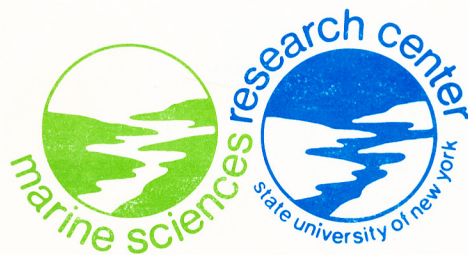


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Status of the Fisheries of the Middle Atlantic Bight Region

J.L. McHugh



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STONY BROOK, NEW YORK 11794

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OF THE MIDDLE ATLANTIC BIGHT REGION

J. L. McHugh

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Status of the Fisheries
of the Middle Atlantic Bight Region¹

J. L. McHugh

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Introduction

For the purposes of this paper, the Middle Atlantic Bight region is defined as those parts of United States Atlantic coastal waters from New York to Virginia inclusive and out to the edge of the continental shelf. This is the region of interest to the Mid-Atlantic Fishery Management Council and its member states, and to the Mid-Atlantic Fisheries Development Foundation. It has produced maximum annual domestic commercial fish and shellfish landings of about 1.5 billion pounds, a maximum annual foreign catch of more than 700 million pounds, and a recreational catch of more than 300 million pounds a year.

¹This research was sponsored in part by New York Sea Grant Institute under a grant from the Office of Sea Grant, National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce; and in part by a direct grant from NOAA.

²Contribution 252 of the Marine Sciences Research Center.

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Until the mid-1960s there was no significant foreign fishing in the region, except for a Canadian sea scallop fishery on Georges Bank, which occasionally may have extended its operations southward. The domestic fisheries were coastal and seasonal until the 1920s, when introduction of the otter trawl allowed fishermen to follow the migrating stocks along the coast with the seasons and out to wintering grounds at the edge of the continental shelf. The economic depression of the late 1920s and 1930s inhibited development of this new fishery for a while. Total landings (Fig. 1) grew slowly until the 1940s, when shortage of red meat and meat rationing during the second world war stimulated fishery development. The peak of this development was reached in 1947. Total landings then dropped somewhat, possibly because some stocks were overfished during the war, but also because prices dropped and costs were rising.

The second period of rapid growth was caused by development of the Atlantic menhaden (Brevoortia tyrannus) fishery, which was able to take advantage of the catastrophic decline in production of Pacific sardine (Sardinops sagax). Total domestic landings in the Middle Atlantic Bight region reached an all-time high in the decade 1953-1962 (Fig. 1), then dropped sharply to a low in 1969, when landings were only about 33.5% of the 1962 high. This decline was caused largely by a

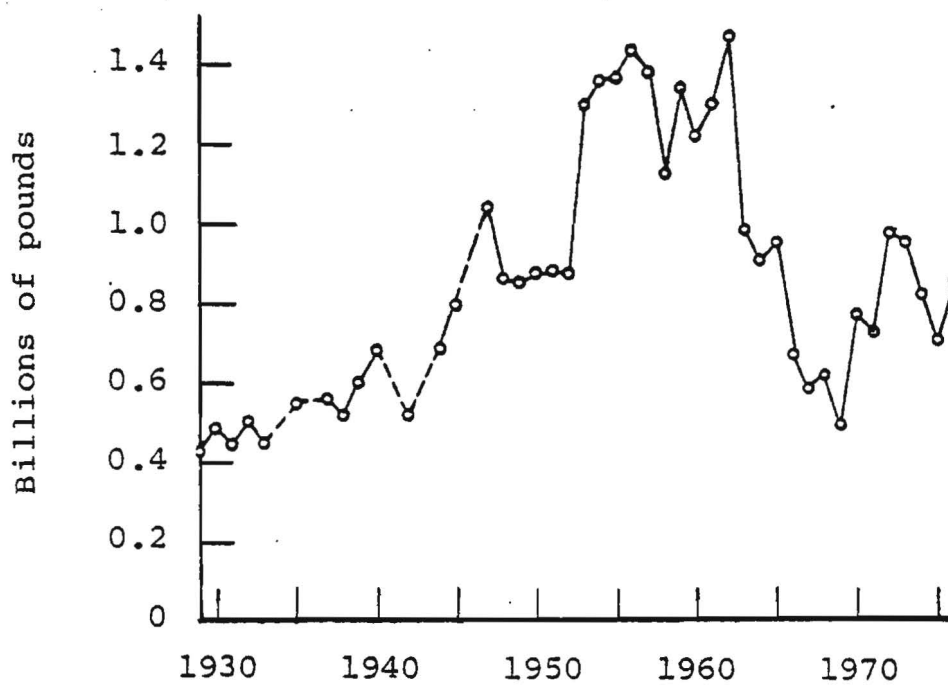


Figure 1. - Total landings of all species by American fishermen, New York to Virginia inclusive, from 1929 to 1976.

substantial drop in abundance of menhaden, but it was aggravated by reduced abundance of several important food fish species, including scup (Stenotomus chrysops), weakfish (Cynoscion regalis), Atlantic croaker (Micropogon undulatus), and several others, and by catastrophic declines in production of American oyster (Crassostrea virginica) in most areas.

To add to the difficulties of domestic fisheries, foreign fleets began to move into the region in the mid-1960s, making large catches of some traditional American resources. The sharp reversal of the downward trend in the 1970s was caused by encouraging increases in abundance of menhaden, summer flounder (Paralichthys dentatus), bluefish (Pomatomus saltatrix), and weakfish, and by rapid development of the surf clam (Spisula solidissima) fishery. These increases came about through no improvement in fishery management in the region, and it is not certain that they can be maintained. It is worth noting that none of the species that contributed to increased landings was important in foreign catches.

These findings, in part, have been reported previously in several papers (McHugh, 1972, 1974, 1977; McHugh and Ginter, 1978).

Landings by Groups of Species

Total landings give only a general indication of the history and condition of the fisheries because they do not show which resources are important, and how the contribution of each to the total catch has varied with time. For most of the period illustrated in figure 1 menhaden was dominant by weight. Thus, the trends and fluctuations illustrated were largely variations in menhaden landings. Full understanding of the dynamic changes in the commercial fisheries of the region requires analysis species by species. But first it is instructive to examine certain segments of the fisheries which have common characteristics.

Food finfishes were the principal stocks shared with foreign fishermen, thus landings of food fishes might be expected to show the effects of foreign fishing. Some food finfish species of the coastal zone were not vulnerable to foreign fishing because they seldom or never moved beyond 12 miles of the coast. Thus, it is useful to examine separately trends in domestic commercial landings of resources harvested jointly with foreign fishermen, and those taken exclusively by Americans or almost so.

Industrial fish species, because they are used for purposes other than human food, and thus have other markets, can be treated as a group. Dominated by menhaden, which has

never been important in foreign catches, they can be considered to have been relatively free of the effects of foreign fishing.

Another group of species with special characteristics and many common features is the commercially important invertebrates, mostly bivalve mollusks and crustaceans. With the exception of squids (Loligo pealei and Illex illecebrosus), sea scallop (Placopecten magellanicus), and American lobster (Homarus americanus), these have not been taken by foreign fishermen, and in the Middle Atlantic Bight region only squids have supported major foreign fisheries.

Finally, the sport fisheries must be considered. These are especially important in the Middle Atlantic Bight region, and according to latest figures amounted to about 300 million pounds in 1974. This was roughly about three times the commercial food finfish catch in the same region.

Finfish species shared with foreign fishermen

Major finfish species taken by foreign fishermen in the Middle Atlantic Bight region have been Atlantic mackerel (Scomber scombrus), Atlantic herring (Clupea harengus), silver hake or whiting (Merluccius bilinearis), red hake or ling (Urophycis chuss), alewives (Alosa pseudoharengus and A. aestivalis), Atlantic cod (Gadus morhua), butterfish

(Peprilus triacanthus), sharks (several species), flounders, especially winter or blackback flounder (Pseudopleuronectes americanus), and yellowtail flounder (Limanda ferruginea), scup or porgy, pollock (Pollachius virens), skates (several species), and haddock (Melanogrammus aeglefinus). Historic landings by domestic commercial fishermen of these and other jointly-exploited finfish species are illustrated in figure 2. Domestic landings of these species followed an upward trend to a peak of about 118 million pounds (53,750 metric tons) in 1951, trended slowly downwards to 1965, then dropped rapidly to a low of about 53 million pounds (24,130 metric tons) in 1971, a decline of about 55%. The timing of the final abrupt decline, and a substantial body of scientific evidence, point to foreign fishing as the primary cause. Domestic landings of these species as a group since 1971 appear to have stabilized, or have been increasing slowly.

Finfish species taken only by domestic fishermen

Major food finfish species taken exclusively, or almost exclusively, by domestic commercial fishermen in the Middle Atlantic Bight region have been Atlantic croaker, weakfish, striped bass (Morone saxatilis), northern puffer or swellfish (Sphoeroides maculatus), American shad (Alosa sapidissima), spot (Leiostomus xanthurus), white perch (Morone americana),

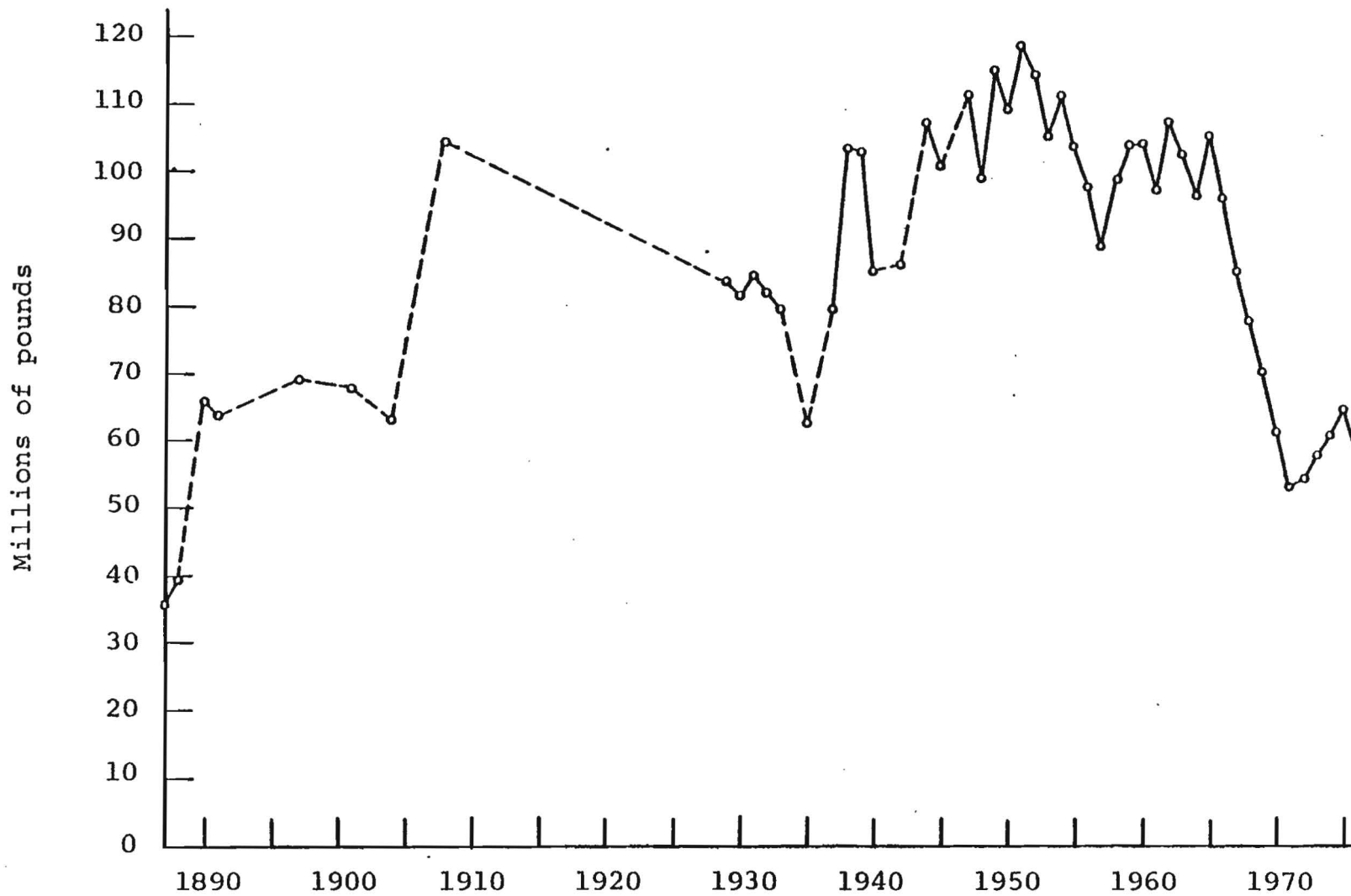


Figure 2. - Domestic landings of food finfishes of species taken by American and foreign fishermen, New York to Virginia inclusive, from 1887 to 1976.

and American eel (Anguilla rostrata). Historic commercial landings of these and other edible species of lesser importance taken solely by domestic fishermen in the Middle Atlantic Bight region are illustrated in figure 3. Commercial landings rose to a maximum of about 132 million pounds (59,780 metric tons) in 1945, dropped abruptly to a low of about 22 million pounds (9,980 metric tons) in 1966 (a decline of about 83%), and have remained stable or may have followed a moderate upward trend since that time. The effects of fishing on these strictly domestic living marine resources are not well understood. Concern about foreign fishing has diverted most research and management attention to international fishery problems. Fluctuations in landings of individual species sometimes have been very large. For example, Atlantic croaker dropped from maximum landings of almost 60 million pounds (27,000 metric tons) in 1945 to a low of only 6,000 pounds (less than 3 metric tons) in 1968; northern puffer fell from a maximum of about 13 million pounds (5,890 metric tons) in 1965 to 6,000 pounds (less than 3 metric tons) in 1975. Although fishing effort in some domestic fisheries has apparently declined, it is virtually certain that these fluctuations, which reflected substantial declines in abundance, were caused in part, if not primarily, by environmental changes. The identity of the pertinent environmental variables,

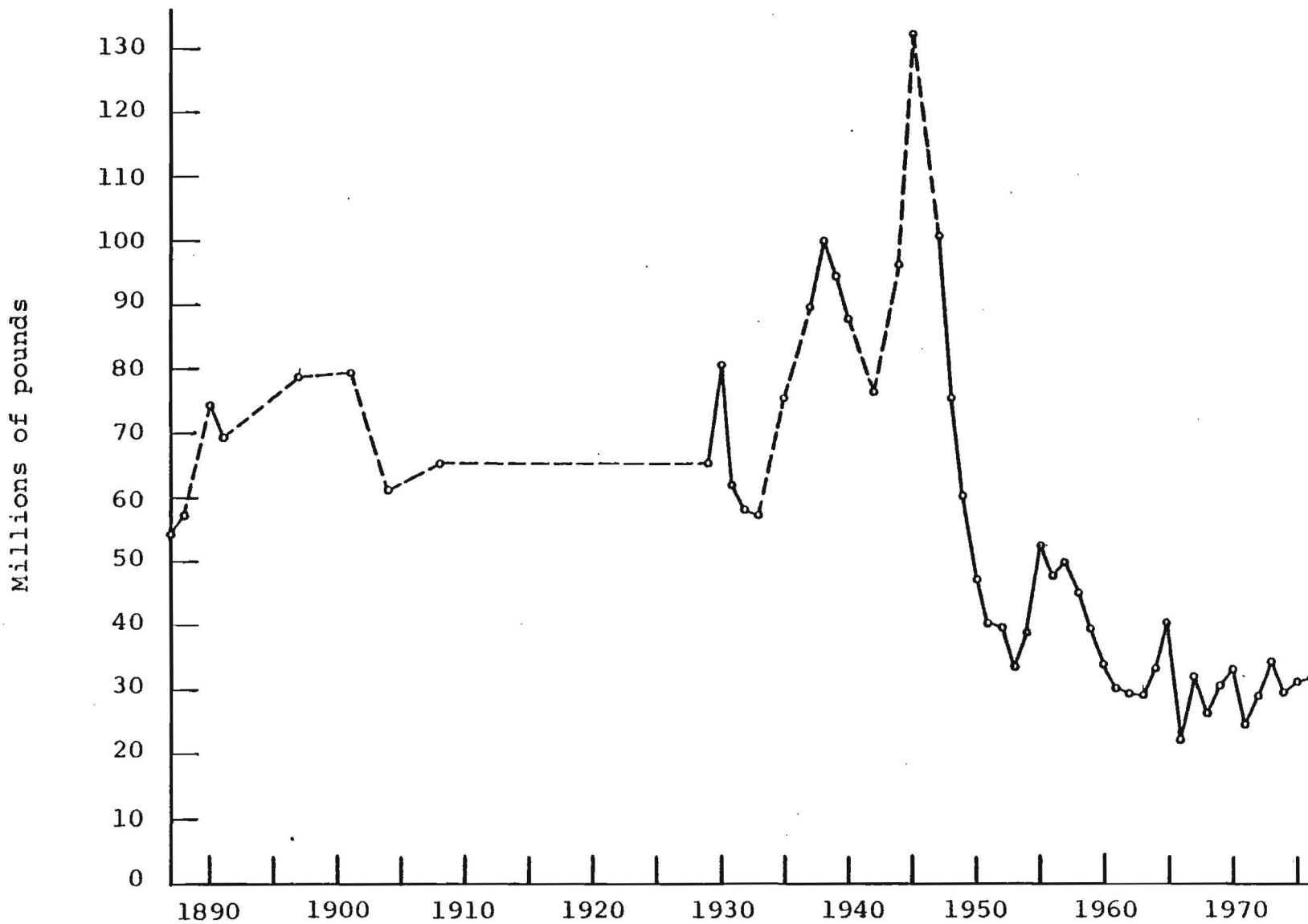


Figure 3. - Domestic landings of food finfishes of species taken solely by American fishermen, New York to Virginia, inclusive, from 1887 to 1976.

and whether they were natural or man-made, is not known. The croaker resource has since partially recovered, but it is too early to tell whether northern puffer will come back or not.

The long-term downward trend in production of finfishes as a group is not reassuring. Some other species have declined almost as much in landings as croaker, and several have declined by 3 or 2 orders of magnitude from historic maxima to subsequent minima. These apparent declines in abundance have been balanced, at least in part, by increases in recreational catches, but estimates of increasing catches by saltwater anglers are by no means sufficient to account for the decline of total commercial landings. No effective management program exists for any species or stock of finfish in this inshore group. It is difficult to escape the conclusion that these resources have been adversely affected by some human activity, either fishing, or environmental change, or some combination of the two; but this analysis does not rule out other possible causes, such as rising costs of fishing, reduced market demand, and perhaps other economic restraints.

Industrial fisheries

Valuable domestic industrial fisheries also have been operating in the Middle Atlantic Bight region. Menhaden is

the major species, but substantial landings of other resources, like thread herring (Opisthonema oglinum), mixed trawl-caught fishes, of which red hake and searobins (Prionotus spp) have been major components, and horseshoe crab (Limulus polyphemus) have been used at certain times and places. These industrial species and others are not used only to manufacture fish meal and oil. Some species like silver and red hake and searobins, for which demand as human food is limited, may be diverted to other industrial uses when demand for human food is satisfied. Among such industrial uses are bait, mink food, and pet foods.

Landings of industrial species have declined substantially from the peak of about 1.2 billion pounds (526,200 metric tons) in 1962 (Fig. 4). The explanation will rest largely on assessment of the condition of the menhaden resource. Available scientific evidence suggests that the resource has been overfished. The center of the fishery has shifted to Chesapeake Bay from waters farther north. Recent landings in Virginia, on the average, have been higher than ever before, and opinions differ as to the condition of the resource and the effects of fishing upon it. It is unlikely that the resource can continue to sustain the heavy fishing pressures to which it has been subjected in Virginia and North Carolina.

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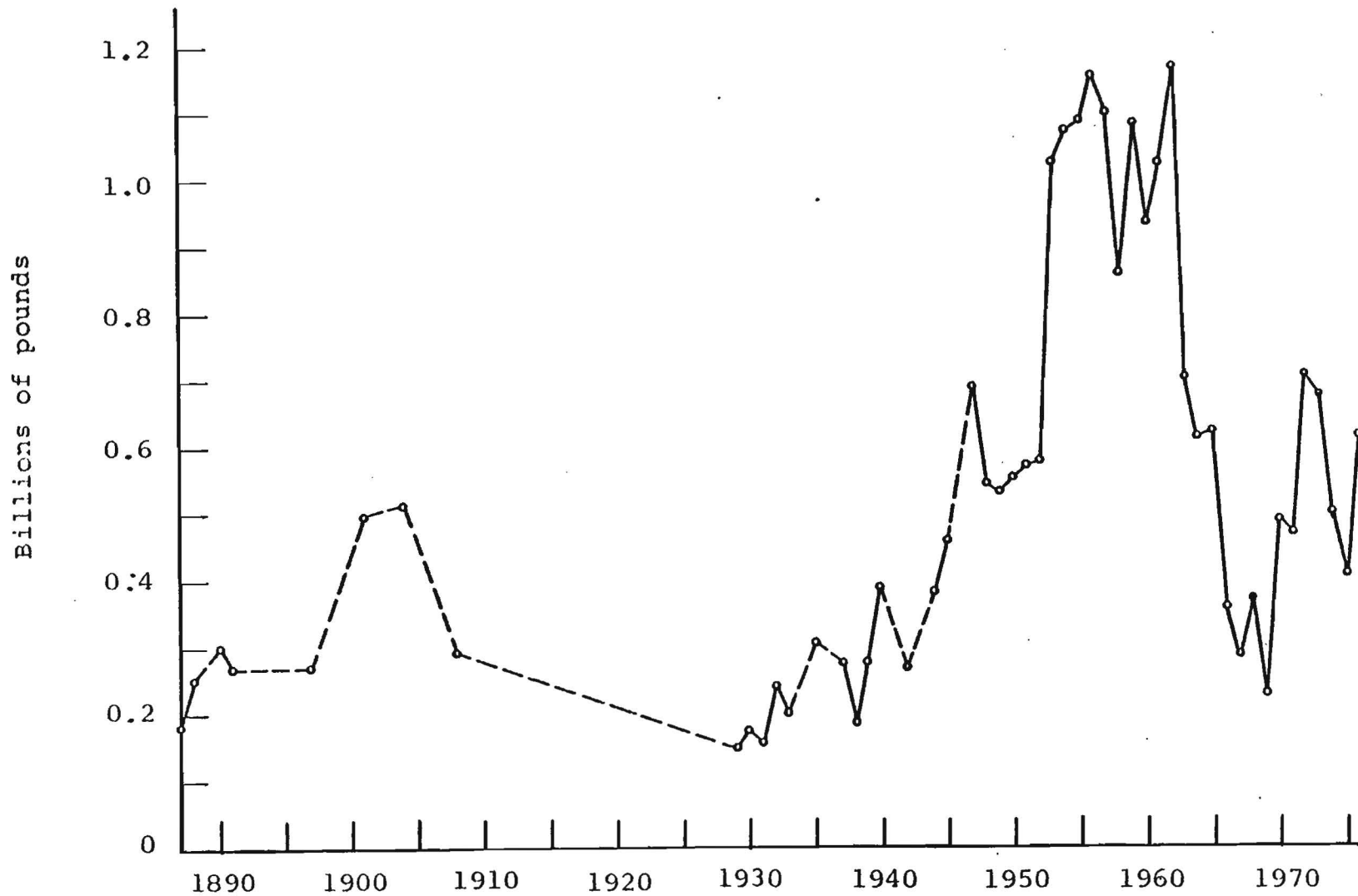


Figure 4. - Landings of industrial species (mostly menhaden) by American fishermen, New York to Virginia inclusive, from 1887 to 1976 inclusive.

Shellfisheries

Trends and fluctuations in commercial shellfisheries of the Middle Atlantic Bight region have differed from those of the finfisheries. At first glance (Fig. 5) the situation might appear to be relatively healthy, because the trend in domestic landings of all species combined has been upwards since the early 1940s. But this trend has been maintained at the expense of shifts from one resource to another, as individual resources have declined from high to low levels of production and the industry has turned to new species. The upward trend has been marked by some major swings in total weight landed, partly because there have been time lags in switching to new resources, and partly because several species have undergone major changes in abundance from natural environmental changes. Major species in the domestic shellfish industry have been American oyster, blue crab (Callinectes sapidus), surf clam, hard clam (Mercenaria mercenaria), soft clam (Mya arenaria), sea scallop, squids, American lobster, and bay scallop (Argopecten irradians).

Only three of these shellfish resources have been harvested also by foreign fishermen: sea scallop by Canada, and squids and American lobster by several countries. These resources have contributed only a small part of the total domestic shellfish catch, and the trend in total domestic

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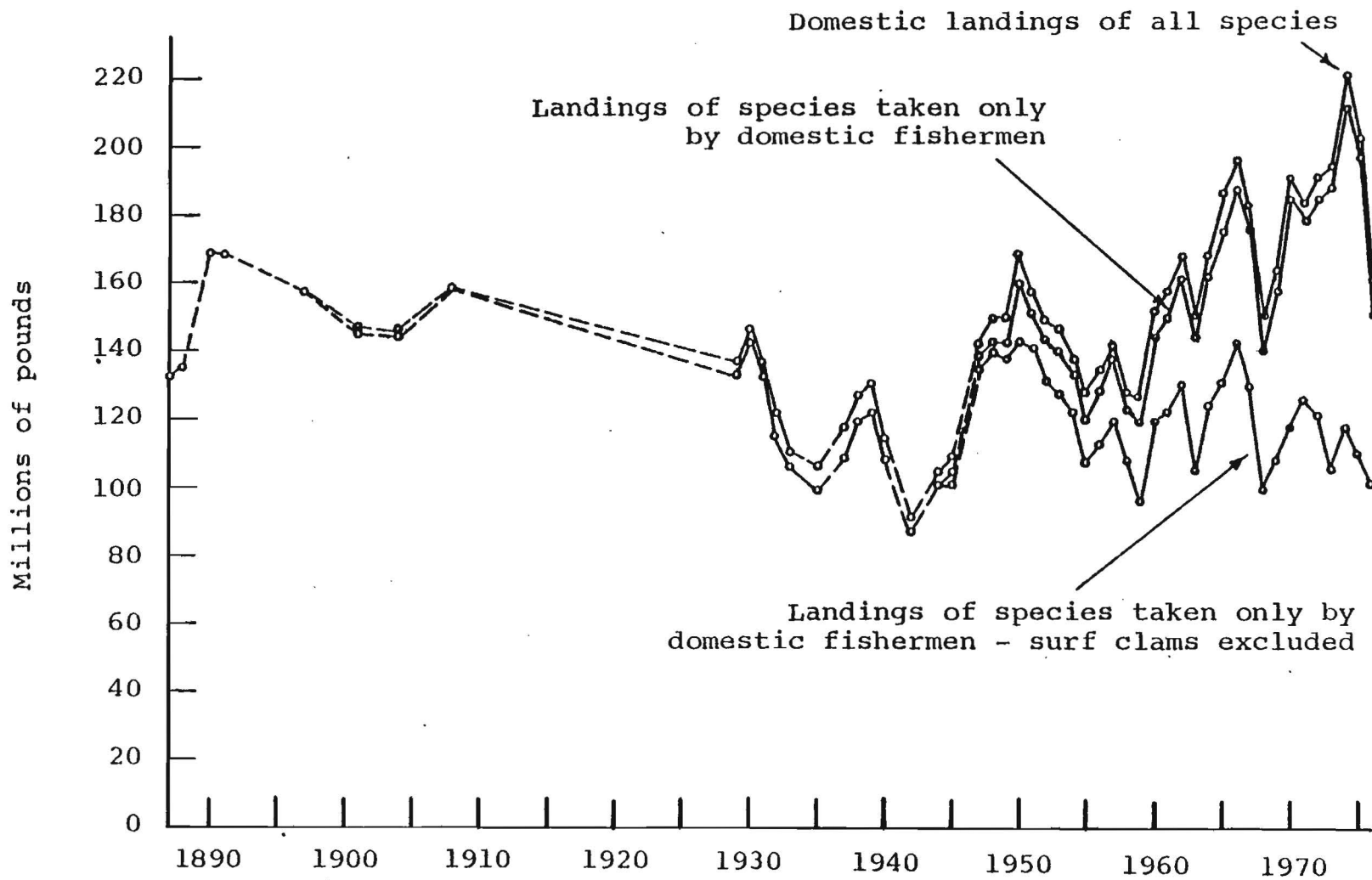


Figure 5. - Landings of food shellfishes by American fishermen,
New York to Virginia inclusive, 1887 to 1976.

landings, and the level of these landings, are not changed much if foreign-caught species are deleted (Fig. 5).

The principal feature of the domestic shellfish fisheries of the Middle Atlantic Bight region which has made their history different from that of the food finfish industries has been the relatively recent development of several new or expanded fisheries. Another has been that the shellfisheries typically have been species- or stock-oriented, by-catches are not a problem, and movement to new resources has been gradual. Outstanding among the new shellfisheries has been the surf clam fishery, which was insignificant prior to the second world war. It was largely the phenomenal development of this fishery, which reached its peak as recently as 1974, that kept total shellfish production rising, although a contributing factor was a long-term major upward trend in blue crab production and harvesting of new stocks of soft clam, American lobster, and ocean quahog (Arctica islandica). The recent catastrophic decline in the surf clam resource has not yet shown its full effect on total shellfish production, and the sharp drop in surf clam landings since 1974 has not yet noticeably affected the long-term trend. It is likely, however, that 1974 will mark the peak of domestic shellfish production for a long time to come, unless the industry can find ready markets for squids. The only likely possibilities for

recovery of inshore shellfish stocks are improved water quality in the coastal zone, mariculture, and better management of the fisheries.

The effect of the surf clam harvest on the trend of total domestic shellfish production can best be illustrated by examining the trend with surf clam landings removed (Fig. 5). This shows that domestic production of all other shellfish species combined has been declining since the 1890s. The downward trend has been relatively gradual because new stocks of soft clam, American lobster, and some other species have been available to reinforce the shellfish supply. Thus, the full impact of man's activities on total shellfish production has yet to be felt, although the trend of landings of all major shellfish species now is downward. In contrast, domestic landings of shellfish species taken also by foreign fishermen have been rising slowly, because squids have been finding new markets.

The reasons for declining domestic shellfish production are better understood, on the whole, than the reasons for falling production of food finfishes. For some shellfish resources, in some places in the region, effective steps have been taken to arrest, or even to reverse, the downward trend. It remains to be seen whether the considerable body of knowledge available can be used effectively to manage domestic

shellfisheries everywhere in the region.

Recreational fisheries

The catch by saltwater anglers in the Middle Atlantic Bight region is substantial. Of the four national surveys since 1960, only one has provided enough detail to compare the recreational catch with domestic commercial landings in the region from New York to Virginia inclusive. That was the 1974 survey, which estimated that recreational fishermen took about 268 million pounds (121,600 metric tons) of finfishes, and an additional 52 million pounds (23,580 metric tons) of shellfishes, from the waters of the Middle Atlantic Bight region. Deducting weight of bivalve mollusk shells, to make the recreational data directly comparable to commercial landings, reduces this catch to about 29 million pounds (13,150 metric tons), for a total estimated edible foodfish and shellfish recreational catch of nearly 300 million pounds (135,000 metric tons). This was almost equal to total domestic commercial landings of about 311 million pounds (141,000 metric tons) of food fishes and shellfishes in the same region in 1974. Shellfishes dominate commercial landings of edible species in the Middle Atlantic Bight region. Recreational catches of food finfishes in this region in 1974, according to the best information available, were about three times

as large as commercial food fish landings.

It is generally conceded that fishing effort by salt-water anglers has been increasing. For the Atlantic coast of the United States as a whole the numbers of anglers and the total weight of their catches have been following an upward trend since the first survey was made in 1960, but numbers of anglers have been rising more rapidly than their catch (Fig. 6). Thus, by any criterion, recreational marine fishing is a force to be reckoned with. The sport catch can not be ignored if the United States intends seriously to manage its marine fisheries. Uncontrolled sport fishing may be a much greater threat than foreign fishing ever was, and at least as great a threat as uncontrolled domestic commercial fishing. This is true whether the criterion be the future of the commercial fishing industry, of the recreational fishing industry, of the living resources, of the national food supply, of the interests of consumers of fishery products, or the socioeconomic welfare of the nation as a whole and particularly coastal communities. The Mid-Atlantic Fishery Management Council has not addressed this question seriously as yet, and, as far as I am aware, neither has any other regional council. The situation is more critical in the Middle Atlantic Bight region because the human population is most concentrated here and saltwater sport fishing is most intense.

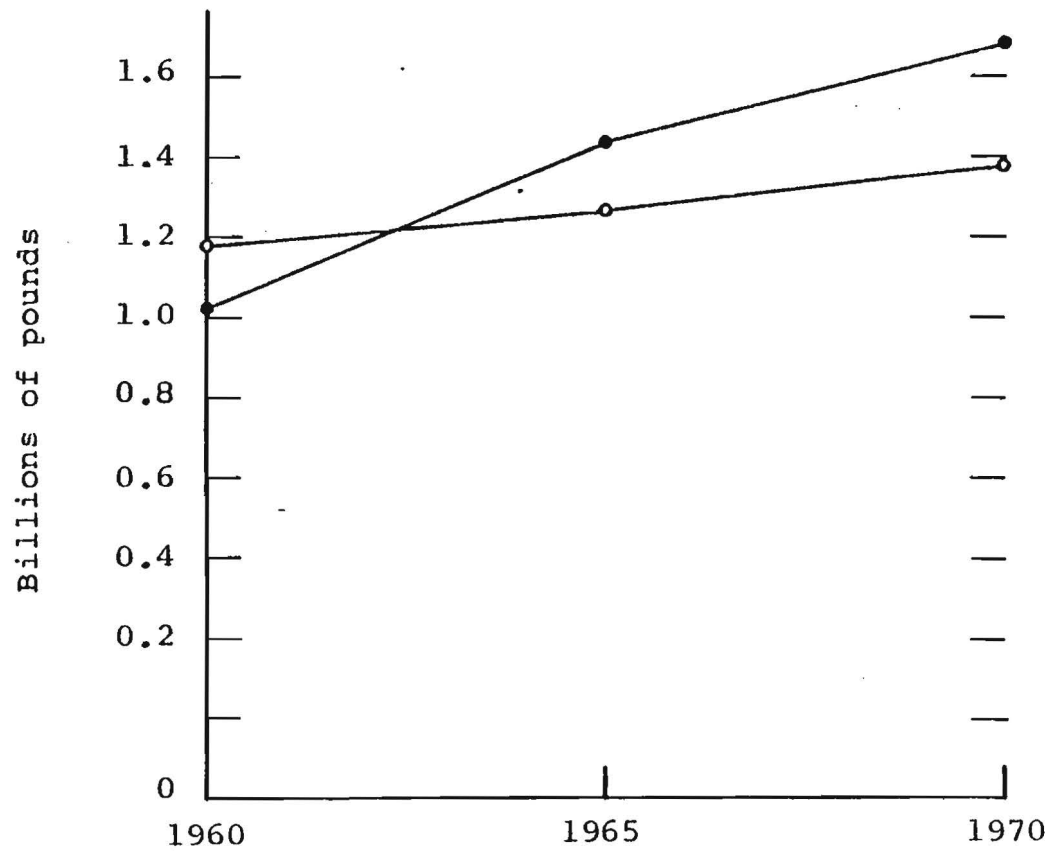


Figure 6. - Catch by recreational fishermen (open circles) and numbers of fishermen (black circles) along the entire Atlantic coast, 1960 to 1970.

Regulation of recreational fishing is not discriminatory. In the long run, saltwater sport fishermen also will benefit from intelligent controls.

It must be assumed that the decline in commercial landings of edible species has been offset, at least in part, by increased recreational catches. If the figures given above have any validity, however, this has not been adequate to balance the alarming decline in food finfish production. The statistics need to be examined species by species for a full understanding of their implications.

Individual Commercial Fishery Resources

About 30 species, more or less, have been important in the domestic commercial fisheries of the Middle Atlantic Bight region. Landings of some, like haddock, Atlantic cod, American oyster, alewives, American shad, and yellowtail flounder, have declined substantially in the last 50 years. Several, like menhaden, summer and winter flounders, scup, bluefish, spot, and black sea bass (Centropristis striata), have continued to produce but at highly variable levels. Landings of others, like surf clam, striped bass, blue crab, and hard clam have trended upward, but some have varied widely in abundance from time to time, and all are now below maximum levels of yield. The illustrations that follow show trends

and fluctuations in landings of these species.

Variability in Landings

One striking feature of the history of domestic commercial landings of many species in the Middle Atlantic Bight region has been their great variation. As already noted, Atlantic croaker was the outstanding example, in which the high point was almost 10,000 times the subsequent low (59.7 million pounds in 1945, only 6,000 pounds in 1968). But several others have shown fluctuations of the same order of magnitude and it has not been unusual for maximum recorded landings of individual species to exceed subsequent lows by factors of 1,000 or 100. These extreme fluctuations have had serious economic effects upon the commercial fisheries and equally disturbing effects upon recreational fishing. They have led to wild speculation as to cause and effect, much of it scientifically unsound, and much legislation has been enacted as a result, most of it ineffective. The living resources of the area are of two kinds, migratory species, mostly fishes, and non-migratory animals like oysters and clams. Their environmental requirements and responses are quite different, but species in both groups vary widely in abundance.

Migratory species

Most of the migratory fishes that support the domestic fisheries of the Middle Atlantic Bight region are northern species like cod, haddock, silver hake, and others, or southern species like weakfish, croaker, and spot. Major northern species are most abundant north and east of Cape Cod; major southern species are most abundant south of Cape Hatteras; they migrate south and north into the Middle Atlantic Bight area seasonally. Thus, the Bight is near the extreme limit of the distributional range of many of the living resources in both groups. If environmental conditions vary so as to affect success of spawning adversely, the geographic range of a species will shrink and the Bight region will be most seriously affected. This was almost certainly the reason for virtual disappearance of croaker from the region from the 1940s to the 1960s. If environmental conditions vary so as to cause a shift in latitudinal range of distribution, the Bight region will feel the effects most acutely. This was the cause of the great decline in yellowtail flounder landings in the 1950s, and probably a contributing cause of the decline and recent recovery of the weakfish stocks in this region. If heavy or excessive fishing reduces the abundance of northern or southern species substantially, the Bight region will also suffer most. Such effects have been largely responsible for declines in

cod and haddock landings in the Bight, from excessive fishing to the north, and in menhaden landings north of 38° north latitude, from heavy fishing pressure in Chesapeake Bay and North Carolina.

The history of commercial fishing in Delaware, which is almost exactly in the center of the Middle Atlantic Bight region, is illustrative. Five major fisheries in Delaware have collapsed totally. The causes were clearly a combination of fluctuating supply and overfishing (McHugh, in preparation).

The prognosis is for continued wide fluctuation in abundance of migratory resources in the Bight region, from causes that can only partially be controlled by man. The fortune of fisheries in the region will continue to be uncertain.

Non-migratory species

Major non-migratory resources in the Middle Atlantic Bight region are sessile animals like American oyster and several clam species, or those like blue crab, which perform limited migrations, and thus can for all practical purposes be considered endemic. Most of these live in shallow coastal waters, where they may be subject to extreme natural fluctuations in environmental factors, which also cause major changes in abundance. Most of these resources also are unusually

vulnerable to environmental degradation caused by man, which either denies access to certain stocks, or affects survival adversely. On the other hand, foreign fishing has not been a problem with most of these resources. Their general decline demonstrates the failure of domestic management.

Most non-migratory species are found in shallow, sheltered coastal waters, where they are easily available to man. Illegal harvesting is common in many areas, which creates public health problems and possible erosion of consumer confidence. Man-made environmental stresses, occasionally harsh environmental conditions, and heavy and inadequately controlled harvesting, commercial and recreational, combine to make management extremely difficult. Improved public attitudes and enhanced governmental attention are essential if downward trends in production are to be halted and reversed.

Anadromous and catadromous species

Several important fishery resources of the Middle Atlantic Bight region are anadromous, spawning in fresh water but spending a major part of their lives in the sea, like striped bass, American shad, alewives, and white perch. One resource, American eel, is catadromous, spawning in the ocean, but spending a major part of its life in estuaries and fresh water. As such, abundance of this group of species is

determined mostly by conditions in estuarine and fresh waters. In vulnerability, they are like the non-migratory resources, or are perhaps threatened even more severely. All are over-harvested or fully utilized, except possibly white perch and American eel. Scientific management of the fisheries is essentially lacking, and presence of these resources in waters close to human population centers has created a mythology that often complicates and interferes with wise management.

Underutilized resources

Despite heavy exploitation of fishery resources in the Middle Atlantic Bight region for the last 50 to 100 years, some potentially valuable species remain underutilized or virtually unutilized. It is possible that abundance of some of these stocks has been enhanced by selective harvesting of traditional species. Among the fishes in this category are spiny and smooth dogfishes (Squalus acanthias and Mustelus canis), various skates and rays, goosefish (Lophius americanus), and possibly silversides (Menidia menidia and M. beryllina), American sand lance (Ammodytes americanus) which apparently has been increasing in abundance recently, and tilefish (Lopholatilus chamaeleonticeps). Among invertebrates are rock crab (Cancer irroratus), Jonah crab (Cancer borealis), and red crab (Geryon quinque-dens). Controls on

foreign fishing have raised the possibility of large increases in domestic squid production. Prices of silver hake, red hake, and other species now frequently used as industrial species might be improved by appropriate product development, and in fact are up already. Ocean quahog still presents possible opportunities for increased catches, although the present fishing power of the sea clam fleet probably can more than take the allowable surplus. Other potential resources are Atlantic thread herring and some jacks, which migrate seasonally into the Bight region in considerable abundance at times. This is but a sampling of potential resources in the region.

With few exceptions limited market demand has been the principal constraint on development of domestic fisheries for these resources. Extended jurisdiction has increased the potentiality of foreign markets for these species, but the economic health of American fisheries could be improved if reliable domestic markets also were developed. Market development probably will be an important activity of the Mid-Atlantic Fisheries Development Foundation.

Domestic commercial landings of major species in the Middle Atlantic Bight region (New York to Virginia inclusive) from 1929 to 1976, and a few from 1880, are given in the following section. They are arranged in three groups: 1) resources shared with foreign fishermen; 2) finfish resources harvested exclusively, or almost so, by domestic fishermen; and 3) domestic shellfish resources.

Note the peaks of production for many species during the middle and late 1940s, in response to the shortage of red meat and meat rationing during and immediately after the war. These peaks were particularly pronounced for most low-priced species that were in good supply, like Atlantic mackerel, Atlantic herring, and silver and red hakes, which in normal times have been in relatively low demand as human food.

- 1) Resources shared with foreign fishermen

Figure 7.--Landings of Atlantic cod in the Middle Atlantic Bight region 1929 to 1976. The decline in the 1940s probably was caused by a shift to the south to other species. Foreign fishing undoubtedly was partially responsible for the decline in the 1960s. The estimated recreational catch of cod in the region in 1974 was about 717,000 pounds.

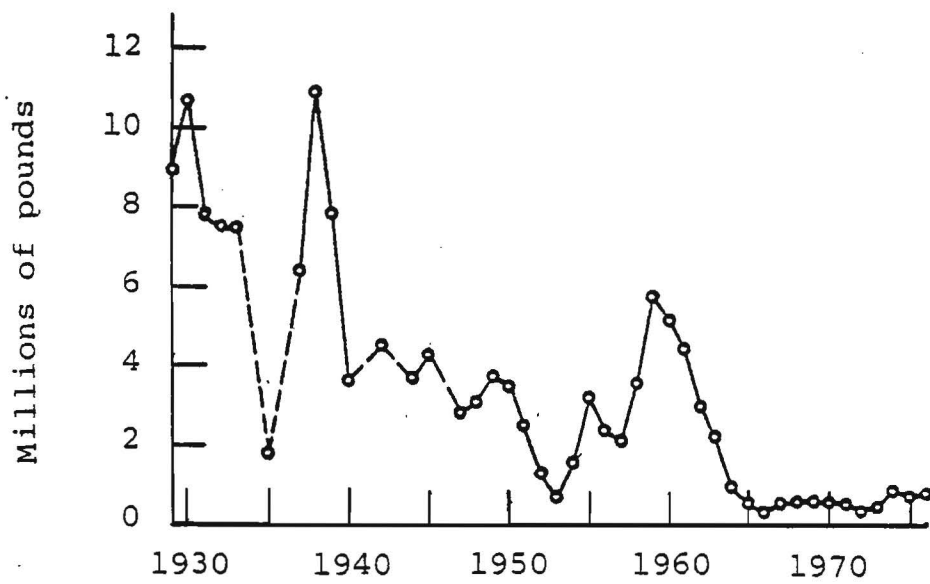


Figure 7

Figure 8.--Landings of haddock in the Middle Atlantic Bight region 1929 to 1976. The initial decline was not caused by foreign fishing, but probably by a general shift away from northern fishing grounds. The stocks now are overfished and the catch has been very strictly controlled by quota.

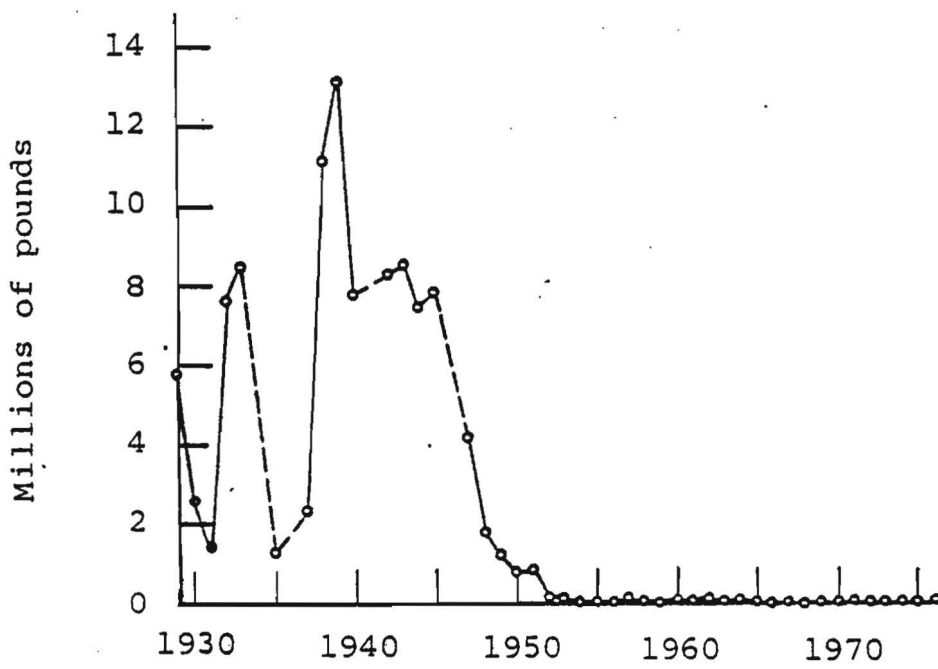


Figure 8

Figure 9.--Landings of Atlantic mackerel in the Middle Atlantic Bight region 1929 to 1976. The sharp decline in the 1950s was caused partially by a natural decline in abundance, but commercial catches in the 1940s almost certainly would have been lower if war had not stimulated demand. Atlantic mackerel is not in great demand for human food in the United States. Mackerel is a popular sport fish, and the estimated recreational catch in the region in 1974 was well over 6 million pounds.

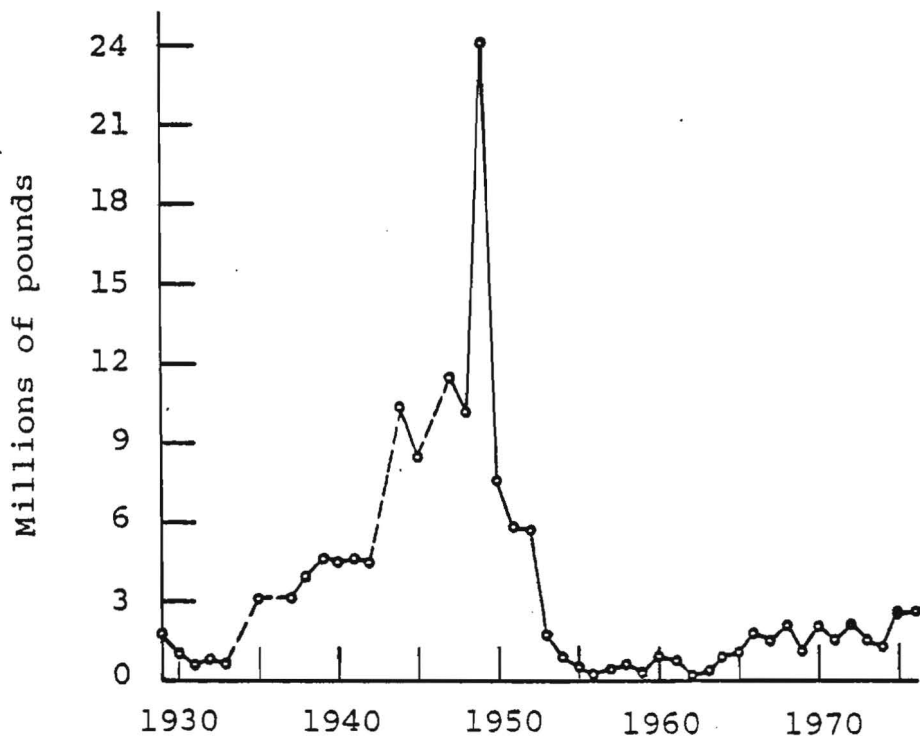


Figure 9

Figure 10.--Domestic commercial landings of alewives in the Middle Atlantic Bight region 1880 to 1976. The decline in Virginia in the mid-1960s was caused by foreign fishing.

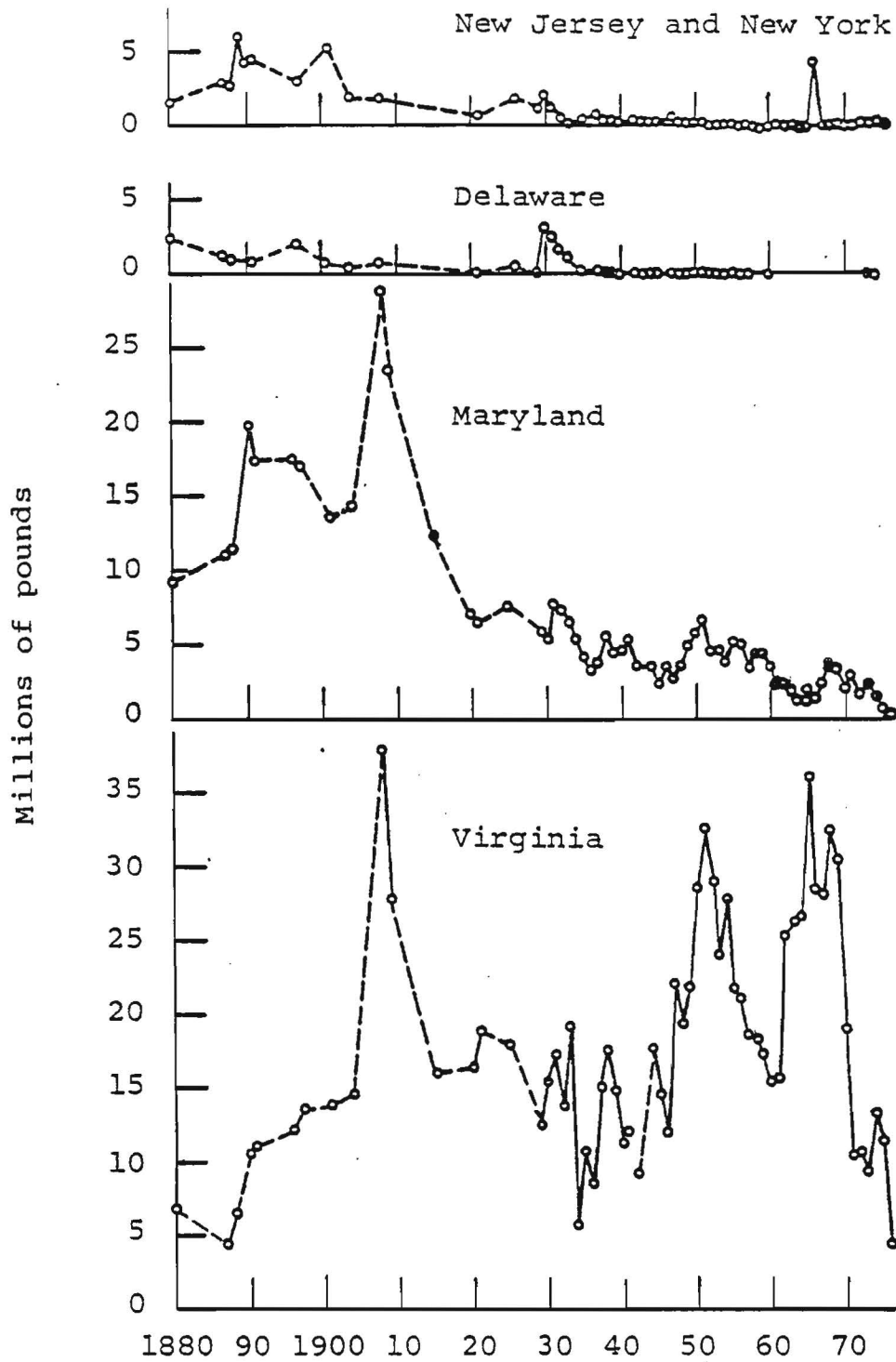


Figure 10

Figure 11.--Domestic commercial landings of Atlantic herring in the Middle Atlantic Bight region 1929 to 1976. Note the large war-stimulated increase in the 1940s. The large peak in 1966 was caused by an unsuccessful attempt, which lasted only one year, in New York to support the dying menhaden industry by substituting other species.

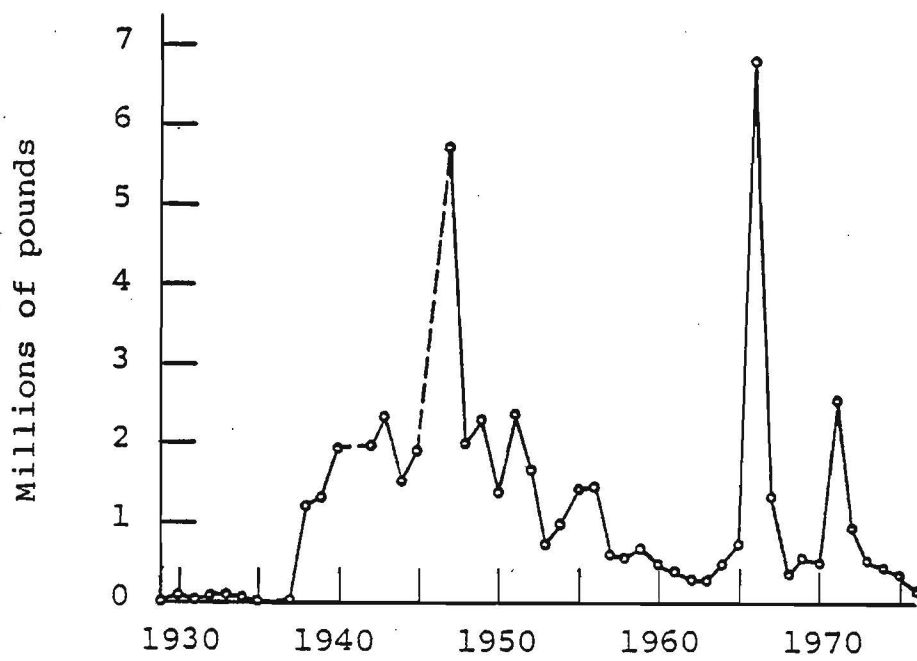


Figure 11

Figure 12.--Domestic commercial landings of whiting or silver hake in the Middle Atlantic Bight region 1929 to 1976. Note the relatively high level of landings during and after the war in the 1940s. Domestic landings have been trending upward since the 1950s despite a heavy foreign catch. Recreational landings in 1970 were about 1.4 million pounds.

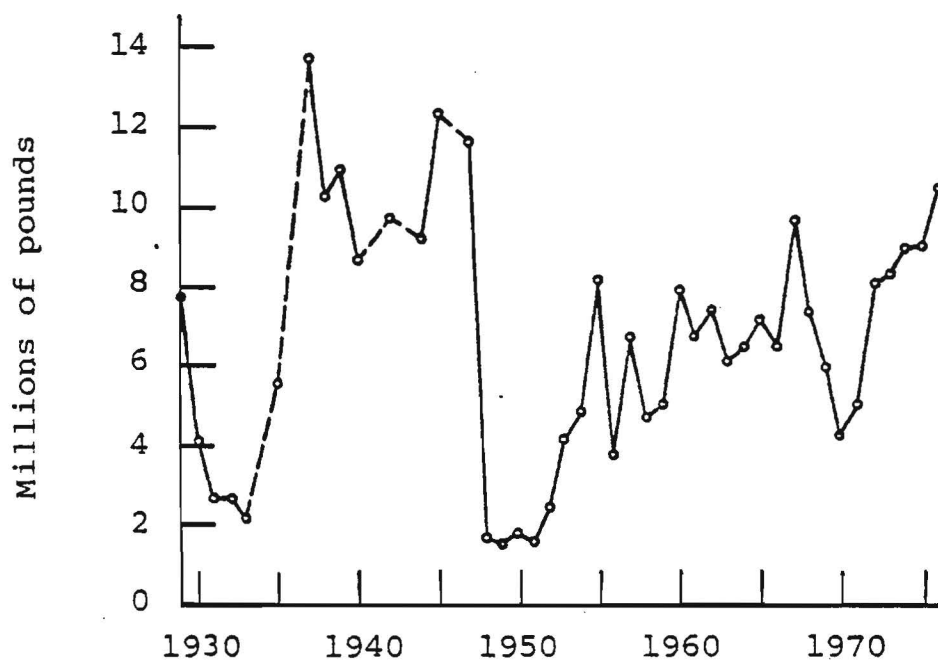


Figure 12

Figure 13.--Domestic commercial landings of ling or red hake in the Middle Atlantic Bight region 1929 to 1976. Note the large increase during and immediately after the war in the 1940s. The recreational catch in 1970 was about 0.9 million pounds.

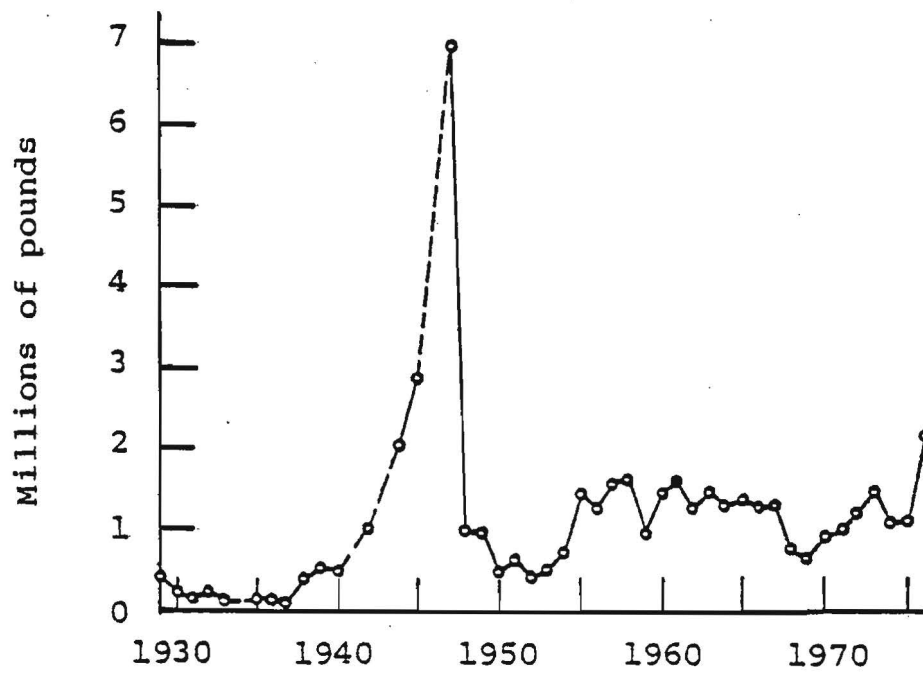


Figure 13.

Figure 14.--Domestic commercial landings of butterfish in the Middle Atlantic Bight region 1929 to 1976. The decline prior to the mid 1960s was caused by domestic economic conditions, including limited demand. More recently, heavy foreign fishing, much of it by-catches incidental to the squid fishery, kept availability of butterfish low in the region.

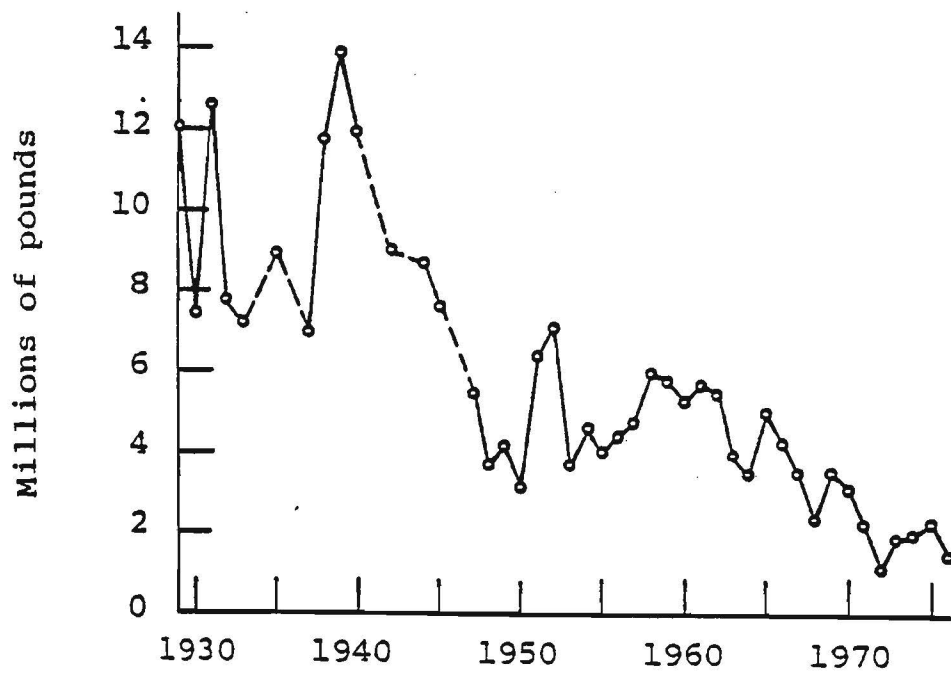


Figure 14

Figure 15.--Domestic commercial landings of flounders in the Middle Atlantic Bight region 1929 to 1976, and landings of the three major species. Much of the variation in landings of fluke, blackback, and yellowtail was caused by fluctuations in spawning success. The recent decline in yellowtail landings was related to foreign fishing. Note that, in general, flounders have held up well so far. The sport catch was 14.4 million pounds of summer flounder and 7.7 million pounds of winter flounder in 1974.

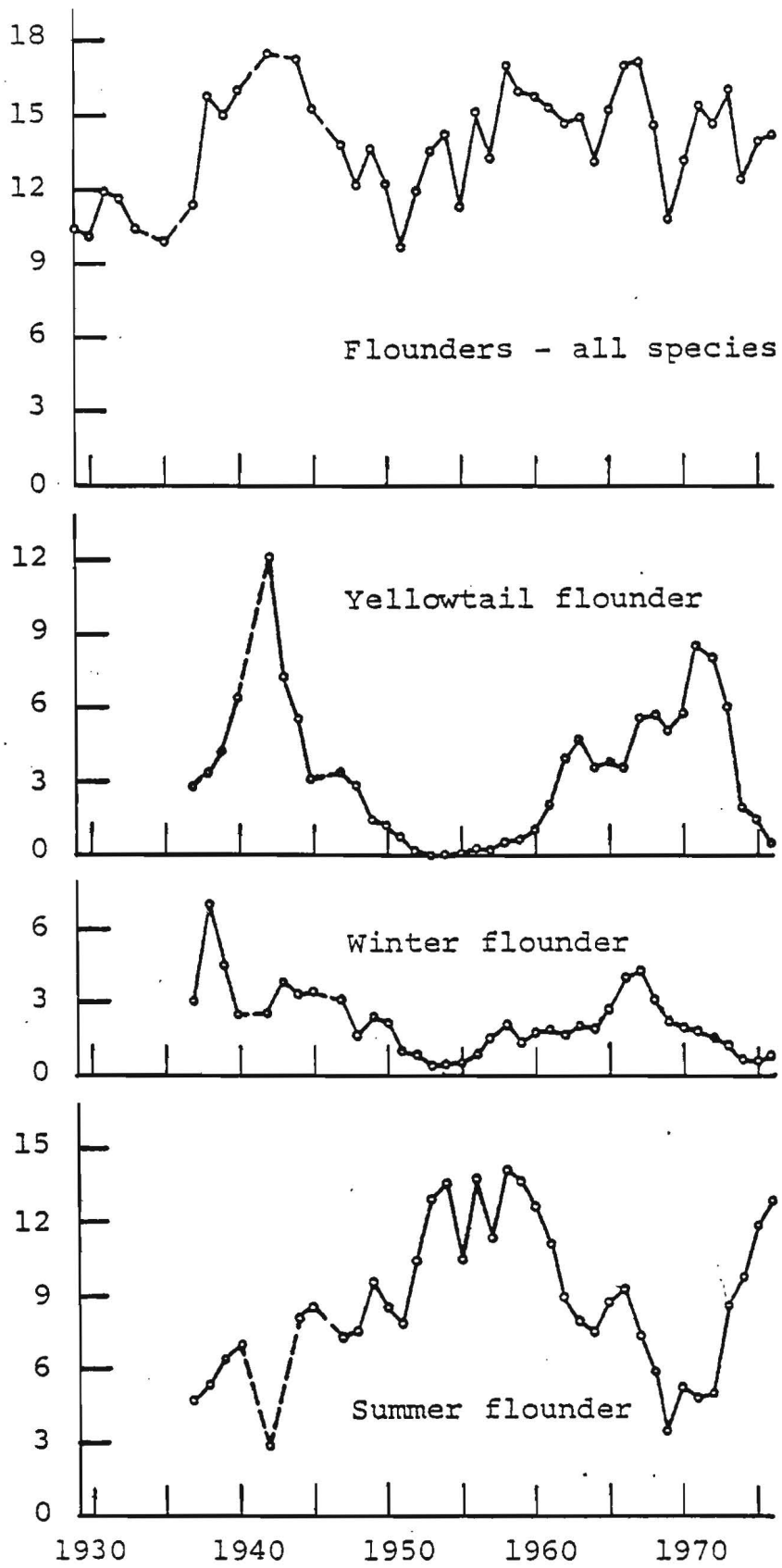


Figure 15

Figure 16.--Domestic commercial landings of scup or porgy in the Middle Atlantic Bight region 1929 to 1976. The decline in the 1960s was caused largely by spawning failures. Foreign catches have not been large, but increased fishing intensity at a time of natural scarcity puts unnecessary additional stress on the stocks. The estimated recreational catch in the region in 1974 was over two million pounds. The resource has recovered partially in the 1970s.

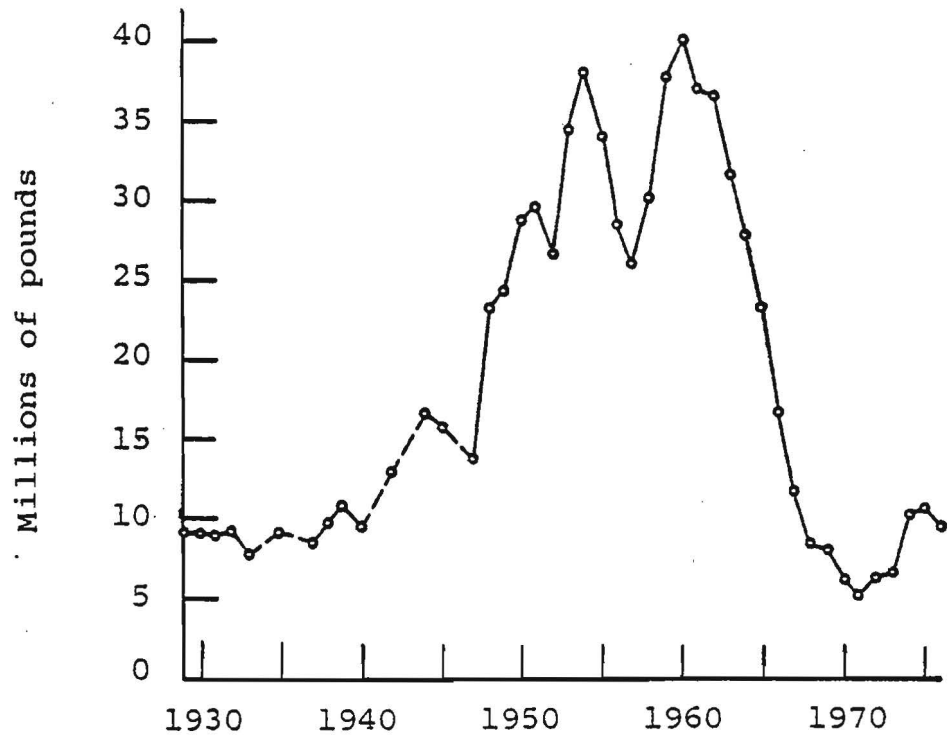


Figure 16

Figure 17.--Domestic commercial landings of longfin and shortfin squid in the Middle Atlantic Bight region 1929 to 1976. Demand is low in the United States, and the domestic catch has been only a small fraction of the foreign catch since foreign fishing for squids in the region began in the 1960s. If markets could be found, the domestic catch could be increased substantially.

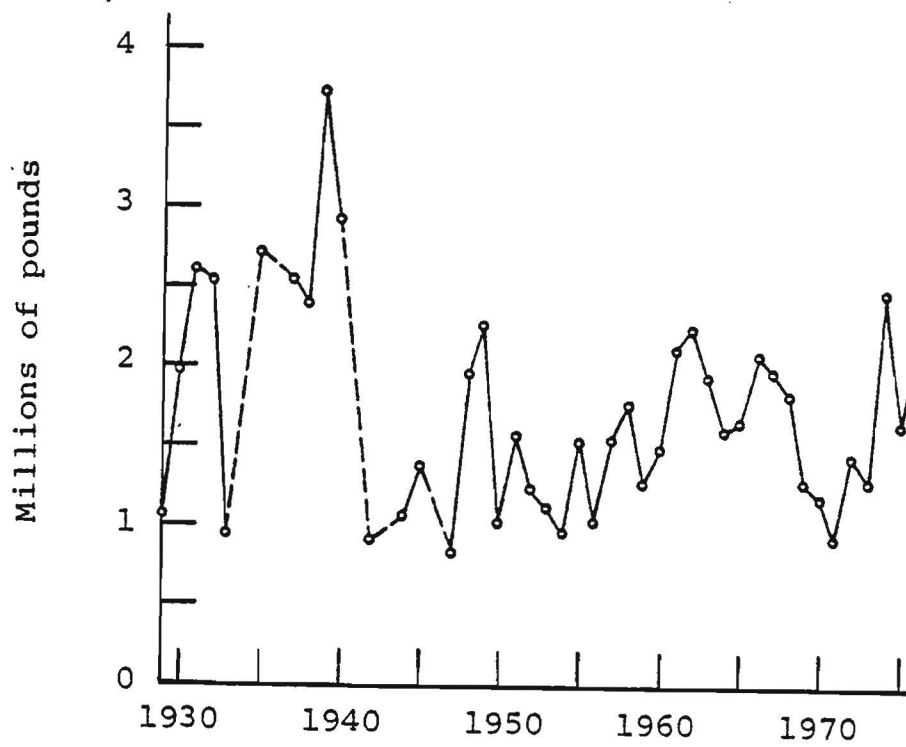


Figure 17

Figure 18.--Domestic commercial landings of sea scallop in the Middle Atlantic Bight region 1929 to 1976. The species apparently is highly variable in abundance south of Georges Bank. When scallops have been scarce to the north the New England fleet has moved into the Middle Atlantic Bight region, and at times over 50 percent of New England landings have been taken in this region. Thus, landings from New York to Virginia are not an accurate index of catches or abundance in the region. Presently, the resource has been unusually abundant south of Cape Cod.

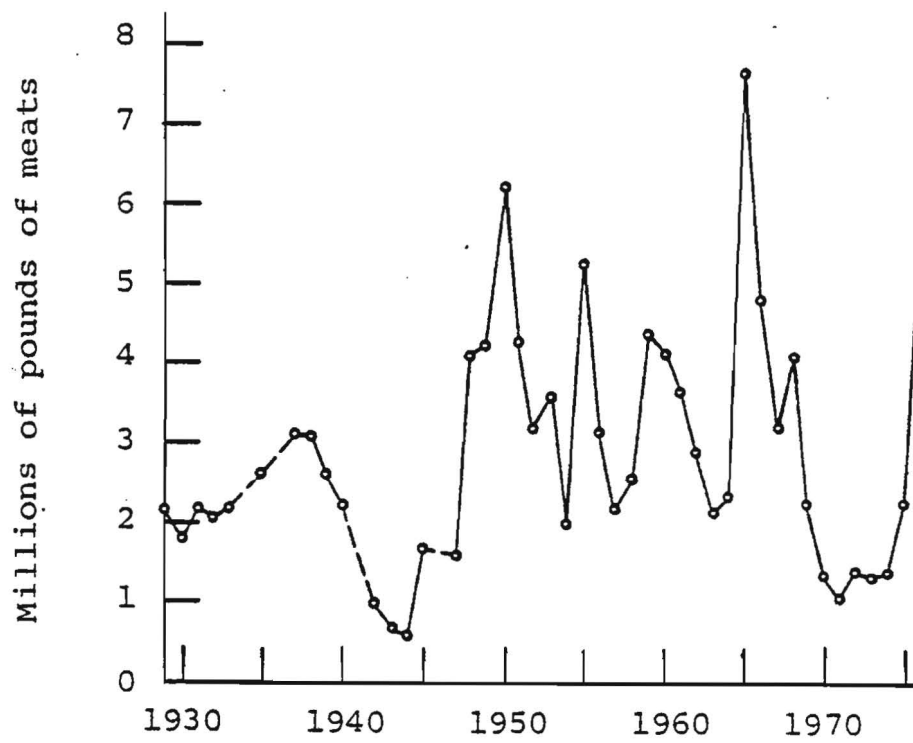


Figure 18

Figure 19.--Domestic commercial landings of American lobster in the Middle Atlantic Bight region 1929 to 1976. The increase to 1970 was caused by a southward shift of the distributional range of the species in response to falling water temperatures, and to development of new fisheries on the outer continental shelf. The sharp decline in the 1970s probably was caused by overfishing. Reported foreign catches were not large, but there has been some question as to whether they were reported accurately. The fishery probably needs to be regulated if yields are to be maintained.

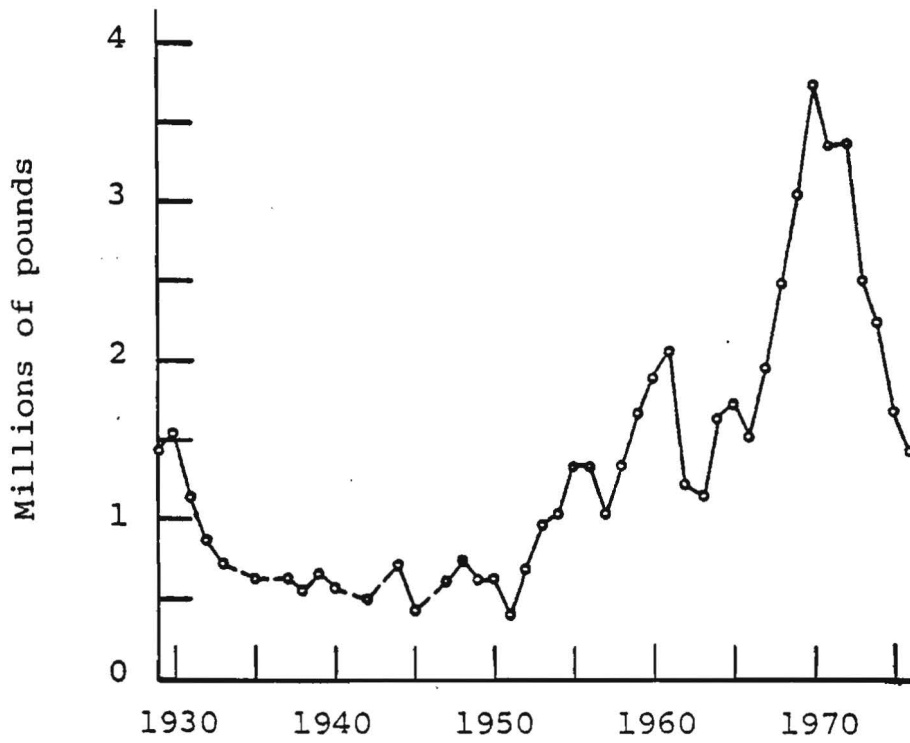


Figure 19

2) Finfish resources harvested exclusively, or almost so, by domestic fishermen.

Figure 20.--Domestic commercial landings of Atlantic menhaden in the Middle Atlantic Bight region 1929 to 1976. Average annual landings in Virginia in the 1970s have been higher than ever before, but intensive fishing there and farther south has affected the northern fisheries adversely. The present high level of abundance in Chesapeake Bay may be only temporary.

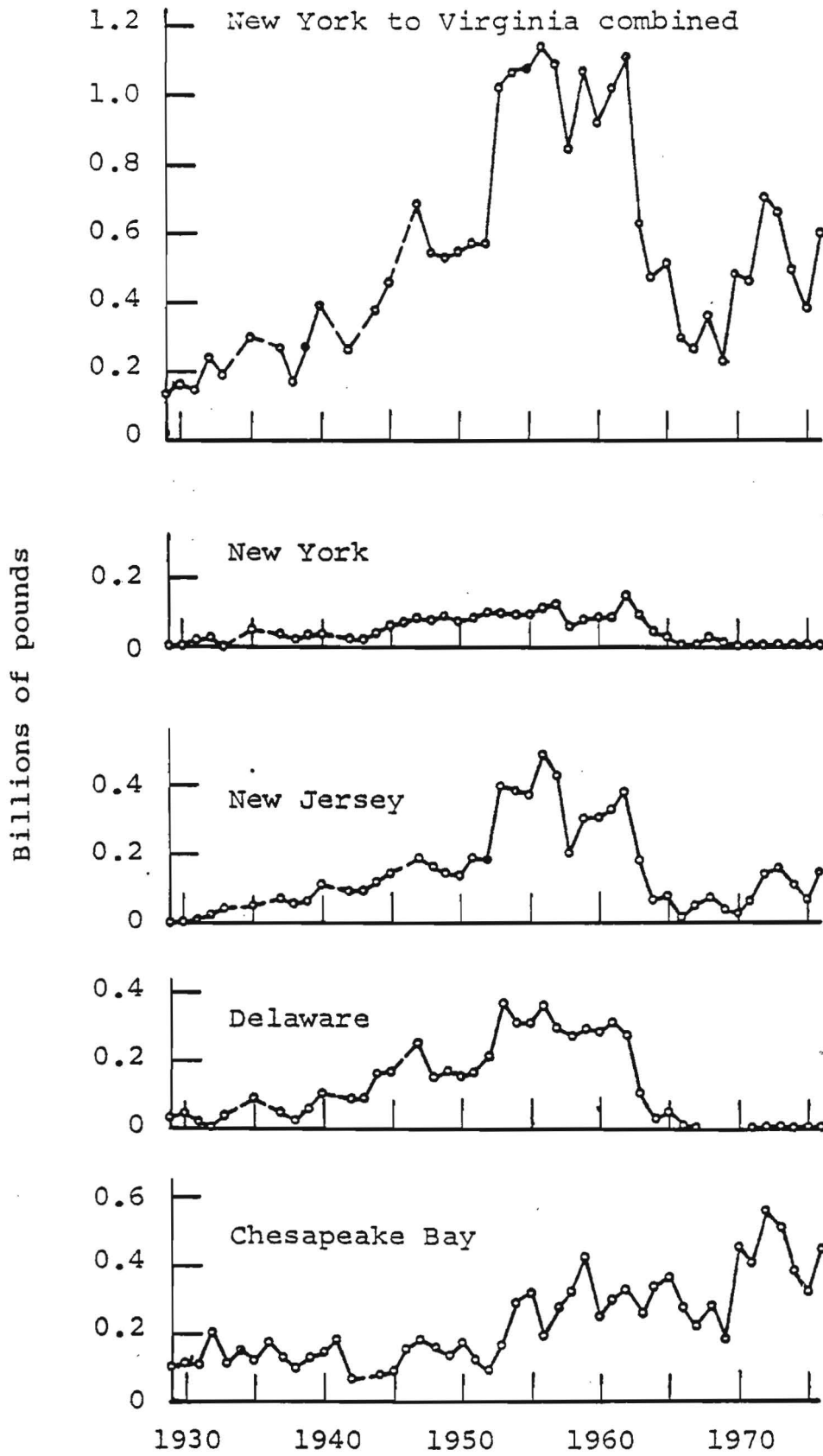


Figure 20

Figure 21.--Domestic commercial landings of Atlantic croaker in the Middle Atlantic Bight region 1929 to 1976. This is one of the southern species which fluctuates widely in abundance in this region from natural causes. The peaks in the 1930s and 1940s were caused by unusual abundance north of Cape Hatteras. The 1945 peak was emphasized also by the wartime demand for fishes. The decline in the 1940s and thereafter was probably caused by spawning failures and a shift of the distributional range to the south. Abundance in the region has increased substantially recently. The estimated recreational catch in 1974 was well over two million pounds.

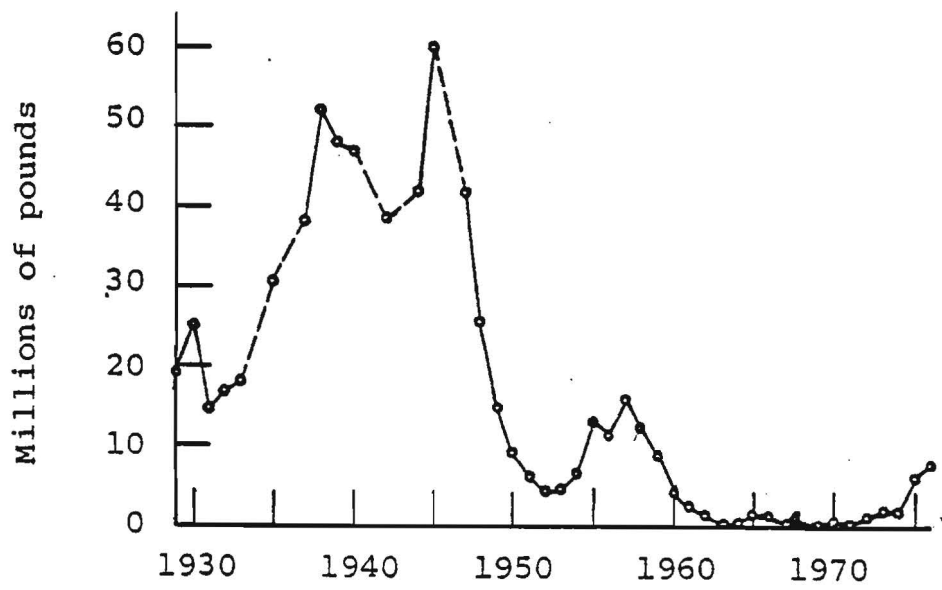


Figure 21

Figure 22.--Domestic commercial landings of weakfish or gray sea trout in the Middle Atlantic Bight region 1929 to 1976. Unusual biological abundance and wartime demand for fishery products contributed to the 1945 peak. The decline through the 1950s and 1960s was caused by spawning failures and withdrawal of the stocks to the southward in response to changing environmental conditions. A substantial recovery has taken place in the 1970s. The recreational catch in 1974 was estimated at about 6 million pounds.

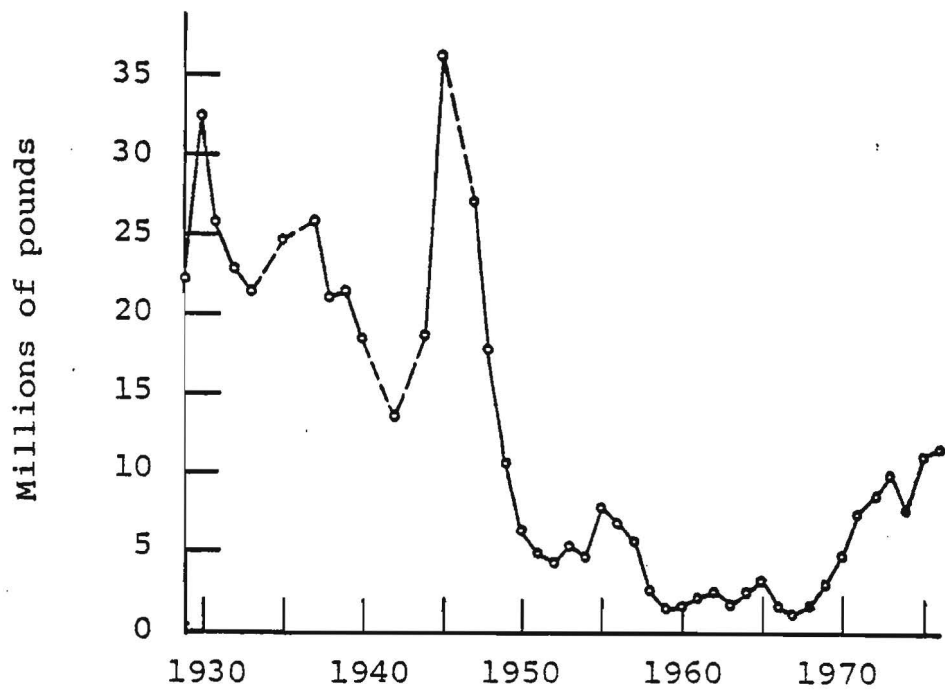


Figure 22

Figure 23.--Domestic commercial landings of American shad in the Middle Atlantic Bight region 1929 to 1976. The peak in the 1940s was caused by relaxation of fishing regulations during the war in response to the demand for protein food. The subsequent decline was caused partially by overfishing, but declining demand and changed economic conditions have contributed. Water pollution and dams also have had adverse effects on shad survival. Estimated sport catch in 1970 was over 4.2 million pounds.

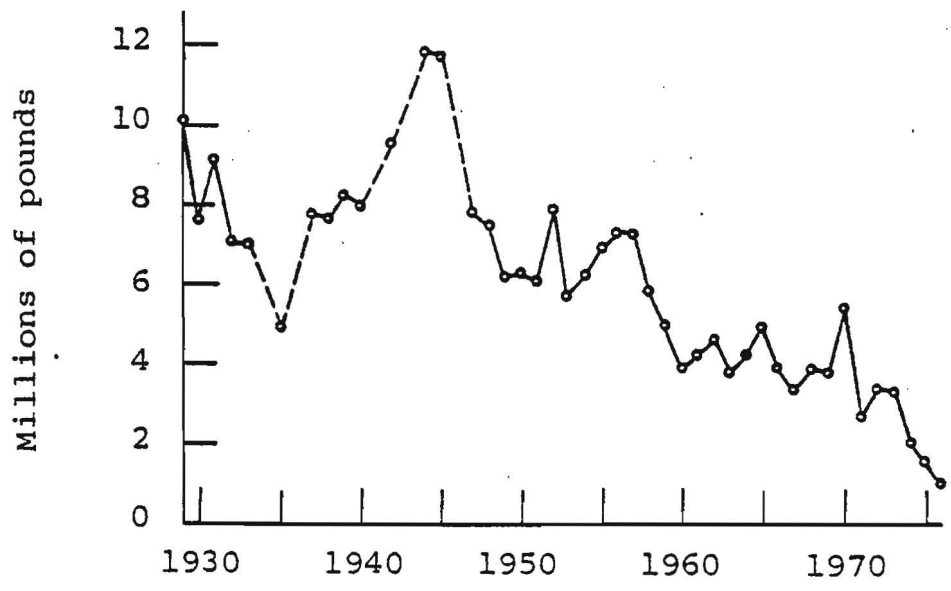


Figure 23

Figure 24.--Domestic commercial landings of northern puffer or swellfish in the Middle Atlantic Bight region 1929 to 1976. This was not a popular food fish until wartime demand created markets in the 1940s. The commercial fishery reached a peak in the mid-1960s, and it has since virtually collapsed. The resource fluctuates widely in abundance from natural causes, and poor spawning success contributed to the drop in the 1970s. It is not known what effect fishing has had on the resource. Estimated sport catch in 1970 was over 16.5 million pounds.

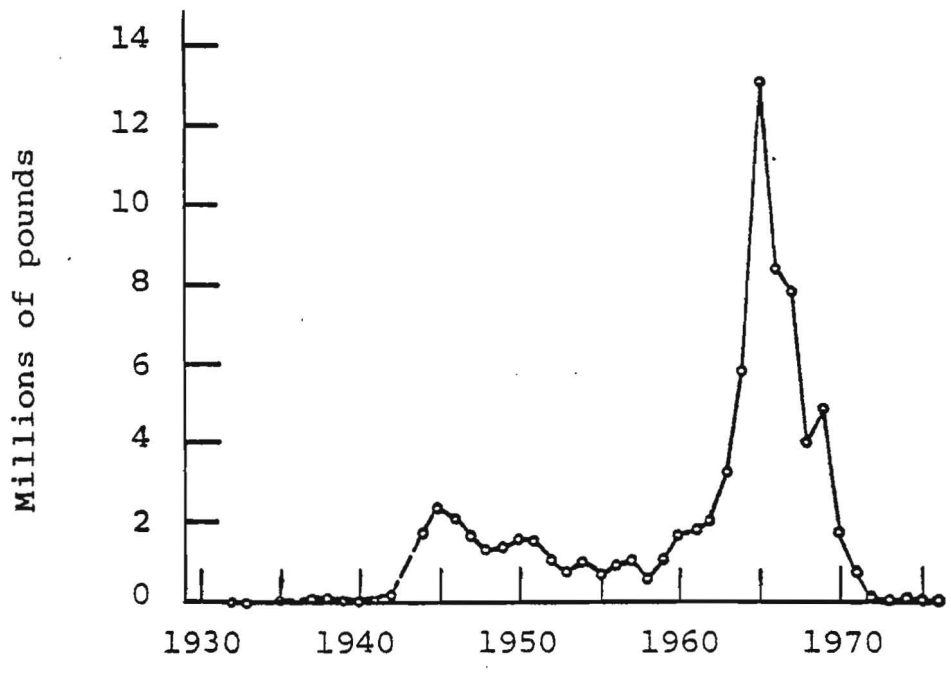


Figure 24

Figure 25.--Domestic commercial landings of black sea bass in the Middle Atlantic Bight region 1929 to 1976. This species also fluctuates widely in abundance from natural causes, and the decline since the 1952 peak was caused at least partly by reduced spawning success, but overfishing may also have played a part. The estimated recreational catch in 1974 was about two million pounds.

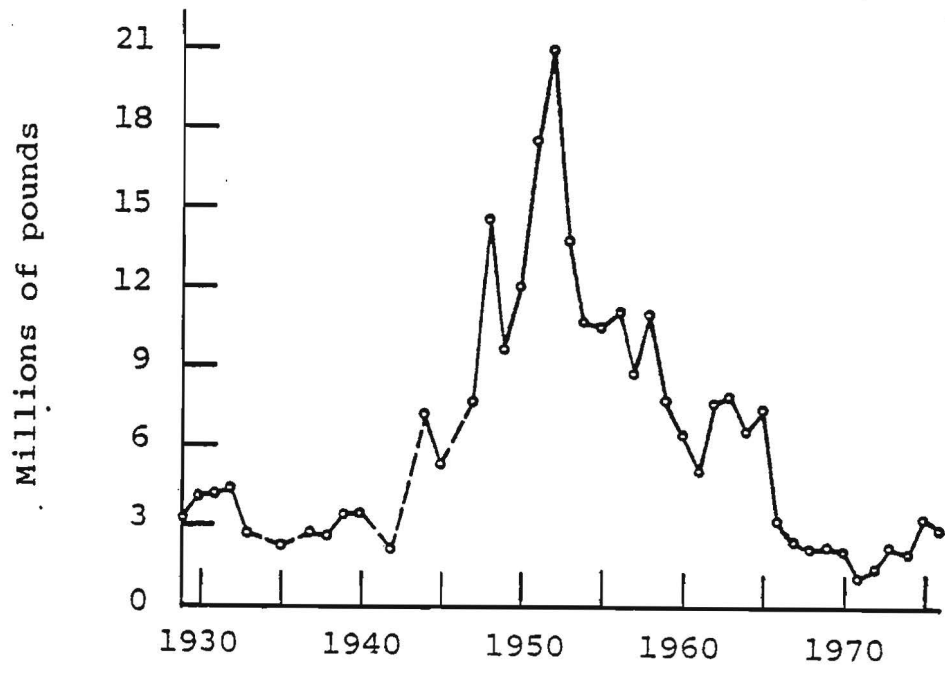


Figure 25

Figure 26.--Domestic commercial landings of striped bass in the Middle Atlantic Bight region 1929 to 1976. Despite heavy sport and commercial fishing, and environmental hazards in the estuaries, the resource has been increasing in abundance for at least 40 years. Superimposed on this upward trend have been major swings in abundance related to success of spawning. The recent decline is the most severe on record, and there is no assurance that the resource will recover. However, there is no evidence that the resource has been adversely affected by fishing. An estimated recreational catch of about 4.5 million pounds was taken in the region in 1974. The sport catch has been estimated to take up to 6 to 7 times as many fish as commercial fishermen do.

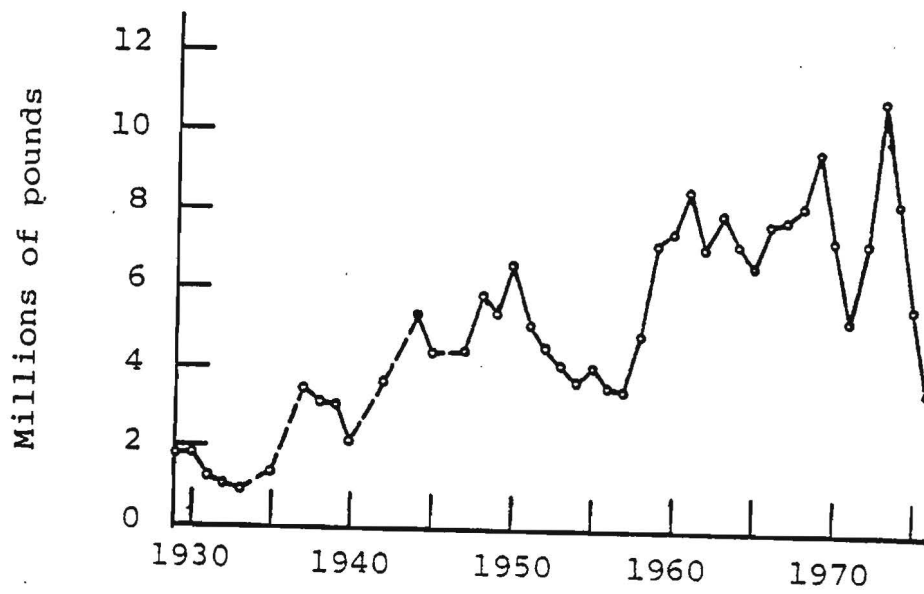


Figure 26

Figure 27.--Domestic commercial landings of spot or lafayette in the Middle Atlantic Bight region 1929 to 1976. The species fluctuates widely in abundance from natural causes, and because it has a short life these fluctuations affect the catch substantially. The cause of the downward trend in landings since 1949 is not known. The recreational catch in 1974 was estimated at over 6 million pounds.

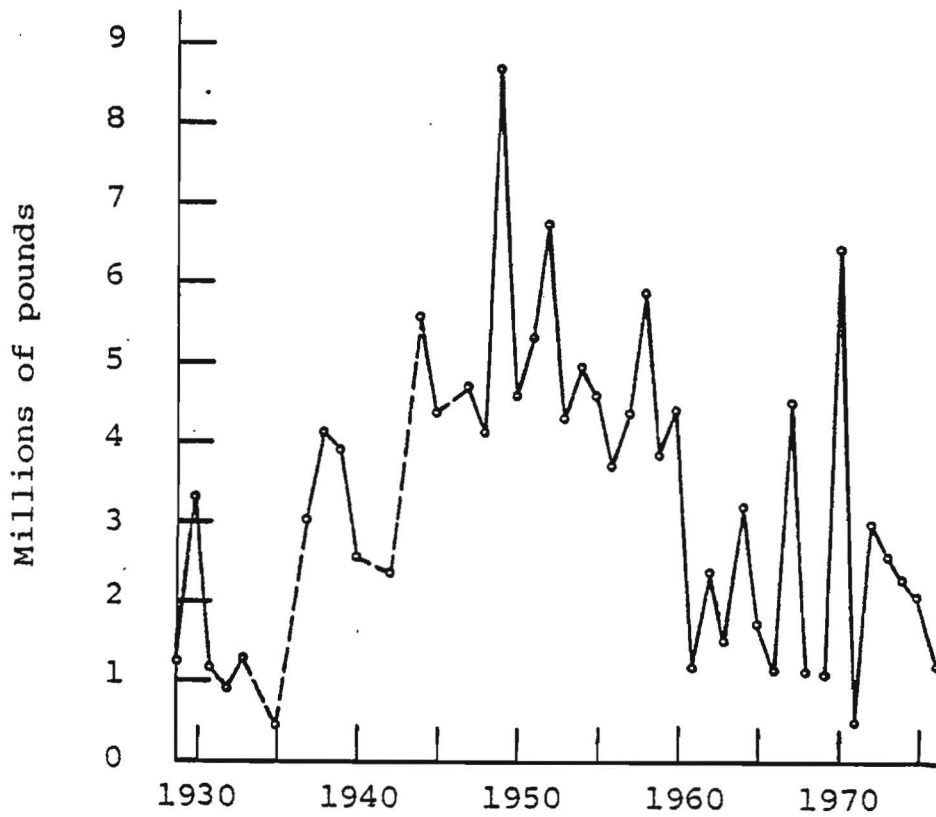


Figure 27

Figure 28.--Domestic commercial landings of bluefish in the Middle Atlantic Bight region 1929 to 1976. The decline since the 1930s and subsequent recovery in the 1970s is believed to have been caused by a decline and increase in success of spawning. This is an important recreational species in the region, and the 1974 sport catch was estimated to be about 24 million pounds. This species now may be as abundant as it ever has been in the region. Surveys of saltwater sport fishing have suggested that the recreational catch of bluefish may be 20 times or more as great as the commercial catch. There is some fear that commercial fishing for export may develop, and recreational fishermen feel strongly about this.

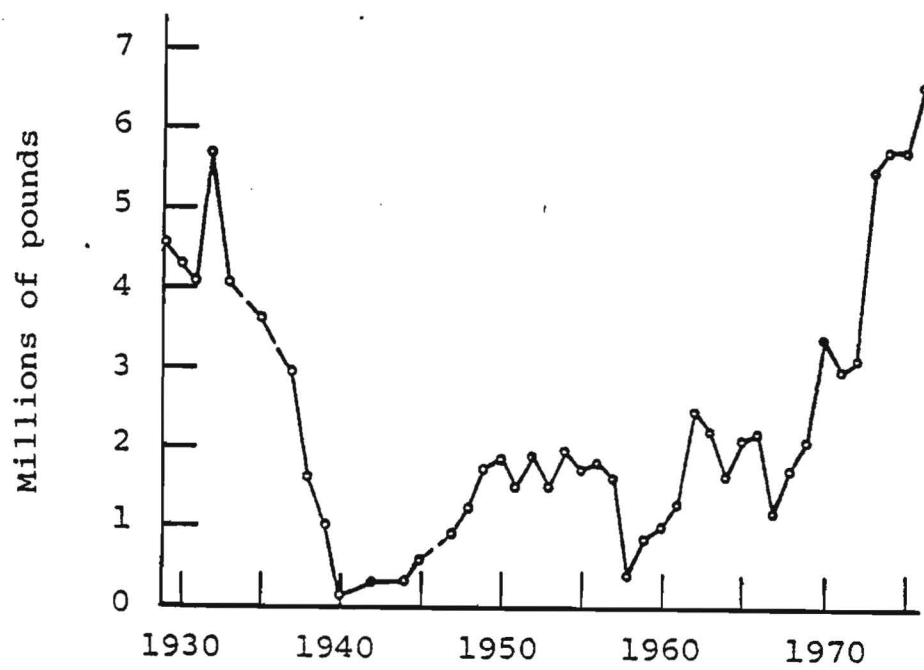


Figure 28

Figure 29.--Domestic commercial landings of white perch in the Middle Atlantic Bight region 1929 to 1976. The species varies in abundance from effects of natural environmental variations. The cause of the recent decline in commercial landings is not known. The recreational catch in 1974 was estimated to be over 9 million pounds. Thus it is questionable whether the resource actually has declined in abundance.

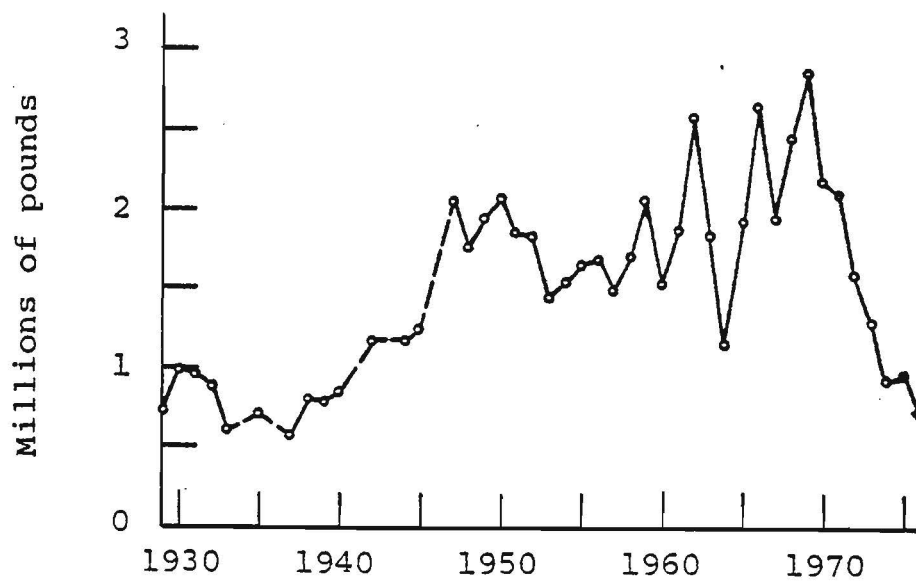


Figure 29

3) Domestic shellfish resources

Figure 30.--Domestic commercial catches of blue crab in the Middle Atlantic Bight 1929 to 1976. This is primarily a southern species, not very abundant north of Chesapeake Bay. The trend of abundance has been upward in Chesapeake Bay for about 50 years, with wide fluctuations related to success of spawning. The recreational catch is large. It was estimated at about 28 million pounds in the region in 1974.

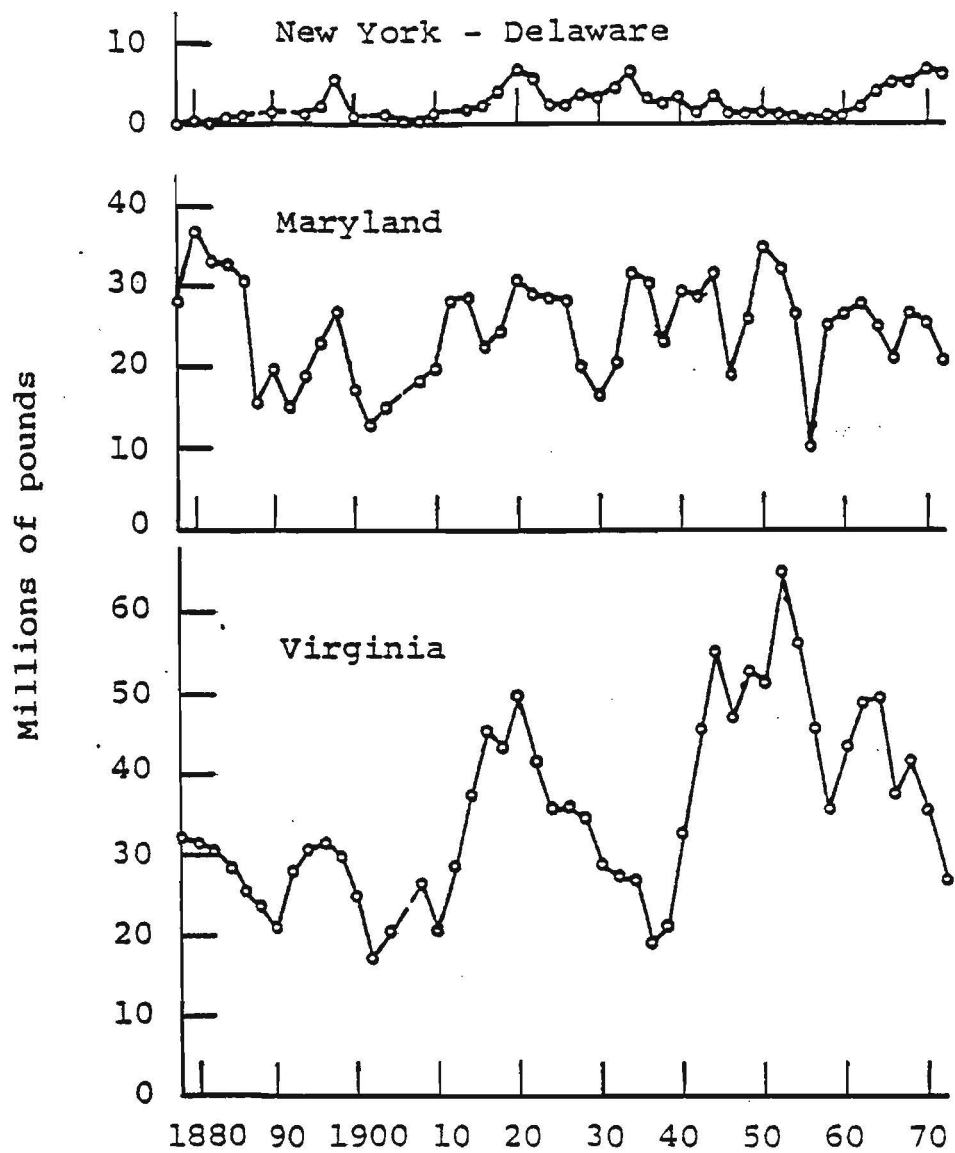


Figure 30

Figure 31.--Domestic commercial landings of American oyster in the Middle Atlantic Bight region 1880 to 1976. The general trend has been downward.

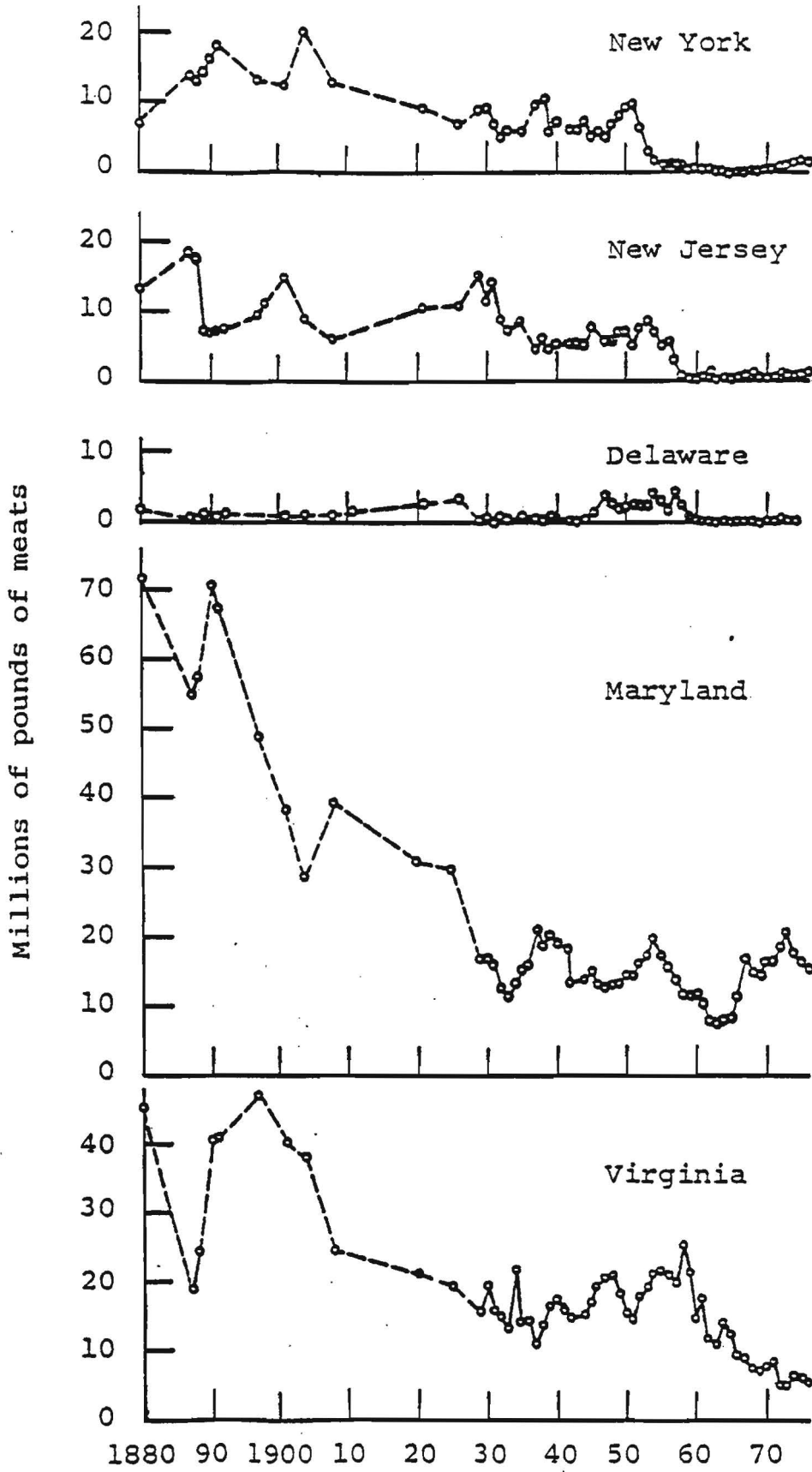


Figure 31

Figure 32.--Domestic commercial landings of surf clam in the Middle Atlantic Bight region 1929 to 1976. This resource is overfished, and the present fleet is far too large.

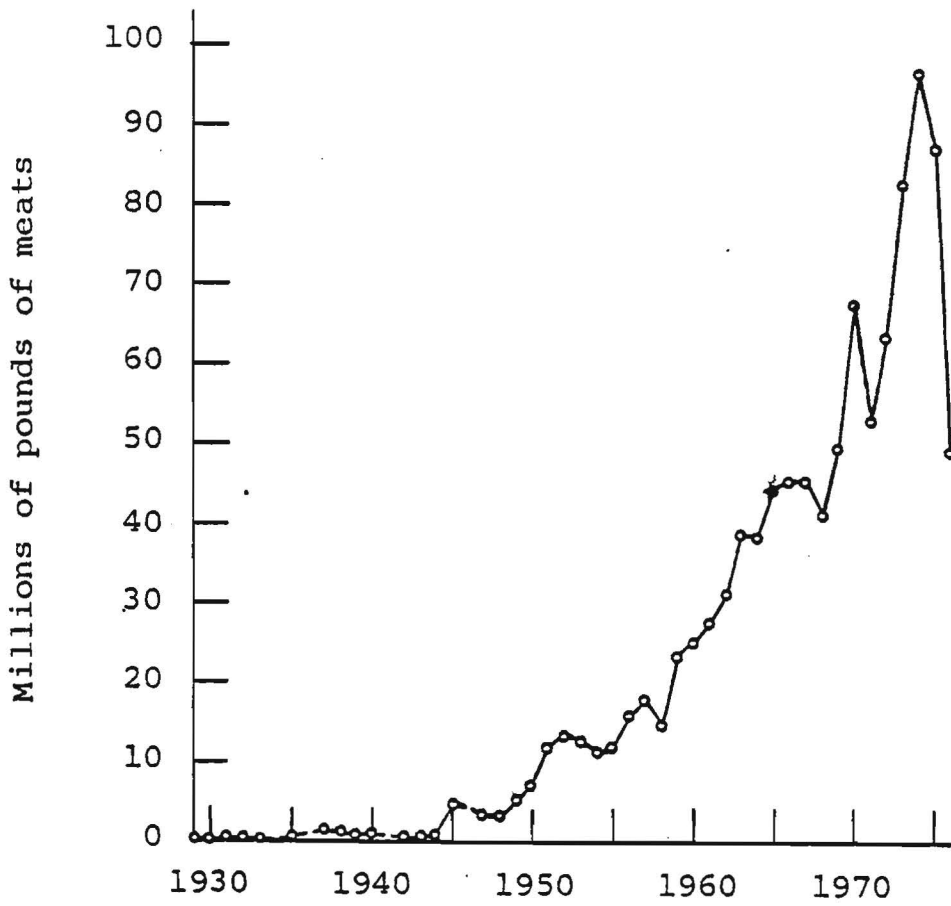


Figure 32

Figure 33.--Domestic commercial landings of hard clam in the Middle Atlantic Bight region 1880 to 1976. Catches are down somewhat, but the resource has stood up remarkably well. Estimated sport catch in 1974 was about 2.75 million pounds.

Millions of pounds of meats

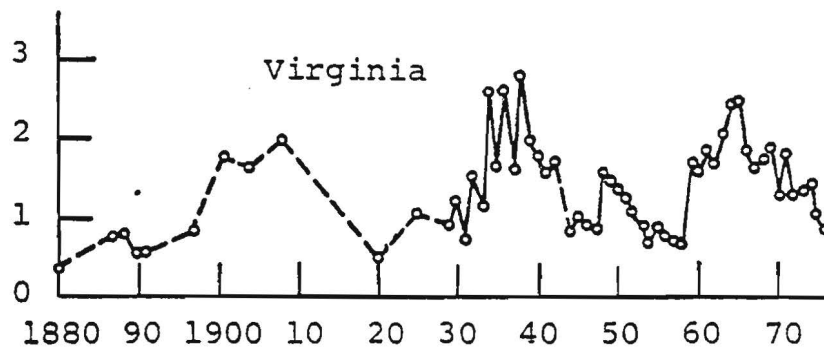
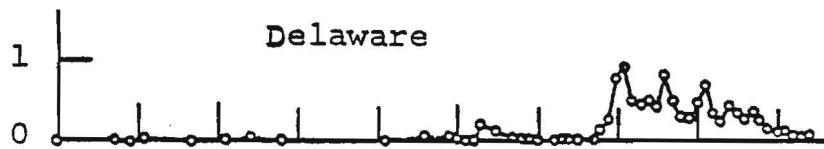
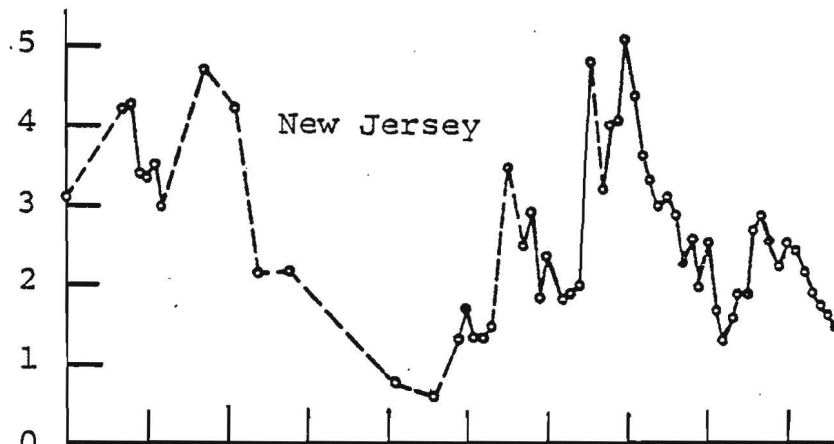
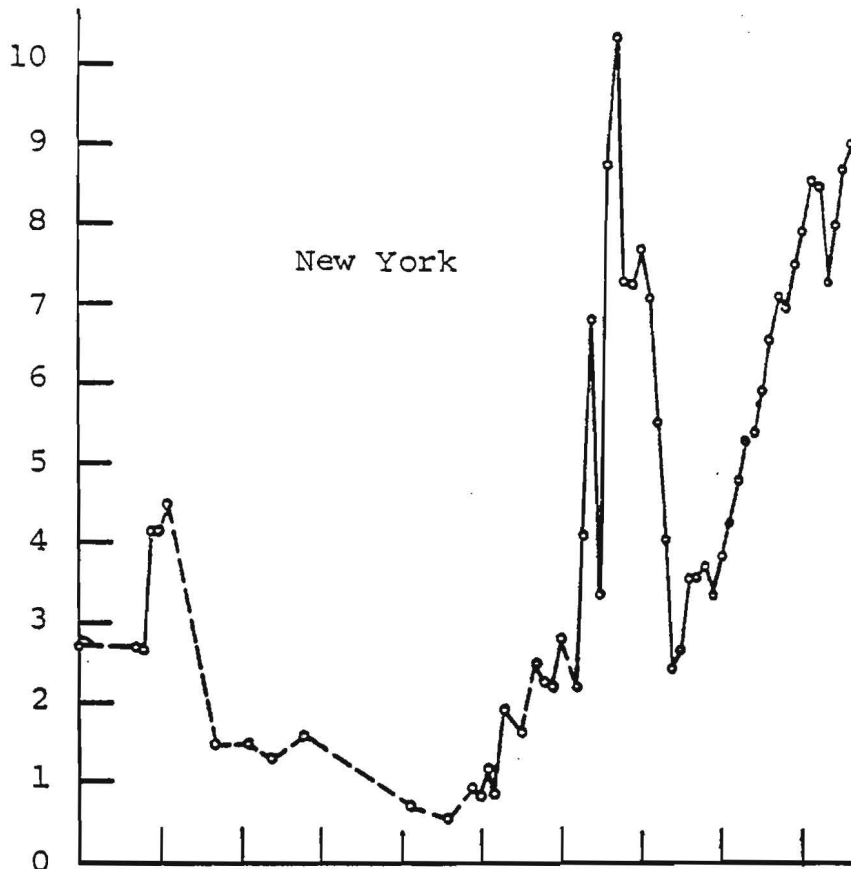


Figure 34.--Domestic commercial landings of soft clam in the Middle Atlantic Bight region 1929 to 1976. The large increase to a peak in the 1960s was caused by development of a hitherto underutilized resource in Maryland waters when the resource in New England declined, primarily from the effects of natural environmental change. The sharp decline in the early 1970s was caused by the effects of a hurricane on the Maryland resource. The resource has so far not recovered.

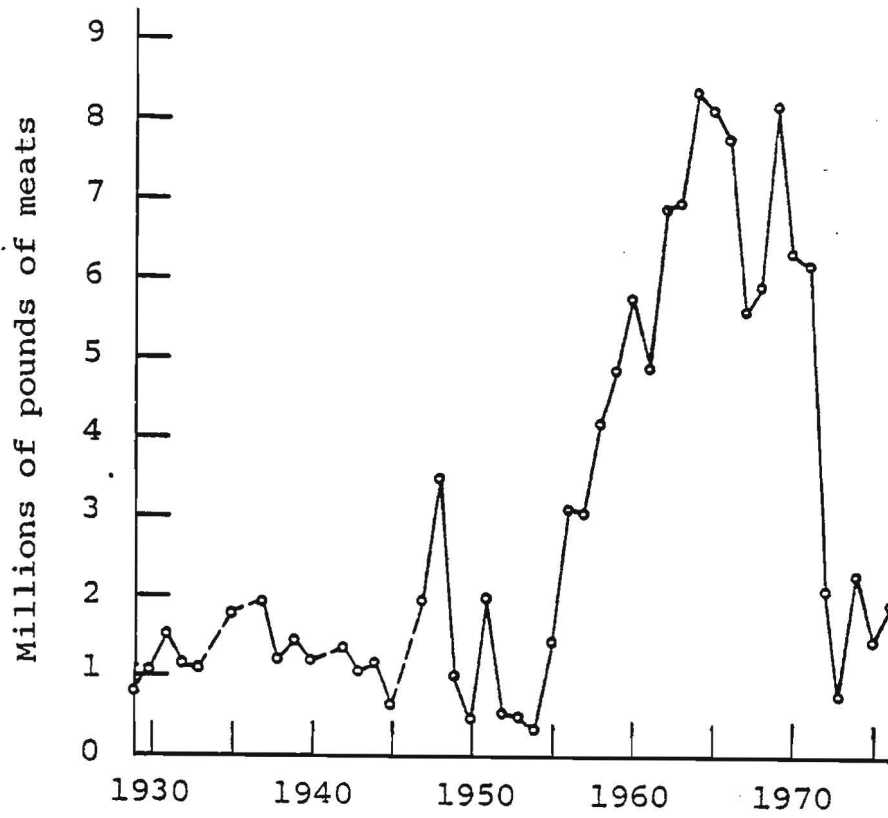


Figure 34

Extended Jurisdiction as a Solution

Many people saw national jurisdiction over fisheries out to 200 miles as a magic solution to all the problems of United States marine fisheries. The simplified view was that Public Law 94-265 would put an immediate end to foreign fishing and that American fishermen would be free to take resources thereby released. This ignored certain facts. With a few notable exceptions, foreign fleets were not competing seriously with Mid-Atlantic fisheries. Nothing, other than economic constraints and lack of markets, had prevented United States fishermen from developing these fisheries earlier. PL 94-265 provided that surplus resources, over and above those which American fishermen could take and market, must be allocated to foreign fishermen. Furthermore, the Act provided that American fishermen, as well as foreign fishermen, were to be equally subject to regulation, to maintain the living resources at optimum levels. Misunderstanding of these points has led to much controversy, and probably will continue to do so.

How then can American fishermen take advantage of the new regime created by PL 94-265, if advantages are indeed possible? The history and present condition of the domestic fisheries provide some guidelines. Separate arrangements may be necessary for fisheries on the high seas (3 to 200

miles) and those in coastal waters (territorial sea and inland marine waters), because under the new regime one region falls within the authority of the regional fishery management councils, whereas the other remains within state jurisdiction, under legal and management authority which has not been notably successful in the past, and only now is beginning to improve in some places.

The best commercial fishing strategy would appear to be to avoid reliance on one or a few species by exploiting as broad a resource base as possible. The necessary flexibility would be provided by a seaworthy, multipurpose vessel, with a reasonably long cruising radius. The vessel and its crew and equipment should be adaptable to using as many different kinds of gear as possible, with a capacity to refit quickly as needed. Such a vessel could follow fish and shellfish concentrations, fishing where and when it was most profitable. Management measures might include a system of deterrent taxes to discourage harvesting scarce and overfished stocks, and negative levies and other incentives to encourage taking underutilized resources.

Effective operation of such a scheme would require an efficient intelligence system, to predict abundance and availability, to identify the best times and places to fish, and to decide what deterrents and encouragements to offer.

Such intelligence could best be provided by government, but it would require trust and cooperation by fishermen.

A third essential ingredient would be market development, to break down consumer resistance to unfamiliar species and products. A number of activities might be necessary: consumer education, test marketing, research on handling the catch at sea and ashore, and new processing and packaging methods. In some areas, New York State is an example, improved landing facilities will be necessary. Direct marketing activities are an industry concern. They could be generated and coordinated by the Development Foundation, as could be other activities leading to increased demand and sales. Government and universities, with cooperation from industry, could provide research facilities and expertise.

Conclusions

It appears that much could be done to improve the capability of United States fishermen to take advantage of extended jurisdiction. A regional fishery development body could provide the incentive and the coordinating mechanism. Education and understanding are needed at all levels. Improved fishing strategies, better fishery intelligence, a broader resource base, and market development at home and abroad are essential ingredients of the scheme. Regional fishery

management councils and development foundations can provide the mechanisms for coordination between offshore and coastal fishing zones; between federal, state, and local governments; and between government, industry, and recreational interests. Understanding and good will are the catalysts which will make the system work.

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