is 81 miles. In some cases, the distance traveled may be well over this average as exemplified by those avid New England anglers who take their trailerable boats as far south as the Florida Keys for a winter vacation. Many anglers do not generally berth their vessels full time at the marina, but rather launch their boat at any one of the thousands of ramps on rivers, bays, sounds, beaches, etc., along the Eastern seaboard.

By the same token that an accurate boat count is near impossible to determine, the revenue generated by this sector of the recreational fishery is difficult to estimate. Much of the money for gas, bait, and vessel equipment is spent all along the coastal area or may be dispersed outside of the coastal area, perhaps outside of the state off which the fishing takes place.

A central problem in trying to determine the total fishing effort of private recreational boats on the Atlantic demersal finfish fishery arises from the inability to determine the portion of time these boats spend in salt versus fresh water and the total time the boats are engaged in fishing as opposed to other recreational pursuits. While it is clearly difficult to pin down the specific effort by private and rental recreational boats on the Atlantic demersal finfish fishery, the 1980 National Survey estimates that over 3.6 million fishing trips were taken by private or rental boats in the North Atlantic during that year. The Survey also reports that an average of eight fish per trip were caught by these private boat anglers.

The species sought by private recreational boat anglers depends on the size and range of the boat, species seasonality, weather, and individual preference. The results of the 1983 KCA Socio-Economic Survey results show that some 75% of private and rental boat anglers have a species preference on the Atlantic coast. In descending order, preferences are for are bluefish, summer and winter flounder, codfish, and striped bass. The same study indicates that an estimated 70% of those who went fishing caught something. Of that number, 58% of the anglers reported that they kept the fish they caught.

Although it is difficult to determine the numerical extent of private boat participation, it is clear from the 1980 National Survey data that this recreational mode is responsible for the bulk of, or a substantial portion of the total recreational catch with regards to selected species. In the North Atlantic it is believed that private and rental boats are responsible for most of the catch of winter and summer flounder, cunner, tautog, scup and Atlantic mackerel (Figure 3D10a). This user group also accounts for a substantial portion of the recreational catch of cod, pollock, and bluefish. In the

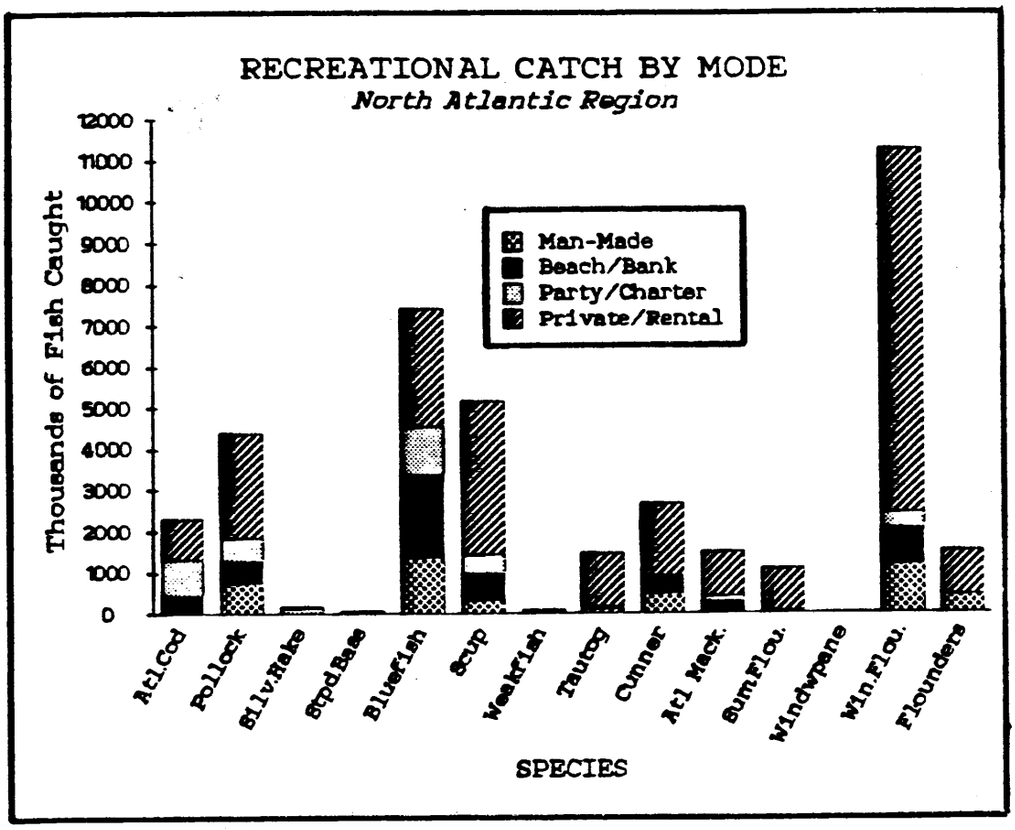
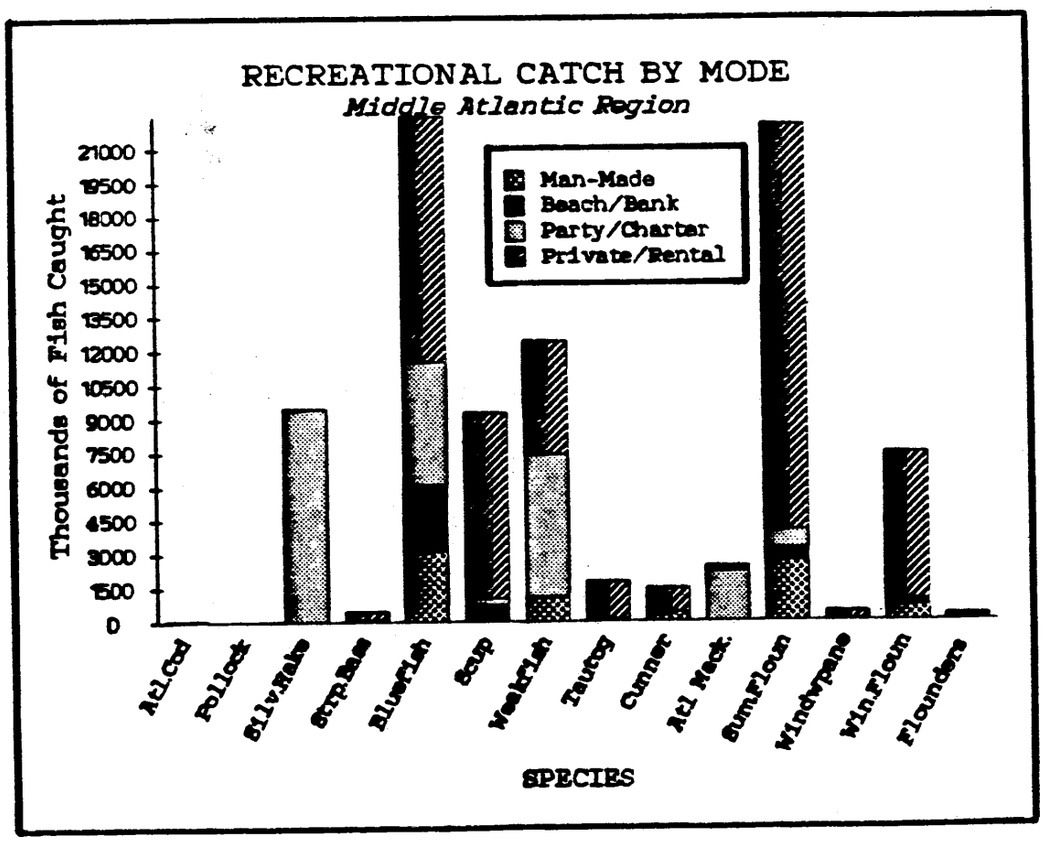


Figure 3D10



Source: Preliminary 1980 National Survey 8/30/85

Mid-Atlantic region, private and rental boats catch most of the recreational summer and the winter flounder, scup, tautog and cunner, and to a lesser extent bluefish and weakfish (Figure 3D10b). The percentage of the total number of recreationally caught fish in both areas by private and rental boats is 60% in the North Atlantic and 61% in the Mid-Atlantic (Figures 3D9a, 3D9b).

Private and rental angling represents an estimated 56% of the overall proportional weight of total recreational fish caught in the North Atlantic. Similarly, 58% of the total proportional weight of fish caught in the Mid-Atlantic is fished by private and rental boat anglers (Figures 3D8a, 3D8b).

Of the estimated number of fish caught by private and rental boats in the North Atlantic, 78% were caught inland, 11% were caught less than 3 miles from the coast, and 11% were caught more than three miles from the coast. In the Mid-Atlantic, some 84% of the fish caught by private and rental boats were caught inland, 11% inside of three miles and 5% caught outside of three miles (Figures 3D11a, 3D11b).

§3D4 Shore-Based Angling

Shore-based recreational angling is a year-round leisure activity, and a relatively inexpensive means of augmenting the household food supply with fresh fish. Information from the 1983 KCA Socio-Economic Survey verifies that shore-based angling is the least expensive mode of recreational fishing with the average expenditure per trip amounting to about $24.00. In most areas, shore-based angling is conducted close to home and does not require major expenditures for travel, lodging, food, or equipment. For many shore based anglers a major factor limiting the activity is the lack of easy access to the shoreline. In 1978 it was noted that in the North Atlantic region 83% of the total shoreline was privately owned. Although shore-based angling is a year round sport in many areas, participation usually peaks during the summer months. In New England, with the exception of a winter smelt fishery, all modes of marine angling are practically non-existent during the winter months. The 1980 National Survey of Fishing, Hunting and Wildlife-Associated Recreation estimated that of the total 12.3 million salt water anglers, 6.7 million (55%) fished from the surf and shore.

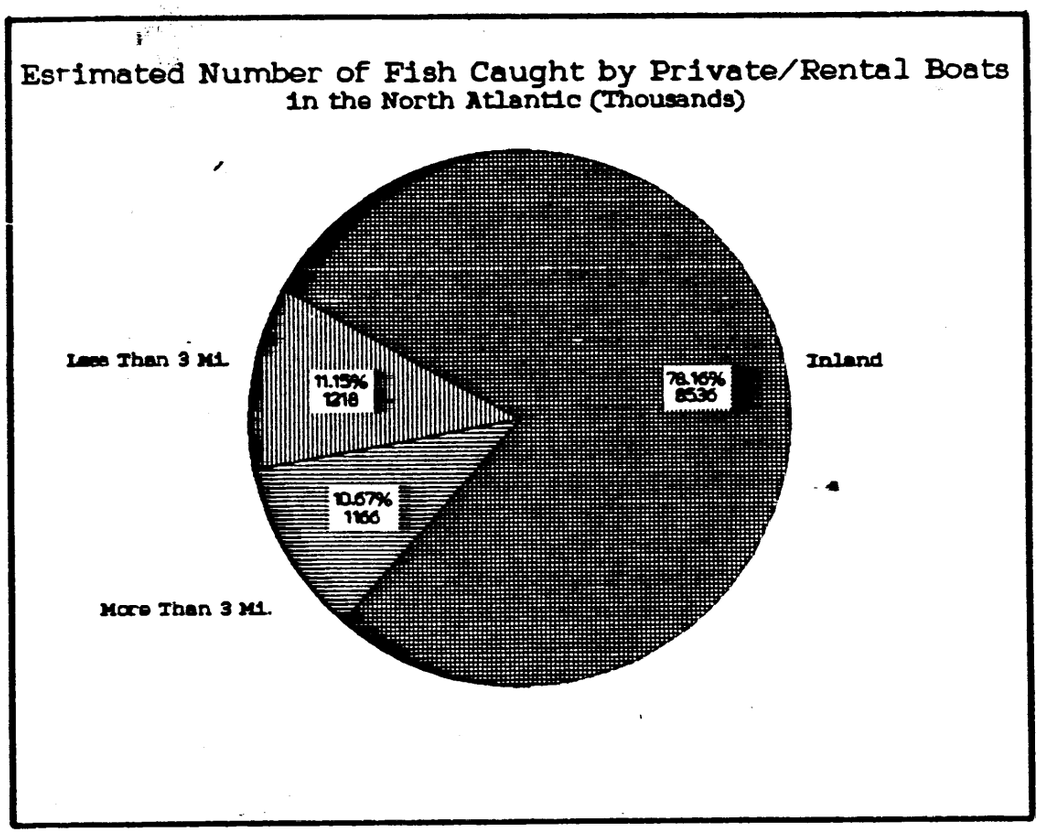
Shore-based angling has been defined according to the following modes:

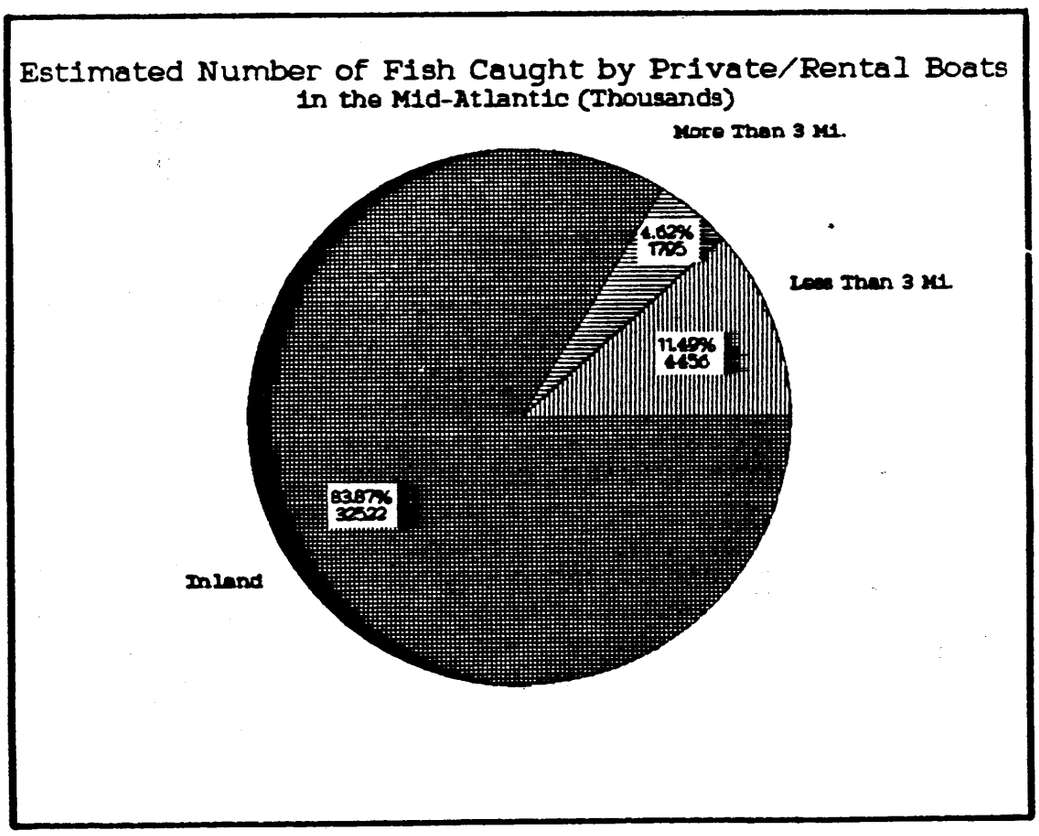
Man-Made or Surf fishing is understood to include fishing from any jetty, beach, or construction (pier) on the ocean;

Beach or Bank fishing includes those fishing areas situated on any bay, river, or sound.

Shore fishing along the 600 mile area from Cape Cod, Massachusetts, to Cape Hatteras, North Carolina, has been of considerable importance for more than 300 years (1978, Freeman). These shore fisheries have historically depended on about a dozen species, which include bluefish, striped bass, winter and summer flounder, and weakfish. Freeman (1978) reported that more than three-quarters of a million anglers fish along the shores, docks, bridges, piers, wharfs, bulkheads, and jetties of this area.

Figure 3D11





Source: Preliminary 1980 National Survey

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Data from the 1980 National Survey indicate that in the North and Mid-Atlantic, shore-based anglers catch a substantial portion of the total catch of bluefish in numbers (See Figure 3D10a, 3D10b). In the North Atlantic, shore-based anglers also catch cod, pollock, silver hake, scup, cunner, mackerel, and winter flounder. The bulk of the catch of cod, pollock, and winter flounder by shore-based anglers occurs in April and May, and October through November. Mild weather during these months will allow considerable shore based effort to take place at many locally popular fishing sites throughout New England. In the Mid-Atlantic shore based effort accounts for a portion of the recreational catch of scup, weakfish, summer and winter flounder.

Overall, data from the National Survey indicates that the shore-based angler is responsible for just under 9% of the total weight of recreationally caught fish in 1980 (Figure 3D8a). This catch by shore-based angler in the North Atlantic represents approximately 31% of the total number of recreationally caught fish in 1980. In the Mid-Atlantic, under 8% of the total weight is caught by recreational anglers while this recreational mode accounts for almost 19% of the number of fish caught (Figure 3D8b).

SUBPART E: SOCIAL AND CULTURAL FRAMEWORK

§3E1 Scope of the Social and Cultural Descriptions

While the most apparent effect of fisheries management is likely to be economic, the consequences of fisheries management may be much broader. Other effects, however, are neither reliably predictable nor easily quantifiable since they are related to social-cultural characteristics of each fishing community. This section will outline the relationship between certain socio-cultural characteristics and economic issues common to most fishing communities. The social-cultural significance of the economic and other effects of the plan will thereby be indicated.

Fisheries management policies which affect economic returns have the effect of redistributing effort. This redistribution of effort is usually a switch to different fisheries; however, if the effect of the policies is perceived as being too severe, it is likely that there will be fishermen who will leave fishing for alternative occupations. Their response to changes in the industry and the potential for other opportunities, however, are affected by ethnicity, education, and the existence of alternative occupations.

Employment is a prominent issue in many New England fishing communities. Fishing has traditionally been the major employer in many of the rural coastal communities; however, with decreasing stocks, increasing fishing costs, and the use of closures and limited access techniques for fisheries management that result in long periods when it is impossible for some to fish, alternative employment opportunities are needed.

Generalizing broadly, the most widely available alternative employment in the New England region is seasonal, i.e., the summer tourism industry. In many of the more rural communities in New England, particularly in Maine, summer tourism is the only industry apart from fishing and fishing-related industries (fish processing plants, etc.). Summer, however, is also the most active period of fishing since weather constrains fishing in the winter. Consequently, employment in the tourism industry is not a viable alternative for most New England fishermen. It is, however, employment which can be important for fishermen's wives and other relatives.

In urban areas there is more variety in employment alternatives, but access to employment depends on age and education. The majority of fishermen in New England have not graduated from high school. This lack of formal education limits access to employment in other industries. In its traditional form, fishing was a skill learned by sons from their fathers, uncles and grandfathers and passed on to their own children. Success was not dependent on formal education. Boys often left school as soon as legally possible to go fishing full-time. Although fishing has become increasingly technical with the use of a variety of electronic devices, success still seems to rely on traditional skills and attitudes such as net mending and a willingness to fish for long hours, not formal education.

Related to opportunities for alternative employment are the issues of ethnicity and kinship. The significance of ethnicity is evident primarily in New Bedford and Gloucester where the Portuguese and Italian predominate. Besides a tradition of involvement in fisheries that stretches back to their

European origins, fisheries employment is so widespread, so embedded in the Portuguese and Italian communities of New Bedford and Gloucester that access to employment outside the fishing industry is limited. Fishing and related industries have dominated the economy of Gloucester since the 1700's. Today, fishing and related industries are thought to constitute 40 percent of the city's jobs and revenues. Fishing and related industries are believed to provide over 33 percent of New Bedford's economic base.

In both Gloucester and New Bedford, whole families are often involved in fishing and related industries. For example, in many instances a father, his brothers, and his sons fish together on one boat. In addition, wives often work in fish processing plants or are involved in marketing efforts. The involvement of large segments of the whole community in fishing-related employment obviously means that large numbers of individuals would be forced to seek alternative employment simultaneously should there be a management technique that tied up many of the boats.

Beyond the issue of employment itself is the issue of income. Income is socio-culturally significant for its role in the determination of lifestyles. Choices made in the use of income may directly and indirectly affect fisheries management. For example, if income is used for the education of children, occupations other than fishing might be later sought by those children. If, on the other hand, income is used to purchase technologically-advanced fishing gear, resulting impacts on stocks might require increased management.

Income may also be important in considering whether or not alternative employment would be considered by fishermen. If fishermen were making a significantly higher income than that which they might obtain in another occupation given their age, education and training, they would surely continue to fish even if their income were diminished by management measures. This is particularly true because fishing is considered by most fishermen as an intrinsically satisfying occupation.

Other social choices which have an economic bearing include residence, home port, and port used for off-loading. These factors must be considered in measuring social and economic benefits to communities which arise from the fishing industry (in expenditures by the fishermen, for example, or in employment in related industries, etc. See: "Estimation of Income and Employment Multipliers for Marine-Related Activity in the Southern New England Marine Region" URI 80-10). These are also important in measuring social and economic costs of the fishing industry to a community. For example, if a majority of boats are berthed in a port, but off-load elsewhere, and the fishermen reside still elsewhere, the economic costs of providing mooring space to the fishing boats may or may not be balanced, for example, by their attraction of tourists. The values community members place on such aspects as the scenic benefits of the boats and the diversity of lifestyles symbolized by the presence of fishermen and their boats are sometimes at odds with the values the same community might hold vis-a-vis environmental considerations. Harwich, Massachusetts, is currently involved in a controversy on the advisability of increasing commercial fishing and related industries with fears of water pollution and aesthetic considerations being offered as a basis for opposition by those who do not need the employment offered by the development.

Mooring space raises the issue of the conflict between commercial and recreational fisheries. There is an ideological level of the conflict between these groups with both commercial and recreational fishermen arguing that society benefits more from their operation than from the other group's and that they should therefore have a greater share of the resource than they now have. The commercial fishermen maintain that their jobs are more important than leisure activities, especially because their occupation results in the provision of food for large numbers of consumers. Recreational fishermen maintain that fishing is a basic right for individuals and point to the millions of dollars spent on recreational fishing as evidence of the importance of their industry. In addition, NMFS statisticians estimate that anglers land 30 to 35 percent of the total finfish poundage harvested for food in the United States (Hart, 1985).

The conflict is not always on an ideological plane since economic impacts of one group on the other can be significant. Where the recreational fishing boats crowd the harbor, making access to the piers difficult or time consuming, the conflicts are apt to be serious since the commercial fishermen view time as money. Although recreational fishermen theoretically do not catch fish for sale, the operations of recreational fisheries are very much a part of the commercial world. Charter and party boat operations depend on their reputations of bringing recreational fishermen to areas where they can catch fish. Fixed gear commercial fishing operations, however, are accused of blocking areas traditionally fished by recreational boats. Gear conflicts also arise when entanglements occur due to poor marking or visibility of fixed gear.

In some ports, a symbiotic relationship exists between commercial and recreational fishing interests. Tourists are attracted by "working harbors" where they can see commercial operations, especially if they can participate in a related activity such as recreational fishing. The recreational fishing industry may also serve as a benefit to the commercial fishing community in need of alternative employment opportunities. Additionally, the multiplier effects of the value of the recreational fisheries on related industries may be beneficial to commercial fisheries by, for example, decreasing costs of certain equipment.

Methods of operation, which stem from choice of fisheries, size and form of boats, and types of gear, have socio-cultural significance. Some researchers have found that forced changes in fishing techniques, coupled with moves to urban centers as occurred in Nova Scotia, can lead to negative social consequences such as alcoholism, suicide, and crime (Acheson, 1979). Features such as whether or not the majority of the fishing boats are small day boats with attendant constraints on operation dictated by foul weather or large trip boats able to fish year-around, affect the communities' patterns of life. Boats making long trips tend to be larger vessels with greater horsepower, greater available hold capacity, more crew members, greater value and average higher gross stocks for the year than do day trip boats (Peterson and Smith, 1979).

One might hypothesize as well that the method of operation may lead to self-esteem, pride in work and product, leading to quality which might be lost if perceived freedom of operation or independence of the fisherman is too extremely regulated. An important figure in the New England region is the

owner-captain of a fishing boat. These individualistic entrepreneurs take considerable risks to finance boats, and many complain of the difficulties of making a living hunting an elusive prey, hampered by high costs and increasing management. Most though proudly acknowledge the benefits of "being their own boss," including freedom not to fish in heavy weather and freedom to decide on the amount of time to spend ashore (Peterson and Smith, 1979).

Finally, some comment on the local norms regarding management should be included. Fishermen are increasingly aware of the negative impacts of heavy fishing on certain stocks, and many acknowledge the necessity of fisheries management. However, fishermen want as little interference as possible with their usual operations, especially with their option to shift gear as necessary. Inshore or small-boat operators prefer boat quotas so they are not penalized by their inability to fish in rough weather.

All fishermen who agree that management is necessary comment that the key to successful management is enforcement. The perception that "everyone else is cheating" causes fishermen to devise a wide variety of techniques to avoid compliance with regulations in order to stay competitive with others who are avoiding the regulations. With active enforcement coupled with heavy fines or other strong economic sanctions, most fishermen say that fewer fishermen would be willing to take the risk of being caught.

Ethnicity, as defined by recent immigration, is a factor in acceptance of and adherence to management regulations. Recent immigrants who fish with other recent immigrants have, as a group, been criticized in both Gloucester and New Bedford for their disregard for fisheries management regulations (Miller and Van Maanen, 1979).

Enforcement of fisheries regulations is considerably easier when the fishermen agree that the regulations are necessary and appropriate. For example, many fishermen now agree that spawning area closures are often appropriate; however, if an area is closed for spawning when the fishermen know from analyzing the fish in their catch that spawning is over or in a different area, the regulations will often be ignored.

In addition, different communities of fishermen may find some regulations more acceptable than others because of the effects that the regulations have on other aspects of their lives. Not everywhere in New England are the motivations the same. Researchers have found that Maine fishermen, in general, must be able to remain in their natal community; their income must remain about the same; and they must have the freedom to fish when weather permits. Rhode Island fishermen, in contrast, have fewer ties to their natal community. It is their immediate or nuclear family (i.e., wife and children) rather than the extended family (cousins, etc.) and community that is important. Therefore, any plan which in effect demanded more time away from their wives and children would probably be opposed.

Brief profiles of the major ports in New England in the next section outline characteristics which are most commonly associated with socio-economic effects of fishery managment.

§3E2 Analysis of Specific Ports

The following selection of ports was based entirely upon accessibility of comparable data. Most of the information came from interviews with National Marine Fisheries Service port agents and New England Fisheries Management Council members, supplemented by interviews with a few commercial fishermen. Published articles on various ports were reviewed but were used primarily as a basis for interviews. In most cases, specific data in published reports are outdated. In addition, such reports focus on a broad range of topics, making comparisons between ports on specific issues difficult.

For six of these ports (New Bedford, Gloucester and Provincetown, Massachusetts; Portland and Rockland, Maine; and Stonington, Connecticut), U.S. Department of Commerce Census Bureau data was used to check estimates of population, educational level, and employment figures. The data, however, is not sufficiently focused on the fishing component of these communities to be reliable as a primary source of information. Point Judith (i.e., Galilee and Jerusalem), Rhode Island, and Stonington, Maine, are not separately listed in the published census data.

New Bedford, Massachusetts

New Bedford, Massachusetts, had landings with the highest value of any port in the country in 1983: $109.2 million for 111.8 million pounds of fish. Groundfish, particularly cod and yellowtail flounder, and scallops caught on Georges Bank make up the largest share of New Bedford's landings. Over 410 boats, employing at least 3,007 fishermen, use New Bedford as a home port. Of these boats, about 256 are rigged with otter trawls, and they usually have 6 crew members. Medium-size trawlers predominate; there are 181 in the 51- to 150-ton range. The other 154 boats, with an average of 9 men as crew, are scallopers most of the year. Boats fitted with scallop dredges tend to be large; there are 86 boats over 150 tons and 66 are in the 51-150 ton range. About 50 to 80 transient boats regularly land at New Bedford.

Most of the draggers fish offshore, making 8- to 10-day trips, with 3-day layovers in port. There is some switching (i.e., some fishermen scallop part of the year and drag part of the year), but this is reportedly much less common than in years past. The transient boats include 30 to 40 summer swordfish boats, 10 to 30 North Carolina scallopers (who spend up to 8 months in the region), 4 or 5 boats from Cape Cod, and 2 or 3 boats from Point Judith.

New Bedford's population is approximately 100,000 of which 38 percent are Portuguese. Twenty-four percent of the population is foreign born, and 40 percent speak a language other than English at home. Fishing and related industries are believed to provide one-third of the city's economic base. Among the related industries, processing of fish fillets is primary with twice as many processors today as there were one decade ago. Other related industries include box manufacturing and such services as transport; repair; food, fuel and ice provision; and unloading (lumpers).

As noted in the introduction to this section, ethnicity may have a significant effect on opportunities to obtain employment other than fishing. In New Bedford, 60 to 75 percent of the fishermen are Portuguese, including many who are relatively recent immigrants. Sons of previous Portuguese immigrants continue to flow into fishing and related industries. Fishing is often a family enterprise, with all members of the family involved in the various aspects of the industry. Lack of role models in other occupations, lack of contacts in other industries, and lack of education, especially among recent immigrants, mean that movement out of the fishing industry would be difficult.

For a number of years, a large portion of the New Bedford fleet was made up of Norwegian immigrants; but they did not share the Portuguese's devotion to fishing as family enterprise. Their sons are said to be "educated out of the fishing industry", so the Norwegian influence on the industry has waned. When they were active in the fisheries, the high-liners, the most successful fishermen in New Bedford were generally Norwegian (Smith and Peterson, 1977). The remainder of the population is not dominated by any ethnic group.

Many individuals entering the fisheries today have finished high school. Ten years ago the average was a tenth-grade education, so older crew members and captains are not high school graduates. The educational level among Portuguese immigrants is thought to be, in general, equivalent to a sixth-grade education. The city as a whole has a low percentage of high school graduates. Of adults over 25, only 38.1 percent have graduated; and among 16-19 year-olds who have not graduated, 28.2 percent are not attending school. As noted previously, lack of formal education limits opportunities for alternative employment. However, the education among fishermen, except for immigrants, apparently corresponds with that of the general population, so competition for jobs would not be with those far better educated.

Aside from fishing-related industries, other industries in New Bedford include textiles (needle trades which are dominated by women), electronics (employing 50 percent males and 50 percent females), services, machine shops and welding (many of which are also marine-related, however), and tourism. Unemployment in February 1984 was 9.2 percent, a considerable drop from the previous February's rate of 12.9 percent. Census Bureau data reported that New Bedford's median family income in 1979 was $14,930, ranking fourth among the six port communities. Per capita income was $5,431, ranking fifth among the six communities.

Gloucester, Massachusetts

Gloucester, Massachusetts, boats landed 150.9 million pounds of fish worth $38 million dollars in 1983, ranking it first in New England by poundage (seventh nationally), while ranking eighth nationally in value. Gloucester boats land a variety of groundfish, predominantly cod and pollock which are lower-valued species than New Bedford's yellowtail flounder and scallop catch.

Gloucester's fleet consists of 235 vessels over 5 tons, employing 1,133 fishermen. Of these vessels, 230 are draggers (96 are in the 5-50 ton class, 98 are in the 51-150 ton class, and 36 are over 150 tons). Five scallopers employing 42 men also work out of Gloucester, and only one is over 150 tons. In 1982, thirteen manufacturing plants produced food and kindred products, particularly seafood. They employed an average of 1,381 people with an annual

payroll of $25,927,282. Gloucester's population is considerably smaller than New Bedford's, with approximately 28,500 inhabitants. Therefore, a larger percentage of the community is directly involved in fish harvesting and processing.

Some individuals conservatively estimate that 40 to 45 percent of the community's employment and revenue is dependent on the fishing industry. In recent years there has been increased development of fishing-related industries including the building of a $3.1 million seafood industrial park with space for 4 fish processing plants, building of a $6 million fish freezing and cold storage facility, construction of a third marine railway, investment in Cape Pond Ice Company, and establishment of two inland industrial parks which are the homes for several fishing-related industries. In fish processing plants, women are commonly hired as packers. Work is considered well-paid, but it is seasonal except in the plants which use imported frozen blocks of fish. The usual proliferation of industries serving (and thus dependent on) the fishing industry exists (e.g., banks and settlement houses; ice, food and oil provisioners; chandleries, machine shops, and railways).

The dominant ethnic group in Gloucester is Italian (16 percent of the population); and immigration continues today, although only 8.3 percent of the population is foreign born and 12.5 percent speak a language other than English at home. Those who immigrated before the 1950's tended to encourage their children to obtain an education and leave the fisheries, but more recent immigrants have bought their own boats and have encouraged their sons to enter the business. It is now difficult for someone without family connections to find a fishing job on a Gloucester boat. Many of the fishermen, even early immigrants, speak Italian on their boats, so their wives are frequently more fluent in English than they are. Like the Portuguese in New Bedford, the Italians in Gloucester dominate the fishing industry. This means that management efforts which negatively affect incomes from fishing will have a disproportionately greater effect on these ethnic groups. In addition, the concentration on fishing limits employment opportunities in other industries.

The educational level among fishermen in Gloucester is said by some fishermen to be about tenth grade on the average. Most fishermen are said to have had some high school training, but few actually graduated, and there is only one known college graduate. The general population has more formal education (65.5 percent are high school graduates and 14.2 percent are college graduates). Among 16-19 year-olds who have not graduated, 16.9 percent are not enrolled in school. Their educational level, therefore, would put many fishermen at a disadvantage in competition with the general population for alternative occupations.

Some fishermen of Italian descent say that fishing as a way of life is considered more important in Gloucester than the income itself. However, incomes are fairly high on the average. Large offshore boat crews average $30,000 to $40,000 per year, while their captains earn $50,000 to $55,000 per year. Crews on small boats which are considered highliners make $20,000 to $25,000 per year, while their captains make $35,000 to $40,000 per year. Crews on small boats which are not highliners make $15,000 to $20,000 per year, and their captains make $25,000 to $35,000 per year. Lumpers (who unload the boats) belong to a strong union which limits membership. Lumpers

were originally from fishing families, and now tend to be sons of lumper fathers. Lumpers can make annual salaries of $30,000 to $60,000 depending upon whether or not freight traffic is high (supplying frozen blocks to processing plants). Census data lists the median family income of Gloucester as $19,213 and per capita income as $7,602, ranking the second highest of the six ports for which there is accessible census data.

In recent years Gloucester has made an effort to diversify its economic base. Tourism and light industry are the major non-fishing related employers. Many of the 2,000 employees in the light industries live outside of Gloucester. Computer components, brass and cork washers, boilers, water pumps, silk-screening, plastics, chemicals and tape are some of the products produced in the area. Unemployment in 1979 was 7 percent, but is currently under 5 percent.

Gloucester is also the home port of some of the larger New England based party/charter operations and services a fair number of private anglers' boats along the Annisquam River. The community's summer population increases by one-third with the influx of about 10,000 tourists and summer vacationers.

Provincetown, Massachusetts

The catch landed at Provincetown, Massachusetts, is a mixture. Like most inshore fishermen, the Provincetown fishermen seek the more valuable species such as yellowtail flounder and cod, but commonly switch to whiting or even dogfish when they are plentiful. Provincetown is home port for about 40 commercial fishing boats and close to 200 full-time fishermen. Of the 35 full-time draggers, 30 are 20 to 30 year-old wooden vessels and 5 are less than 6 years old and of metal construction. Two other boats are exclusively gillnetters, fishing June through September. Three small boats use gillnets for mackerel in December, March and April, and switch to inshore dragging for clams during other seasons. Currently there are only two boats with home ports elsewhere which unload in Provincetown. The harbor is shared with a few lobster boats and seasonally with large numbers of charter fishing boats.

The Provincetown groundfish boats are considered inshore draggers, primarily fishing 12- to 16-hour days or making short, 2- or 3-day trips. Only a couple of boats are not owner-operated. At least one of these is owned by the local seafood buyer.

Provincetown has a much smaller population than New Bedford and Gloucester with 3,372 inhabitants. Like New Bedford, 38 percent are Portuguese, though in contrast to New Bedford only 7.1 percent are foreign born and only 11.6 percent speak a language other than English at home. Fishermen in Provincetown usually refer to the fleet as a "Portugee fleet." Although only about 10 to 15 percent are Portuguese immigrants, the majority are Portuguese descendents. Although they do not speak Portuguese on their boats, there is an identification with Portuguese culture and tradition, as transplanted and transformed by American influences.

The ethnic traditions are reflected in crew recruitment. Most of the crews are family based, with fathers, sons and brothers working together. The 4- to 5-men crews are fairly young on the average (30 to 35 years old), and youth continue to enter the fisheries.

As in New Bedford and Gloucester, apart from recent immigrants, a majority of the fishermen have completed the tenth grade. In Provincetown, though, there are also a few college graduates, including at least one fisherman who graduated from the University of Rhode Island's fisheries program. The general population is quite well educated (74.8 percent are high school graduates and 20.2 percent are college graduates).

There are two businesses involved in fillet production for restaurants, one full-time, the other seasonal, each employing about 5 people. Aside from fishing-related businesses (railways, suppliers, etc.), tourism and the usual service businesses are the only alternative occupations. Only 3.7 percent of the population is engaged in manufacturing, and the unemployment rate is high at 19.5 percent. Hyannis, Orleans, Yarmouth and Dennis are the closest towns with significant alternative employment available.

Tourism has been the dominant industry in Provincetown in recent years and has received any development money the town could commit. In the past few months, however, there has been an indication that the town recognizes the value of maintaining a viable fishing industry and is seeking ways to help develop its potential. The town recently committed itself to renovating the town pier, where the fleet has been precariously berthed for years.

Fishermen are more supportive of management measures than in previous years because they fear a collapse of the fisheries. They would prefer boat quotas so that the small boats are not penalized by their inability to fish in rough weather. Increased enforcement of fishery regulations would be preferred if it would curb the pressure put on the fishing grounds by the four or five New Bedford boats commonly in the area. Most fishermen feel that they are making a subsistence level of living now. Median family income in Provincetown is only $13,009, ranking fifth among the six ports, and per capita income is $6,845, ranking third among the six.

Point Judith, Rhode Island

Point Judith, Rhode Island, landings were 61.6 million pounds, valued at $25.5 million, in 1983. The catch is a mixture, with switching among target species common. In order of importance in an average year, the species include yellowtail, silver hake, butterfish, squid, winter flounder, scup and summer flounder. Recently, cod has shown up in the landings as well. Point Judith is the landing port for 130 boats and about 579 fishermen. Of these boats, about 129 are full-time, year-around draggers, and 81 are in the 51 to 150 ton class. There are also 4 or 5 gillnetters and 1 scalloper (over 150 tons). Of approximately 50 lobster boats, 20 are full-time, year around. Ninety-three boats belong to the Point Judith Cooperative, and there are two other major fish dealers.

The majority of the fleet fishes 1- to 3-day trips south of Block Island and off of the Vineyard. The only boats currently fishing on Georges Bank are going for swordfish. The fleet is highly versatile, fishing for whichever species is abundant and likely to bring a reasonably high price. Although 80 percent of the time the fishermen know what they are going to catch before they leave port, if the target species is not readily or apparently available, the fishermen will switch to a different species by changing nets to another mesh size.

Ethnic affiliation is not noteworthy; general American mix predominates. Any categorization tends to be geographic rather than ethnic; that is, people are identified as "Westsiders" if they come from Jerusalem.

Most fishermen come from fishing families, and youth continue to enter the industry. There are four families who are said to have been the founders of the industry in Point Judith and to whom many currently in the industry are related. Most are dedicated to fishing and would probably continue to fish as long as they could make their boat payments, regardless of whether or not the business was profitable by objective standards.

Educational level varies, though probably higher on the average than most other ports. Most fishermen are high school graduates, and perhaps 20 percent are college graduates. One captain was formerly a professor at the University of Rhode Island. Many of the fishermen have taken fisheries courses, and a number have gone through the University of Rhode Island's fisheries program.

Tourism and service industries are the only alternatives to fishing-related industries in Jerusalem. Galilee does have other industry. It is conceivable that alternative occupations could be found in Newport or Providence. Employment in Connecticut and Massachusetts would also be accessible, although inconvenient.

Income levels vary with the boat, year and species available. In an average year the captains of highliner boats probably make in the vicinity of $70,000 with their crews making around $30,000. Trip boats (non-highliners) average $30,000 to $35,000 per year for their captains; day boats average $25,000 to $28,000 for their captains; and crews make approximately $20,000.

Conflicts between commercial and recreational fishermen are not uncommon in the area, as there is competition for space and for berths. The major gear conflict, however, is between commercial dragging and commercial lobstering.

Portland, Maine

Portland, Maine, had 53.9 million pounds of fish worth $16 million landed in 1983. There are approximately 450 fishermen on 104 full-time finfish or offshore scallop boats berthed in Portland. This number includes 25 to 30 boats which use gillnets at times. Most of the 92 otter trawlers are in the small (44) to medium (35) range. Of the 12 scallopers, 6 are in the 5 to 50 ton range, 3 are in the 51 to 150 ton range, and 3 are over 150 tons. In addition there are about 150 lobster boats, many of which are berthed on the islands. Mixed variety of groundfish is caught year around by the larger boats. Gillnetters slow down in the winter, and those under 40 feet switch their gear depending upon the season. The latter fish for cod in the spring, hake or lobster in the summer, pollock in the fall, and inshore scallops in the winter.

The fishing industry is said to rank fifth or sixth in economic importance in Maine. In Portland, with a general population in 1980 of 61,572, about 1,000 to 1,500 people are employed in fishing or fishing-related industries. Among these are the 300 finfishermen, 200-300 lobstermen, 6 large processors employing 6 to 30 cutters each, and 10 fish markets employing 2 or 3 cutters each.

Ethnicity is mixed among fishermen, though Italians are perhaps predominant among fishing families. In the general population, 4.5 percent are foreign born and 6.3 percent speak a language other than English at home.

The educational level of the general population is fairly high (72.9 percent of adults over 25 are high school graduates and 19.4 percent have had at least 4 years of college). Among 16-19 year olds not in school, 15.3 percent are not high school graduates. No estimate of the educational level of fishermen was offered by those interviewed.

Tourism, insurance companies and law are the other major employers in Portland. Although many national insurance companies have their head offices located in Portland and the industry is the largest employer in the city, the educational level among fishermen is usually not sufficient for employment in insurance companies to be considered a realistic alternative occupation, nor would law provide opportunities. Tourism is important in the summer and could offer some opportunities. With an unemployment rate of 6.4 percent in 1979, Portland's median family income was $16,616, ranking third among the 6 ports. The per capita income was $6,416, ranking fourth among the ports.

Rockland, Maine

Rockland, Maine, had landings of 54.6 million pounds worth $12.3 million in 1983. At least 42 vessels, with 230 crew members, use Rockland as home port. Of these vessels, 34 are draggers with 175 fishermen (11 are in the 5-50 ton range, 12 are in the 51-150 ton range, and 11 are over 150 tons). Of the 8 scallopers, 3 are small, 4 are medium, and 1 is large. There are also 50 inshore draggers and 1,000 small lobster boats in the county. Rockland, population about 8,500, was formerly a great redfish port; but with the decline of the species and exclusion from Canadian waters, fishermen now round out their redfish catch with a variety of other groundfish species.

Thirteen redfish/groundfish boats (7 operated by one company and 5 or 6 operated by another) are berthed at Rockland. Six of the boats operated by the first company are 120 feet, one is 95 feet. The other company's boats range in size from 80 feet to 105 feet. Each of the boats has a crew of 6 men. Besides these groundfish boats, there are 5 carriers with small boats attached which fish for pogies. In 1983, 24 million pounds were caught, sold for fish meal and oil production. There are also 10 or 12 herring boats (25 to 50 feet) which use purse seines and are owned by the sardine plant. This is a seasonal fishery, generally lasting from July to October, with an occasional short season in February. Weirs are also used for herring, but in recent years the herring has stayed too far offshore to make weirs useful. In the surrounding county there are approximately 50 inshore boats and more than 1,000 lobster boats.

Although opinions vary, the local fishing industry may provide about half of the town's economic base. There are sardine plants which operate in summer and a few processing plants which work with imported frozen fish blocks. Non-fishing related industries include a cement plant, a snow plow manufacturer and an Irish moss plant. Unemployment is about the same as it is for the state as a whole, i.e., appoximately 8-10 percent in the offseason and 5 percent during the most active fishing season.

There is no dominant ethnic group. Only 1.8 percent of the population in 1979 was foreign born, and only 3.9 percent speak a language other than English at home. The educational level for the town as a whole is about high school (63.8 percent of adults over 25 are high school graduates and 9.5 percent have had 4 or more years of college), although fewer fishermen are thought to actually be graduates.

Incomes for successful, company fishermen are in the $50,000 to $100,000 range for captains and in the $40,000 to $60,000 range for crew members. Independent fishermen earn less money considering that they are responsible for boat mortgages and maintenance, but are thought to do "not badly." Sardine fishermen probably make 10 to 15 percent less than the company fishermen, and the day-trippers make 10 percent less than the sardine fishermen. In contrast, the incomes in the area for non-fishing related employment tend to be in the lower-middle range. The median family income in 1979 was $12,867 and per capita income was $5,389, ranking lowest among the 6 ports.

The 14 inch minimum size option for redfish could create problems for the companies for more than one reason. Both companies process small redfish imported from Canada which are used for lobster bait. The companies also rely on the redfish catch to fulfill their government contracts, and there is some fear that the 14 inch minimum size would reduce their catch too drastically.

Stonington, Maine

Stonington, Maine, is the home port for 13 to 18 full-time commercial boats with 70 to 90 full-time fishermen. Of the boats, 10 to 15 are trawlers, a couple are year-around scallopers and gillnetters, and there are three offshore lobster boats which change over to gillnetting, dragging or scalloping as their prospects change with the season. Another 150-200 inshore lobster boats, employing 200 to 400 fishermen on a part-time basis, also use Stonington as home port. November to April scalloping attracts the most effort, even among the trawlers.

Fishing and fishing-related industries provide well over half the economic base of Stonington. Besides fishing, a boat yard is the largest employer in the town of 2,500 inhabitants. Commercial Fisheries News is the second largest employer. In addition, there is some tourism and a summer resident community with related service jobs. Quarrying, which provided the original economic base of the community, has recently resumed.

There is a strong attachment to Stonington as a community, and islanders would not leave to find fishing jobs elsewhere if they could find other employment. There is no dominant ethnic group, and most of the young fishermen have a high school education.

Fisheries management is regarded ambivalently in the community. Fishermen do not want interference with their operation, especially with regard to their option to shift gear as needed. As rules were promulgated, most fishermen intended to obey the regulations; however, it soon became evident that there would be no enforcement, confidence was eroded and the view that "everyone else was cheating" created a domino effect. The lack of enforcement of the scallop meat count was particularly bad for morale.

Stonington, Connecticut

Stonington, Connecticut, serves as the landing port for 20 to 25 boats, a dozen of which are resident, another dozen transient. In addition, there are about a 100 people who fish seasonally for winter flounder from a variety of boats and skiffs. Yellowtail, mixed flounder (especially in winter), squid, whiting, hakes, and cod are all caught by the fleet. Lobstering, however, dominates the fishing scene, with 95% of the fishermen considered lobstermen. In the last year and a half there has been some controversy between trawler fishermen who began to drag for lobsters and the lobster-pot fishermen. Other shellfishing, oysters and clams in particular, was historically significant and is still practiced.

Boats are owner-operated, and there is no corporate or blind ownership. Few of the boats fish in the large mesh area, although 4 or 5 boats are 65 feet to 85 feet and do occasionally go to Georges Banks for cod if the weather and prices are sufficiently favorable. Most of the catch is sold in Connecticut retail markets; perhaps a quarter of the catch goes to Fulton market in New York.

Ethnicity is not a major factor in Connecticut fisheries. About half of the fishermen claim no specific ethnic ancestry; the other half claim Portuguese descent, but do not form an ethnic community. In the general population of 16,220, 7 percent are foreign born and 9.8 percent speak a language other than English at home.

The educational level among fishermen is thought to be about high school. The general population is well-educated (71.3 percent of those over 25 are high school graduates and 19.2 percent have had 4 or more years of college). Only 9.2 percent of 16-19 year olds are not in school and not high school graduates.

Given the small size of the fishing fleet in Connecticut, fishing might itself be considered alternative employment to the majority of employees who work for industries dependent on defense work. The major employers in the area are General Dynamics (10,000 employees), United Tech, and the U.S. Navy. There are related support services, plus some high tech and light manufacturing. There is also some tourism along the coast. Areas away from the coast serve as bedroom communities for New York city workers. Incomes in the general population are high. In 1979 the median family income was $21,947, and per capita income was $8,330, ranking highest of the 6 ports.

§3E3 Fishing and Processing Employment by State

According to National Marine Fisheries Service statisticians, in 1984, Massachusetts dominated the industry in the New England region with 3,197 fishermen employed on 638 vessels over 5 tons rigged with otter trawls and 1,519 fishermen on 163 scallopers. Medium-size vessels predominate in the finfish industry (313 vessels carrying 1,793 fishermen are in the 51-150 ton class, but 234 draggers are in the 5-50 ton class carrying 705 fishermen). Ninety-one vessels with 699 crew members are in the over 150 ton class. Boats rigged with scallop gear tend to be larger (86 are in the over 150 ton class with 864 crew members, 70 are in the 51-150 ton range carrying 596 crew members, and 17 are in the 5-50 ton class with 59 crew members).

Rhode Island ranked second to Massachusetts with 930 fishermen on 202 otter trawl rigged vessels and 213 fishermen on 26 scallopers. As in Massachusetts, the medium-sized otter trawl rigged boat predominates with 130 in the 51-150 ton class carrying 649 fishermen. Forty-eight boats with 123 fishermen are in the 5-50 ton class and 24 boats with 158 fishermen are in the over 150 ton class. Unlike Massachusetts, the medium range scalloper is more common than the large in Rhode Island (18 vessels with 135 fishermen are in the 51-150 ton range, 7 boats with 76 crew members are over 150 tons, and 1 boat with 2 fishermen are in the 5-50 ton range).

Maine had 803 fishermen on 229 otter trawl boats in 1984 and 140 fishermen on 19 scallopers. A majority of the otter trawls are small (147 vessels with 345 crew members are in the 5-50 ton range). Fifty-nine boats with 277 crew members are in the 51-150 ton class and 23 vessels with 180 fishermen are over 150 tons. There are also more small scallopers than large ones in Maine (9 with 46 fishermen are in the 5-50 ton range; 6 with 52 crew members in the 51-150 ton range and 4 with 42 crew members are over 150 tons).

Massachusetts also dominates the processing industry with 101 plants employing 5,002 seasonally and 4,141 all year. Maine follows with 80 plants which employ 3,205 seasonally and 1,988 annually. Rhode Island has 30 fishery processing plants which employ 661 seasonally and 553 all year. New Hampshire's 10 plants employ 402 seasonally and 318 all year. Connecticut has 3 plants with 83 seasonal workers and 69 all year.

Out of 118 plants producing canned fish products, industrial fish products and fish fillets and steaks in 1984, New England had 97 plants producing fish fillets and steaks, the largest number of such plants in the nation. Of these 97 plants, 53 were in Massachusetts, thus ranking the state third in the nation behind Washington (81) and Alaska (76).

Since unemployment rates in a community indicate, in a very general way, the availability of work and thus the potential for alternative occupations, these rates have been noted for specific ports when the information is available. The 1980 census data indicates that Maine had the highest unemployment rate in New England at 7.7 percent among the general population and 9.8 percent among blue collar workers. Rhode Island had the second highest with 7.2 percent among the general population and 8.2 percent among blue collar workers. Connecticut followed with 5.9 percent and 7.3 percent respectively. Massachusetts had 5.6 percent and 7.5 percent unemployment, and New Hampshire had the lowest rates with 4.7 percent generally and 6.4 percent among blue collar workers.

SUBPART F: EXISTING MANAGEMENT ENVIRONMENT

§3F1 State Programs

Coordination with State and Local Statutes

The Council recognizes that the States' current regulatory regime may not be entirely consistent with certain provisions of this FMP, most particularly as those relate to minimum fish sizes. The specified minimum fish sizes in this FMP (see §7B1) were chosen with due consideration for the selection characteristics of the specified minimum mesh sizes and with the intent of discouraging fishing effort and fishing mortality on concentrations of juvenile fish, thus contributing to achievement of the plan objectives. The Council, however, is also cognizant of the fact that fish in coastal populations of certain of the regulated species (e.g. winter flounder) may, particularly in the more southerly waters, reach maturity at a smaller relative size thus lending support for existing relatively smaller regulated minimum fish sizes in those areas. Notwithstanding certain demonstrable variability in the size at maturity of the regulated species, the Council is concerned that the overall management program, in its application to the groundfish resources in the FCZ, not be jeopardized.

The Council believes the inconsistencies which may exist between the management program specified in this FMP and the regulatory regime currently in effect within the States may be resolved. This may be accomplished if vessel owners or operators are made to understand that as a condition of obtaining a permit to operate in the multi-species finfish fishery, their entire catch and all pertinent fishing gear will be subject to regulations implementing the management program specified in this FMP regardless of whether fishing takes place in the FCZ or the territorial sea. Coincidentally, all such fishing, catch, and gear will remain subject to any applicable State or local regulations. Where differences exist in the regulatory requirements, any vessel permitted to fish in the FCZ must comply with the more restrictive measure.

State Regulations

The species covered under this FMP are distributed within most of the New England and Mid-Atlantic states' territorial waters as well as within the FCZ. The management unit is considered to include the regulated species when they occur within the states' waters as well; and the management policies, measures and recommendations contained in the plan are appropriate for application in state waters. Therefore, the coordination of the states' policies toward the species contained within this plan is important to the implementation of an effective and sound regional multi-species management policy.

Massachusetts

Closed Areas:

A 1983 regulation provides a mechanism whereby the Director, with approval

of the Marine Fisheries Advisory Commission, can close areas with high concentrations of fixed gear and/or molted lobsters. These closures, when enacted, will prevent gear conflicts between draggers and lobster pots, especially at night, and will protect soft lobsters susceptible to damage by mobile fishing gear.

Minimum Fish Sizes:

Summer Flounder	14 inches	Witch Flounder	12 inches
Yellowtail Flounder	11 inches	Winter Flounder	11 inches
Atlantic Salmon	15 inches	Eel	4 inches
Coho Salmon	15 inches	Striped Bass	24 inches
American Dab	12 inches	Haddock: Commercial	17 inches
Cod: Commercial	17 inches	Recreational	15 inches
Recreational	15 inches		

Mesh Sizes:

No mesh size regulations exist for trawls or gillnets used for the taking of groundfish with the exception of permitted gear in estuaries, embayments, salt ponds, tidal creeks or rivers.

The use of any type of net inside 70 estuaries, embayments, salt ponds, tidal creeks or rivers is prohibited in the State of Massachusetts. Nets can only be fished if a special permit is obtained from the Division of Marine Fisheries. If nets are 200 feet or less and are used to catch bait fish, no restriction applies (unless prohibited by a special act or regulation).

Use of gillnets for taking groundfish is not as restricted as use of trawls. Gillnetting for groundfish is allowed anywhere in state waters with the exception of Buzzard's Bay and Boston Harbor and the 70 defined estuaries, embayments, salt ponds, tidal creeks or rivers, where a special permit is required with conditions (i.e., mesh sizes and closed seasons). In addition, area/season closures do not pertain to gillnetting for groundfish.

Connecticut

Statutes in the State of Connecticut: (1) authorize the licensing of commercial fishermen; (2) prohibit trawling of any type inside the mouths of estuaries (pertinent to winter flounder as well as all other species); (3) require submission of catch reports by commercial fishermen (including trawlers); and (4) grant regulatory authority to the Commissioner of Environmental Protection over finfishing (sport and commercial).

Minimum Fish Sizes - Commercial:

Cod	17 inches
Haddock	17 inches
Yellowtail Flounder	11 inches
Winter Flounder	10 inches
Fluke	14 inches

Minimum Fish Sizes - Recreational:

Cod	15 inches
Haddock	15 inches
Yellowtail Flounder	11 inches
Winter Flounder	8 inches (10 inches as of January 1, 1985)
Fluke	14 inches

Mesh Sizes:

Gillnets must be 3 inches or more stretched measure.

Other regulations that also exist in the State of Connecticut:

Pound nets must be set at least one mile apart.

Prohibit landing an amount of a species managed by an FMP in excess of the amount specified in the plan, or the amount allowed by an adjacent state's regulations promulgated in support of the FMP, whichever is the greater amount.

New Hampshire

Minimum Fish Sizes - Commercial:

Cod	17 inches
Haddock	17 inches
Winter Flounder	11 inches

Minimum Fish Sizes - Recreational:

Cod	15 inches
Haddock	15 inches
Winter Flounder	11 inches

Mesh Sizes:

The taking, transporting or possessing of cod, haddock and yellowtail flounder shall be prohibited on board any boat rigged for gillnetting with any net with a mesh opening of less than 5-1/2 inches stretched mesh.

The taking, transporting or possessing of cod, haddock and yellowtail flounder (groundfish) shall be prohibited on board any boat rigged for mobile gear, including but not limited to, purse seine, Scottish seine, beam trawl, midwater trawl, otter trawl, pair trawl, or drag seine in any form with a mesh opening less than 5-1/2 inches stretched mesh.

Other regulations that also exist in the State of New Hampshire:

It shall be required of anyone taking crustaceans or finfish to identify all pots, traps or nets left unattended in the following manner:

1. All fixed gear shall have the name of the owner permanently affixed.

High flyer buoys, as customarily used on longline gear, shall be marked with the name of the owner;

2. Pot or trap trawls shall be marked with a single buoy made of highly visible material;

3. Gillnets and longline sets 6,000 feet or less shall be buoyed on each end to support a vertical shaft at least 5 feet high with a radar reflector of at least 100 square inches reflective area;

4. Flags and pennants affixed to buoys marking a string of gear as required by this section shall be of uniform color.

Any person who possesses a permit shall submit a report to the executive director by the 10th of each month for the month previous, whether or not fishing occurred. Said report shall contain the following information on a daily basis:

a. Precise area of fishing activity;

b. Number of gear units fished;

c. Hours or days gear was fished;

d. Size of gear;

e. Number of pounds by species of fish landed and/or discarded;

f. Month;

g. Signature of permittee.

Maine

Minimum Fish Sizes - Commercial:

Cod	17 inches
Haddock	17 inches
Yellowtail Flounder	11 inches

Minimum Fish Sizes - Recreational:

Cod	15 inches
Haddock	15 inches
Yellowtail Flounder	11 inches

Mesh Sizes:

In Maine territorial waters west of a line beginning where the shore intersects 69°20'W and ending where 69°20' intersects the outer limit of Maine territorial waters, vessels using otter trawls, pair trawls, beam trawls, Scottish seines, mid-water trawls or any other gear specified by the Regional

Director of the Northeast Region, National Marine Fisheries Service, must use nets having cod ends with a mesh of at least 5-1/2 inches, unless such vessels are exempted under the provisions of the optional settlement program. Vessels using gillnets within the area specified above must use nets having mesh of at least 5-1/2 inches.

Other regulations that also exist in the State of Maine:

Optional Settlement Program - A fisherman engaged in fishing with an otter trawl, pair trawl, beam trawl, Scottish seine, mid-water trawl or any other gear specified by the Regional Director of the Northeast Region, National Marine Fisheries Service, for silver hake, red hake, redfish, squid, northern shrimp, herring, mackerel, dogfish or any other species that the Regional Director shall specify as legitimately taken with small mesh gear, may register with the Regional Director his intent to fish for the above species for a specified period of time. During that period he may use mesh smaller than the legal size, provided that at least 50 percent of his total catch by round weight for the specified period consists of the above species and that no more than 15 percent (or any other percentage specified by the Regional Director) of his total catch by weight, consists of groundfish.

Documentation - Anyone engaged in fishing under the optional settlement program will be required to keep a record of his catch by species and by weight and surrender such a record to the National Marine Fisheries Service upon completion of the declared period. Documentation shall be submitted on NOAA form 88-153 or other forms specified by the National Marine Fisheries Service.

Fishing for Groundfish in the Optional Settlement Program - During the time he is in the optional settlement program, a fisherman may have his groundfish catch exempted from the 15 percent maximum catch limit set forth in the optional settlement program outlined above, if the fisherman complies with the following requirements:

a. The fisherman shall call the Chief of Marine Patrol, Department of Marine Resources, during normal business hours and give his name, the vessel name, permit number and state that he is in the optional settlement program and will fish with only the regular mesh described above for a specified number of days;

b. The fisherman shall, during the period specified above, have only the regulation mesh size described above on board between the time he leaves the dock and returns; and

c. The fisherman shall at the end of his optional settlement period, request that the Department send to the Regional Director a certification of the time period during which the fisherman should be exempted from optional settlement restrictions.

Department Records - The Department shall maintain a log of all optional settlement exemption requests from fishermen and send written confirmation of the requests to the requesting fishermen as soon as possible. The Department

shall maintain a current list of fishermen exempted from optional settlement requirements. Names will be removed automatically from this list at the end of the exemption time period requested by the fisherman, unless the fisherman contacts the Department to request a modified exemption time period.

Enforcement - The Department periodically shall board vessels participating in the optional settlement program in order to ensure compliance with these regulations.

Rhode Island

Minimum Fish Sizes - Commercial:

Cod	17 inches Fork Length
Haddock	17 inches Fork Length
Yellowtail Flounder	11 inches Fork Length

Minimum Fish Sizes - Recreational:

Cod	15 inches Fork Length
Haddock	15 inches Fork Length
Yellowtail Flounder	11 inches Fork Length

Other regulations that also exist in the State of Rhode Island:

General State Marking, Setting and Tending - It shall be illegal to set, haul and/or maintain a gillnet within one-half mile of the Rhode Island coast which does not adhere to the following specifications:

1. Length: A single net or series of nets may not exceed maximum total length of six hundred feet.

2. Setting Pattern: All gillnets must be set perpendicular to the shore or nearest shore structure. Gillnets must be set in a straight line. Hook backs may not exceed one hundred feet from the seaward end of the gillnet.

3. Tending Requirements: Each gillnet set within the territorial waters of the State of Rhode Island must be hauled once each day (24 hour period).

4. Identification Requirements: It is illegal to set, haul or maintain a gillnet in the territorial waters of Rhode Island which is not clearly marked (buoys or netting) with the owner's/operator's name and/or commercial license number.

5. Distance from Fish Traps: It shall be illegal to set, haul or maintain a gillnet within 3,000 feet of a fish trap licensed by the Rhode Island Department of Environmental Management.

6. Marking Requirements: With the exception of a size one bait gillnet, the near shore end of all gillnets must be marked with a fluorescent

orange float with a minimum diameter of 10 inches. The offshore end of a gillnet must be marked with a fluorescent orange float with a minimum diameter of 20 inches. The midpoint and/or a hook back must also be marked with one fluorescent orange float.

§3F2 Canadian Management Program

Closed Areas

Each year from March 1 to June 1, haddock spawning areas are closed on Georges Bank and Browns Bank, a measure which both the U.S. and Canada have accepted since the early 1970's. Both countries have adhered to and patrolled these areas until the recent boundary decision reached by the World Court. The Canadians still consider the spawning closures an integral part of the management strategy for these areas.

Minimum Fish Sizes

There are no regulations for minimum fish sizes contained in Canada's 1984 Atlantic Groundfish Management Plan. Rather, they have introduced a much broader control of trying to encourage and counsel fishermen to fish for a more marketable (larger) fish.

Mesh Size

Although the present Canadian minimum mesh size regulation for groundfish is 5-1/8 inches, fishermen often use larger size mesh (6 inches), on an entirely voluntary basis, in order to cut down catch rates of cod on the Grand Banks in the wintertime, and in an attempt to generally increase the quality of fish caught.