THE STATUS AND CONDITION OF NEW JERSEY'S MARINE FISHERIES AND SEAFOOD INDUSTRIES

CHARTING A COURSE FOR THE FUTURE

NEW JERSEY
DEPARTMENT OF AGRICULTURE
CN 330, Trenton, New Jersey 08625
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The Status and Condition of New Jersey's Marine Fisheries and Seafood Industries

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A WORD FROM NEW JERSEY SECRETARY OF AGRICULTURE, ART BROWN.....

New Jersey is at a significant crossroads in the history of its commercial and recreational fishing industries. Depending upon the course that is taken, these industries can continue to "fire fight" a series of fragmented issues on a local basis or they can join together to develop workable public policy and private sector opportunities. The charting of the latter course is dependent upon an unprecedented level of cooperation among industries, legislators, state agencies and academia.

Recognizing the critical challenges confronting our fisheries, the New Jersey Department of Agriculture commissioned this report. It has been ten years since such a comprehensive analysis of the industry was done. This report represents a new beginning. It provides a factual foundation on which to build the future of the state's fisheries. It identifies both resources and impediments impacting the maintenance and development of our fish and seafood industries.

Now we must work together to formulate a strategy that will create new opportunities for our fishery-related industries. With your help, the commercial and recreational fishing industries of the Garden State can reach their full and sustainable potential.

Join with us to develop a full range of long- and short- term strategies for both the public and private sectors. We can then set an action agenda based on a workable plan.

I look forward to working with you to ensure that our commercial and recreational fishing industries prosper and grow in the 21st century.

Arthur R. Brown, Jr.
Secretary of Agriculture

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EXECUTIVE SUMMARY

I. INTRODUCTION

The New Jersey Department of Agriculture commissioned this report. It is a resource document on the status and trends of the commercial fisheries that can be used by members of the industry, legislators, and state agencies with responsibility for planning and controlling the future of the state's fisheries.

The work is prompted in part by the crisis appearing in the northeast region's fisheries. Many fish and shellfish are scarce, whether due to overharvesting or habitat damage or diseases or natural stock fluctuation. Opportunities to harvest fish and shellfish are also increasingly constrained by state and federal regulations, some designed to deal with resource conservation problems, others to deal with resource allocation problems or public health. The most dramatic problems are occurring in New England, but their effects are felt right down the Atlantic seaboard, as displaced fishermen and markets adjust to tight regulation and closures of the traditional groundfish fisheries.

The report is also in response to concerns about the position of New Jersey and U.S. seafood in global markets, about the marine recreational industry, and about opportunities for aquaculture. It is intended to help state, industry, and other stakeholders engage in problem definition, needs assessment, exploration of alternative solutions, policy planning, and impact assessment. For the first time, it brings together in one document the most recent available statistics as well as key information from earlier studies and surveys.

II: COMMERCIAL LANDINGS

New Jersey's commercial marine fishery landings are significant to the nation for certain species, particularly: ocean quahogs, surf clams, black sea bass, scup, squid, Atlantic mackerel and bluefish.

Commercial marine fishery landings (not counting charter, party boat, or other "sports" landings) have more than doubled in poundage and value between the early 1980s and the early 1990s. In 1993 they totaled about 196 million pounds, with a dockside value of $96.3 million.

However, the picture of growth provided by aggregate statistics masks serious problems.

- Edible seafood (as opposed to bait or industrial use) fish landings have remained essentially flat in poundage and values have not quite kept pace with the rate of inflation.

- Landings of higher value species are declining and being replaced with lower value species

- Shellfish landings volumes have grown substantially but economic returns to harvesters have not increased appreciably, because of rising costs and very little change in the average value per pound.

- New Jersey prices have been below the national average for some species, including an important set of species for which N.J. landings are at least 25% of the national landings.

Landings by Species:

Surf clams and ocean quahogs continue to dominate New Jersey commercial fisheries but the geographical distribution of landings is changing rapidly, with changes in the regulatory regimes (state and federal) and signs of low productivity on traditional grounds.

Tilefish, weakfish, red hake, and lobster are no longer in the "top 15" ranking of New Jersey species (1993 compared with 1982). There has also been decline in fluke (summer flounder), whiting, and oysters, among other species.

Anglerfish (monkfish), herring, sea scallops, and the tunas have moved into the top 15. Other species have increased as well, including skate, mako shark, menhaden, Loligo squid, blue crab, black sea bass, and surf clams.

The largest harvest increases are for species with the lowest values, including Illex squid, skates, dogfish, and herring.

Landings of many high valued species are declining in both absolute and relative terms; including scup, black sea bass, fluke, tilefish, the tunas, and scallops.

Landings by County and Port:

1993 landings by county show little change over the past decade in the distribution of commercial fishing effort. Moreover, growth in landings by weight occurred in all counties, especially in the period 1988-91.

The Cape May/Wildwood area remains the largest and most diversified port of the state.

Atlantic County is most heavily reliant on shellfish landings, both ocean (surf clams and ocean quahogs) and bay (hard clams)

Monmouth County landings have the most species diversity; the port of Belford is the site of recent dramatic growth in ocean quahog landings.

Ocean County has two important ports, with a wide diversity of fisheries and species. It includes Point Pleasant, mostly a nearshore, day-trip, multi-species port, and Barnegat Light, home to a distant-water fleet of longliners and scallopers, as well as bay fisheries for clams and crabs.

Other counties and ports of New Jersey are relatively insignificant, and dominated by Cumberland County, where blue crab was the major species landed in 1993, replacing oysters.

Changes in the Fisheries:

The bay hard clam and soft clam fisheries are increasingly dependent on special state programs for utilization of clams from marginally polluted waters, particularly in Monmouth County (including a "relay" to Ocean County). By 1993, 48% of hard clam landings depended on these programs. (Aquaculture is also an increasingly important force in this fishery; see below).

The situation is very dynamic. For example, in 1990 a large-scale fishery for menhaden, sold as bait, developed in Cape May/Wildwood, giving a major boost to New Jersey's fisheries in terms of landings, but not much added value. This is basically a revival of the old role of menhaden in New Jersey's fishery landings, replacing the older fish meal, fertilizer, and fish oil product with bait, and hence losing the added value of processing.

On the other hand, by 1994 ocean quahogs were no longer being landed in Cape May but had become the dominant species in Ocean and Monmouth County landings. Reasons range from regulatory changes to changes in firm ownership to decline in supply in the more southern clam beds.

Formerly (pre-1980) underutilized species have become important to N.J. Squid (Illex, Loligo) has become a major product of Cape May, Point Pleasant, and Belford; joint ventures with foreign operations helped in the early phase of this fishery and contributed to the more recent beginning of an Atlantic herring fishery

(1991). There was also a spurt of dogfish landings in 1990-92.

There was also a major decline in traditional fisheries. One is the fluke (summer flounder) fishery. Another is the whiting (silver hake) and ling (red hake) fisheries. Ironically, whiting and ling were viewed as underutilized species within the region over the past decade, although they were the major source of value for some of New Jersey's fishing ventures. Causes of decline are many but include increased involvement in these and other "underutilized" species fisheries by operations shifting their geographic focus in response to decline in the New England groundfish fisheries.

Other seemingly "minor" or "underutilized" fisheries that retain or have increased their importance include monkfish (anglerfish); the squids; black sea bass, scup and tautog; winter flounder; blue crabs; dogfish and mako shark. The general pattern is one of intensified search for alternatives and new or expanded markets and market niches. Complicating the situation (see below) is the development of complex management structures.

Species by Gear Type: 1982-1992 -- major changes, trends:

Scallopers have increasingly had a "bycatch" of fluke and monkfish.

Atlantic herring, skate, and dogfish have increased in the catches of fish otter trawls.

The pot fishery for tautog (part of the lobster pot fishery) was increasingly replaced by an otter trawl fishery. On the other hand, "fish pots" have become more important for black sea bass.

Longline gear has largely replaced purse seines for yellowfin tuna.

Mid-water pair trawling has appeared in several fisheries, including the albacore tuna fishery, where it has replaced gill nets as the "second place" gear, next to longlining.

Gill-netting is the primary technique for only 2 species: shad and bluefish. Such gear are also important for dogfish and weakfish, but have declined for other species.

Pound-nets continue their pattern of decline, but as of 1992, remained significant for bluefish (15% of the state catch). Purse-seining has generally replaced pound-nets for the state's menhaden catch (again, restoring an older pattern).

Monthly/Seasonal Patterns:

New Jersey's 1993 pattern shows a good pattern of dispersion of harvesting activity over the year. An active year-round fishery is vital for the stability of fishing communities, harvesters, marketing efforts and efficient processing operations. 1982-1993 changes have been toward greater monthly uniformity.

Landed Value (Price per Pound):

For most species, New Jersey prices have been and continue to be lower than the nationwide average. Exceptions are primarily species caught by longliners from Barnegat Light (swordfish, tunas and tilefish), plus several "luxury" species, lobsters, sea scallops and blue crab, and for reasons unknown, dogfish. The lower New Jersey price holds even for species for which NJ harvests over 25% of the U.S. catch (ocean quahog, surf clam, black sea bass, scup, Atlantic mackerel).

Based on Consumer Price Index (CPI) for 1982-93, (which was 1.50), it appears that few species have shown price increases in excess of inflation. Only fluke, tunas, oysters, sea scallops, weakfish prices outpaced inflation. Dogfish, mako shark, Atlantic mackerel, herring and surf clams actually dropped in absolute price (irrespective of the CPI) between 1982 and 1993.

Because of the high value of certain species, even modest increases in landings make a big difference to value. This has been true in the recent past for scallops, tunas, and lobster in particular.

For particular ports, seemingly minor changes in species abundance or availability may be very important, as has been the case for Monmouth County (Belford) fishermen with blue crabs since 1988, and with hard clams, once depuration facilities were available in 1993.

III: FISHING FLEETS AND PORTS

New Jersey participated in a national trend of increase in the number of commercial fishing vessels until the late 1980s; numbers have fluctuated since then. For 1992 NMFS estimated 1,879 fishing craft in New Jersey, of which 487 were U.S. Coast Guard documented vessels, over 5 net registered tons. There are no reliable data on the proportion of craft actually fishing or on levels of their use for fishing. New Jersey has a higher proportion of smaller, "undocumented," vessels than the nation at large because of the continued importance of bay and inshore fisheries to the state.

NMFS data on fishing vessels with federal permits for regulated fisheries give a view of New Jersey's commercial fishing fleet (including party and charter boats). The vessels tend to be old, most built in the mid-1970s, and the party boat fleet is even older. Larger, more powerful vessels tend to be found in Cape May and Wildwood; smaller vessels predominate at other ports in the state.

Studies done in the 1980s provide more detail on the operations and capital worth and investment of a large sample of New Jersey fishing vessels (again including charter and party boats). In 1986 the inflation rate outpaced depreciation of vessels, but by the early 1990s this situation had reversed or at least leveled off.

Among limiting factors to New Jersey's commercial and recreational fisheries is the scarcity and high cost of adequate waterfront facilities for unloading, berthing, repair, etc. Competition for waterfront property is intense, as shown in the recent history of the port of Belford, where the local fishermen's cooperative continues to struggle with development pressures.

Cooperatives (at Belford and Point Pleasant) persist in northern ports and have provided numerous services to members; they are experiencing problems due to downturns in the fisheries as well as local development pressures. Belford, Point Pleasant Beach, and other more northern ports have experienced decline in some of their traditional fisheries, such as the winter dragger fishery for whiting and red hake. They have increased involvement in squid fishing, improved their market position by expanding local retail operations, and become the site of expanded surf clam and ocean quahog operations as that industry moves northward in response to changing abundance of clams.

Successful hard clam "relay" and "depuration" programs have also enhanced the alternative of bay clamming, and other bay fisheries, particularly for crabs and flounders, are strong in places.

The experience at Barnegat Light shows that commercial food fisheries and charter and party boat fisheries can co-exist and mutually profit. It also suggests the importance of flexibility based on the ability to switch species focus, in the recent history of tilefish longlining expanding into pelagic longlining.

Decline in the Atlantic City fishing fleet in recent years is mostly due to the effects of "ITQs" (individual transferable quotas) in the surf clam and ocean quahog fisheries, particularly the sharp decline in active vessels as owners consolidate their operations. There is relatively little conflict with alternative waterfront uses in the commercial fishing area, on the bayside.

Several of New Jersey's ports have depended heavily on the surf clam and

ocean quahog fisheries, both harvesting and processing. Atlantic City is almost entirely dependent on ocean clamming; Cape May and Wildwood were important surf clam and ocean quahog ports but very recent changes in clam populations and the industry have resulted in the near-demise of these fisheries there and their resurgence at Point Pleasant and Belford.

Cape May and Wildwood remain the most important fishing ports of the state. In 1992 Cape May accounted for over 80% of the total value of New Jersey fish and shellfish and was home to 180 permitted vessels: 5 party boats, 15 charter boats, and 160 commercial vessels, one third of which were otter trawlers, 34 sea scallop dredgers, 11 scallop trawlers, 10 gillnetters, and 6 sea clam dredgers. The remainder included pot boats, handliners, purse seiners, and other gear types. The larger, steel hulled vessels of Cape May include many now equipped with on-board flash freezers or refrigerated sea water systems, giving them a quality advantage. Freezer-trawlers and RSW vessels target Loligo and Illex squid and other species, such as scup or fluke, as conditions dictate. A survey of 3 of the 5 major docks at Cape May shows the high degree of innovativeness at this port.

Gill-netting is a small-scale but widespread and often overlooked inshore fishing activity in New Jersey. Here, as in other states, commercial gill-netting is threatened by pressures from sports anglers and environmentalists to close many inshore fisheries to commercial gears. Recent referenda and laws passed in California, Texas, and Florida against gill-netters appear to be part of a larger social movement that can threaten New Jersey's small gill-net fishery.

Marine fishing takes place out of many other ports of New Jersey, including the traditional oyster ports of the Delaware Bay, which are now almost entirely devoted to crabbing, gill-netting for weakfish, and recreational fishing, as well as experimental aquaculture. Other aquaculture operations are found in the southern bays of Ocean, Atlantic, Burlington, and Cape May Counties.

IV. AQUACULTURE

Summary:

By 1991 aquaculture accounted for almost 40% of worldwide fisheries value, and 16% of the weight of fish and shellfish landed. The increase over 1984 was three-fold to almost four-fold. The U.S. is a minor player in this field, representing only 4% of the value of worldwide aquaculture in 1991. The recent rate of increase in U.S. aquaculture is significant although lower than global trends. Catfish is the dominant species in U.S. aquaculture. The other major species are crawfish, trout, bait-fish, and oysters.

The largest gains over the decade were in aquaculture of salmon, shrimp and "other" (hybrid striped bass, tilapia, ornamental fish and aquatic plants). Oyster culture value represents over 70% of oyster harvest value. The culture of hard clams is not as well-established, representing only 21% of harvest value in 1992.

Examination of U.S. aquaculture output prices per pound by species over the 1983-92 decade indicates that marine species with emerging culture production have performed well but that fresh water species have had problems. Only oysters, salmon, shrimp and "other" (hybrid striped bass an tilapia) have yielded price performance which outpaces inflation (with price per pound increases two to three times above the 1983 levels).

In terms of 1992 farm gate value, the two dominant states in the northeast were Connecticut ($61.8 million, primarily oysters) and Maine ($42.9 million, primarily pen-reared salmon). Together, these two states account for 71% of regional aquaculture value. New Jersey with $2.4 million represents less than 2% of regional aquaculture value. It ranks seventh in overall value among the twelve Northeastern states and fifth in production value of marine species (after Connecticut, Maine, New York and Massachusetts).

A Northeast Regional Aquaculture Center study of aquaculturists has identified expectations for the immediate future concerning supply and demand, as well as perceived constraints to and potentials for development.

Aquaculture has a long history in New Jersey: oyster culture was underway by the beginning of the 1800s, and a private trout hatchery operated in the 1860s, followed by a public freshwater finfish hatchery program. In the past decade or so numerous experiments with other kinds of aquaculture have been considered or implemented but little has come of most of them.

Meanwhile, oyster culture has declined to nothing because of the oyster diseases MSX and Dermo; the harvesting sector of the industry has dwindled to a handful who are turning to harvests from the natural oyster beds, and the processing sector is dependent on Connecticut culture oysters.

Hard clam culture has become the major aquaculture activity in New Jersey. Hard clam hatcheries and grow-out operations accounted for about 25% of the 1992 state hard clam harvest. There were 7 seed-producing hatcheries in 1994. Estimates of the value of hard clam aquaculture production range from $2 million to $3 million.

Although culture of certain species being produced in other Northeastern

states may be problematic because of New Jersey's climatic conditions and water temperatures (e.g., too cold for catfish and too warm for salmon and mussels), other species such as hybrid striped bass, bay scallops, soft shell clams and crabs, black bass and aquatic plants (for the state's pharmaceutical industry) may offer opportunities, if barriers and constraints can be mitigated. A state plan for aquaculture development has been completed and accepted by the Governor.

A survey of consumers, retailers, and food service businesses has recently been completed. Consumers appear to be aware of aquacultured products and to judge them by factors other than price, including being "environmentally friendly," higher quality, and safer than non-aquacultured seafood. Almost all retailers (90%) identify product as "farm-raised" or "aquacultured," but there are discrepancies between retailers' appraisals of what consumers are looking for and what consumers say attracts them. The survey also indicated that retailers are not always aware of which specific products are cultured.

Food service establishments see the advantages of aquacultured seafood as including safety, better quality, consistent quality, and better portion control. The perceived disadvantages included higher prices, less flavor, and limited variety.

V: PROCESSORS

Major shifts in New Jersey processing over the past decade include: decline in the oyster industry, the emergence of activity in frozen prepared products and a decline in independent ocean clam shuckers.

There are serious problems relying on the NMFS voluntary reporting system for information on processing activity. Many processors do not report. It is estimated that there are an additional 28 New Jersey firms which do some form of processing as part of wholesale, retail, or export operations. Accordingly, the following discussion does not reflect the entire industry.

The number of plants incorporated in the NMFS database declined from 28 to 18 (36%) between 1983 and 1992 and a decline in annual employment from 1,051 to 791 (75%). However, the average number of employees per plant increased, from 37.5 to 44, reflecting the fact that the plants that closed or stopped reporting during the decade were mostly the smaller ones.

The value of seafood processing by product type (canned, frozen, etc.) over the past 10 years shows a picture of fluctuating overall value and importance of particular product types. The only clear trend is increase in frozen product. Similar conclusions apply to changes in numbers of plants and employees.

New Jersey has fared slightly better than the Mid-Atlantic region as a whole, in terms of processing plants and employment, but the region had the greatest level of decline in the U.S. during the decade between 1982 and 1992, when the U.S. as a whole experienced an increase in plants.

The historical pattern of reliance on fresh-fish markets, with little value added by processing, has not changed much in the past decade. Analysis of processing and landings data for 1992 showed that the only finfish species where processing volume is equivalent to 25% or more of the landings volume are fluke (summer flounder), winter flounder, and squid. Surf clams and ocean quahogs are all processed, but much of that processing takes place in other states as well.

In turn, seafood processors do not rely heavily on New Jersey-caught species. A 1988 survey found that only 31% of the processors relied on N.J.-caught fish or shellfish for half or more of their raw material. Current oyster shucking and mussel processing relies on product from outside the state.

Calculation of value added is possible only for shucked shellfish meats and finfish fillets. In 1992 for surf clams it was some 200% of the ex-vessel price; for oysters it was about 50%; for finfish fillets it was 10-40%.

Surf clams and ocean quahogs remained the most valuable species for processors over the decade, although the mix had changed to favor surf clams by 1989. Most ocean quahogs landed in New Jersey are now shipped outside the state for shucking and processing.

Even with a large number of oyster shucking plants in 1983, oysters represented only 8% of the processing value; by 1992 the oyster industry had declined even more, and the shucking houses depended on oysters from Connecticut.

Output prices per pound outpaced inflation for: summer flounder fillets. Minced canned ocean quahogs, bluefish fillets, and shucked raw oyster meats. They were below inflation for 8 products: surf clam raw meats, sliced canned conch, canned squid meats, surf clam juice, canned minced surf clams, canned surf clam chowder, canned surf clams in sauce, and gefilte fish.

Surveys done in 1988 with 19 new and 29 older seafood processors show their perceptions of the advantages and disadvantages of doing business in New Jersey. Among the advantages were proximity to markets and ports; availability and quality of raw products, the image of the state, the lower cost of shipping, the strictness of water quality/pollution regulations, and various labor variables. Among the perceived disadvantages were some of the same factors: labor, but seen as unavailable; the image of the state, here in a negative vein; the strictness of and

cost of compliance with environmental regulations, with a focus on solid waste management; and insufficient supply of raw seafood products.

VI: MARINE RECREATIONAL FISHING

Summary

NMFS data on saltwater angling are available for the region and in part for the state. The NMFS survey shows a consistent decline in marine angling trips since 1983. However, the average catch per trip has remained roughly constant, averaging between 5.2 and 6.8 fish per trip.

Findings about catches over the past decade include the following:

The overall catch in the Mid-Atlantic region has fluctuated over a wide range, but the 1993 catch total is less than 50% of the 1983 total.

Species diversity as measured by the percentage of "other" species increased in 1989 and has stayed constant through 1993.

The fluke catch has rebounded from a very low level in 1989; while the 1993 catch again yields the highest share, the number of fish caught are less than 50% of the 1983 level.

The croaker catch has fluctuated, but in recent years its share of the region's recreational catch has increased.

Black sea bass catches declined after their 1986 peak but have maintained a relatively constant share since then.

Spot, bluefish, scup, winter flounder and weakfish each have declined in numbers and shares in recent years.

Decline in total catch numbers appears to be a function of the number of angler trips each year.

An attempt was made to directly compare recreational and commercial landings of species favored by marine saltwater anglers. The results, for 1991, suggest that the recreational fishery takes more fish by weight than does the commercial fishery for four of the top five marine angler species: fluke, bluefish, tautog, and black sea bass. The only exception in the top five in 1991 was Atlantic mackerel.

Data analyzed by the Sports Fishing Institute for 1991 indicated that 745,600 anglers (over the age of 16) participated in marine angling, making 5.76 million trips. Based on survey responses, saltwater angling yielded a total direct expenditure of $417.2 million which converts into an annual average of $560 per participant and $72 per trip.

Largely because of decline in the number of angling trips, total direct expenditures in 1993 are estimated to be $321.3 million, down 23% from 1991.

VII: IMPORTS/EXPORTS OF FISHERY PRODUCTS

For the nation as a whole, there has been a major increase in both imports and exports over the past decade and a decline in the trade deficit for fish products. The Port of New York has seen an increase in the value of exports and a decline in the value of imports.

With certain assumptions, it is possible to extrapolate New Jersey imports and exports from available data on Port of New York activity. The assumptions are that the substantial majority of New Jersey fisheries' shipments go through the Port of New York, and that New Jersey accounts for some 30% of the port's fishery exports and imports. If those assumptions are valid, an estimated $69 million of fishery exports originated in New Jersey in 1993, and $211 million of imports were destined for New Jersey processors, wholesalers and retailers that year.

In the past five years (1989-1993), the Port of New York has experienced a significant rise in exports (164% export value) and decline in imports (8% import value). The value of exports handled in the port has been about 3% and the value of imports has been about 6.8% of the national value of exports and imports respectively.

Although shrimp remains the dominant species imported through the Port of New York, it has declined in total share. Shrimp imports largely account for the importance of the continents of South America and Asia as the sources of imports: together those two continents represented about three-quarters of the value of fishery imports in 1993. The largest percentage increases in imports through the Port of New York were for fishery products from South America and Africa; percentage declines in import values were experienced by products from Europe, Central America and the Caribbean, Asia, and the Pacific Region.

Export shipments of U.S. fishery products through the Port of New York over the 1989-1993 period have increased to all continents except the

Australia/Pacific Island region. During this period, fishery exports to Europe and Asia have dominated port shipments consistently, together accounting for 96 to 98% of the port's fishery exports. Specific identifiable species which accounted for the bulk of this growth were sea urchins (600% increase by value), lobster (200%), dogfish (400%), and butterfish (200%). Together, expansion of exports of these four species accounted for just over 50% of the total increase in exports.

A focus on 15 selected species and 25 selected countries provides more detailed analysis of export potential for New Jersey fisheries.

Port of New York exports to Japan, the top market for fisheries products, have doubled over the past 5 years, and sea urchins, primarily from Maine, made up about half of the value of 1993 shipments to Japan (reflecting price increase for sea urchins). Shipments of tunas and lobster are important but have remained roughly the same; butterfish increased greatly in 1993.

Four European countries --France, Italy, United Kingdom, and Spain -- followed Japan in importance to exports. France has been particularly important (17% of all shipments), and there has been a steady major increase in export values of lobster and squids, as well as recent, but not sustained, increases in exports of dogfish and scallops. Lobsters, squid, and dogfish were also important to rising exports to Italy and Spain, and dogfish, plus clams, were among the species being exported to the United Kingdom. Germany, Portugal, and the Netherlands are in the top 25 countries for Port of New York exports, but are relatively minor markets for the 15 selected species.

South Korea and Hong Kong are also relatively minor destinations for the 15 selected species, albeit in the top 25 markets for exports overall. Eels, herring, and lobsters were important for South Korea; increase in exports to South Korea is mostly in fish products that come from outside the North Atlantic but are shipped through the Port of New York. Lobster, scallops, roe, and squid were among the exports going to Hong Kong. Some of this product was destine for trans-shipment to China. This market has increased steadily, and 1993 saw many new products.

VIII: EMPLOYMENT AND ECONOMIC CONTRIBUTIONS OF NEW JERSEY FISHERIES, 1993

Summary

Estimates are provided for employment in the commercial fisheries of New Jersey. Direct employment in harvesting consists primarily of the crews who work aboard fishing vessels. An estimated 2,706 FTEs were directly involved in

commercial fish harvesting in 1993. This estimate is based on 1992 NMFS data combined with a number of assumptions about crew size, vessel activity, and percent part-time employment. Another 200 or so are estimated to be engaged in dockside support for the harvesting sector of the industry.

About 1,950 FTEs were in fish and seafood processing, 100 in aquaculture, 860 in wholesaling, and 3,278 in retailing. The estimated 1993 New Jersey combined annual direct employment in all sectors of the commercial fishing industry is 9,100. This figure is multiplied by 2.4, for an estimated 21,840 jobs in New Jersey both directly and indirectly attributable to the state's commercial fish and seafood industry. The multiplier includes estimates of support workers such as truckers and suppliers, and their own expenditures.

Another 9,700 FTEs are associated with the state's marine recreational fisheries. This yields a combined total statewide employment of 31,500 jobs attributable to the state's marine fisheries for 1993.

The estimated direct total payroll for New Jersey commercial fisheries in 1993 was $138.4 million, over half from the harvesting and processing sectors.

An estimate of the economic value added was made based on a multiplier of 6.0. The result is a figure of about $600 million valued added in the commercial fisheries industry in 1993. The economic value added for the marine recreational fishery of New Jersey is estimated to be $762.2 million for 1993.

The total contribution of commercial and marine recreational fishing to New Jersey's economy in 1993 is estimated at $1,362 million. This total does not include all federal (income), state (income and sales) or local (property) taxes generated. The combined value of such additional taxes is estimated to exceed $100 million.

IX: STOCK CONDITIONS AND RESOURCE MANAGEMENT

Fish and shellfish population declines and harvest restrictions affect the entire Atlantic coast. New Jersey harvesters are not only impacted directly by declines or restrictions in their traditional target species but also indirectly by problems with other species and other areas. For example, New England fishermen no longer able to rely on groundfish (cod, haddock, etc.) because of declining stocks and regulatory closures are forced to switch to alternatives such as squid, increasing competition for both stocks and market share.

The only species seen as "underexploited" in the northeast region are

species that bring relatively low prices because of low market demand. These include red hake, Atlantic herring, Atlantic mackerel, butterfish, skate, dogfish, and Loligo and Illex squid. New Jersey harvesters and processors have been trying to improve catches and markets for these species.

Among important New Jersey species deemed "overexploited" by the N.M.F.S. in 1993 were: fluke, winter flounder, Atlantic sturgeon, monkfish, scup, black sea bass, tilefish, lobster, and sea scallop. The list of "fully exploited" species also contains many species important to New Jersey's fisheries: the ocean clams, whiting, and bluefish. The challenge is to cooperate in ways to protect and restore these species as well as to enhance the market value of other available resources.

Fisheries management by the State of New Jersey pertains to waters within 3 nautical miles of the coast. The strong trend is for state regulations to be coordinated with inter-state regulations, through the Atlantic States Marine Fisheries Commission; and with federal regulations, through the Regional Fishery Management Councils created by the Magnuson Act.

It is likely that stricter state regulations for many species will emerge over the next few years. The process has already begun. In late 1994 the state proposed amendments to its fisheries regulations to bring New Jersey into compliance with the ASMFC management plans for: winter flounder, bluefish, weakfish, Atlantic sturgeon, and American lobster. Both commercial and recreational fisheries are likely to be impacted.

Stricter regulations for federal fisheries (3-200 miles) are also in place and underway, and the trend is for some kind of limited entry as well as catch quotas and gear restrictions. Important New Jersey fisheries currently regulated under the federal Magnuson Act system include summer flounder (fluke), bluefish, squid, mackerel, lobster, sea scallops and butterfish. Management plans are being developed for black sea bass, scup, weakfish, and tilefish. Some species, like whiting and red hake, are indirectly managed through provisions of the multispecies groundfish management plans developed by the New England fishery management council. Regulation of pelagic shark fishing (i.e. mako shark) has begun, and swordfish and tuna regulations are in place, involving international as well as domestic policy.

The surf clam and ocean quahog fisheries, major contributors to New Jersey's fishery-based economy, are problematic. The lack of signs of new recruitment to the clam stocks as well as depletion of regional clam beds have already led to some shifts of harvesting and processing activity, mostly northward, as well as reductions in allowable catches.

CHAPTER I: INTRODUCTION

New Jersey, the "Garden State," is known more for agriculture and industry than for fishing. It may therefore be surprising to many people that fishing is and long has been an important part of the social and economic life of New Jersey. In 1993 the fish landed by the state's 1900 or so commercial fishing vessels, with over 2700 crew positions, totaled about 196 million pounds, with a value of $96.3 million to the fishing vessels, and a far larger value to the economy and to society expressed in various multipliers. The resulting figure is about $600 million for the 1993 commercial fishing industry plus about $726.2 million for the state's marine recreational fishery. It is estimated that almost 22,000 people work on the boats, in processing plants, and in the wholesale and retail sectors of the commercial fishing industry, and another 9,700 jobs are associated with the important marine recreational fishing industry. These figures only hint at the importance of fishing to the state and to the families and coastal communities involved.

The New Jersey Department of Agriculture commissioned this report. It is a resource document on the status and trends of the commercial fisheries that can be used by members of the industry, legislators and state agencies with responsibility for planning and controlling the future of the state's fisheries.

The work is prompted in part by the crisis appearing in the northeast region's fisheries. Many fish and shellfish are scarce, whether due to overharvesting, habitat damage or diseases. Opportunities to harvest fish and shellfish are also increasingly constrained by state and federal regulations, some designed to deal with resource conservation problems, others to deal with resource allocation or public health issues. The most dramatic problems are occurring in New England, but their effects are felt all along the Atlantic seaboard, as displaced fishermen and markets adjust to tight regulation and closures of the traditional groundfish fisheries.

The report is also in response to concerns about the position of New Jersey and U.S. seafood in global markets, about the marine recreational industry, and about opportunities for aquaculture. It is intended to help state, industry, and other stakeholders engage in problem definition, needs assessment, exploration of alternative solutions, policy planning, and impact assessment. For the first time, it brings together in one document the most recent available statistics as well as key information from earlier studies and surveys.

The task is begun by looking at the most comprehensive and descriptive indicators of commercial fishing activity, data on fish and shellfish landings. Chapter II describes and analyzes these landings with respect to the most recent available data (1993) and trends over the past decade. Information is provided on species composition and share, by county, major port, gear type, season, and ex-vessel price.

Chapter III describes conditions and trends in harvesting operations by port. The major fishing ports of New Jersey range from Belford in the north to Cape May and Wildwood in the south, and the major fishing fleets include sea clam dredgers, otter-trawl "draggers," sea scallop dredgers, gill-netters, pot fishers, bay shellfishers, and party and charter boat fleets. The chapter describes available data on the size, age, geographic distribution and physical characteristics of the commercial and party charter boat fleets; gear types used; activity levels and trip patterns; and crew size. The chapter also describes shoreside facilities, organizations, and product distribution by port. Finally, it summarizes land use and development pressures facing existing commercial fishing docks.

Aquaculture is often cited as an important alternate source of seafood products and as a possible employment opportunity for displaced "capture" fishermen. Chapter IV describes the current nature and potential of aquaculture in the US, the northeast, and New Jersey. It provides information on activity, comparative prices, market perceptions, growth opportunities, and impediments to growth.

Processing activity and trends in New Jersey are presented in Chapter V. Data are provided with respect to the number and type of processing plants, employment levels, species and product mix, and output values over the past decade.

Recreational fishing is an extremely important part of the state's economy in its own right. In addition, sports angling is an important part of the environment of commercial fisheries. Recreational and commercial fishing target many of the same species and waters, require similar waterfront facilities and services, and are both subject to government regulation on catches. Both types of activities and interests must be considered to achieve a balanced appraisal of and response to problems and opportunities facing New Jersey's fisheries. Chapter VI describes current and recent angling activity in the Mid-Atlantic region and in the state. It provides data on angling activity, catch and landings by species, trip and catch distribution by mode of fishing (i.e. boat, shore, pier, etc.), and preferred target species. It also presents a direct comparison of catches of commercial and recreational fisheries for a selected set of species.

Foreign trade in fishery products is an important consideration in fisheries development. Expanded exports represent a potential market for underutilized

species in domestic harvests, and current imports reflect a market demand some of which might be captured by domestic catch and/or processing. Export and import volumes and values for fish and shellfish shipped through the Port of New York, the focus of most of New Jersey's import/export trade are analyzed in Chapter VII. Current and recent shipments and receipts are examined with respect to continents and major species of significance or potential interest to New Jersey.

Chapter VIII estimates the overall contributions of the commercial and recreational fisheries to the New Jersey economy and employment base. This includes direct, indirect, and induced impacts based on employment and on value-added multipliers.

The current "crisis" in fisheries is felt by most people in the industry through the effects of restrictions and management regimes developed to protect depleted stocks and restore them to sustainable levels. Chapter IX summarizes the management regimes (federal, regional, and state) for species of commercial and recreational importance in New Jersey.

Segments of the Executive Summary are reproduced, as appropriate, at the beginning of each chapter. A set of appendices provides a detailed accounting of landings data for New Jersey.

The data provided in this document provide a basis for identifying and dealing with a variety of issues and questions which must be considered in addressing the present circumstances and their inter-related implications. Policies, options and action programs must be established to deal with the survival, stabilization and development of New Jersey's commercial and marine recreational fisheries and their important economic and employment contributions to the state, the key issues include:

Harvesting:

- How can the industry adapt to changes in the available species mix?

  -New marketing operations and targets
  -Changes in gear, fishing patterns and waters fished
  -Adaptation to altered price structure, economic realities and opportunities

Fleet:

- How can the New Jersey fleet adapt to altered economic conditions?

  -Is there excess capacity and over-capitalization in the state's commercial fleet? If so,
  -Identify criteria, priorities and procedures to determine where reductions are needed - specific vessel types, locations, fisheries, etc.
  -Determine how reductions can be achieved and financed

- What can and should be done to provide assistance to displaced vessel crews?

  -Re-location and family counseling and job training
  -Financial assistance (note: as independent, self-employed businessmen fishermen are not eligible for normal unemployment benefits).

Docks and Shoreside Operations:

- How can commercial fishing and sportfishing (party and charter boat) docks and related shoreside service facilities be retained in the face of changing economic conditions?

  -Nature/role of tax relief, development easement purchase programs, other forms of economic assistance or incentives
  -Identification of new marketing and customer patterns and opportunities

Processing:

- The survival and growth of processing operations requires a number of adjustments by participants and others.

  -Processors need to adapt to an increased flow of relatively low-value species. This means more automated, low-cost processing which, in turn, requires a steady, year-round volume. How can such flows be generated and directed towards in-state plants?

  -How can processors target and penetrate new markets which can sustain their output and profit margins?

  -How can processors finance the cost of automation, re-tooling for new species and clean-up of effluent discharges and offal which cause environmental problems?

Marine Recreational Fishing:

- How much of the recent decline in marine angler activity is attributable to the existence of quotas, size limits and declines of stock for the favored species? Can any of these effects be minimized? What activities, incentives and programs can be used to re-direct and rejuvenate angling activity?

- How safe are party and charter boat docks from development pressure? What steps can be taken to retain these facilities?

Aquaculture:

The recently approved state aquaculture plan addresses a variety of problems and barriers related to culture development and operations. The major issues can be categorized as follows:

- Scientific - criteria and guidelines for introduction of non-native species and identification of the native species which can be reliably cultured in New Jersey.

- Regulatory - streamling the permitting process for both on-shore and off-shore aquaculture (including leases for water columns as well as bottoms).

- Technology Transfer - advisory services to aid in design and operation of culture programs to insure survival, eliminate predators, and maximize growth rates.

- Environmental and Health-monitoring of design and operations to control any pollutants and ensure product safety for consumers.

- Economic and Management Support - advisory services to assist in evaluating feasibility, investment and manpower needs, and long term financial projections.

- Marketing - identification and evaluation of target markets and promotional activities appropriate to institutions, retailers, consumers and foreign markets.

- Impact - assessment of the role of aquaculture in: supplementing landings of seafood products; substituting for imports; expanding seafood consumption; creating new export opportunities; and providing new economic and employment opportunities in the state (including jobs for displaced commercial fishermen).

Exports:

- How to identify and penetrate new markets (products, product forms and countries) for existing and newly-targeted species?

- How can cooperatives and processors best participate in trade missions and other export-related programs (product information, trade-leads, etc.)?

CHAPTER II: COMMERCIAL LANDINGS

SUMMARY

New Jersey's commercial marine fishery landings are significant to the nation for certain species, particularly surf clams and ocean quahogs, squid, black sea bass and scup, sea scallops, hard clams, bluefish, tilefish, fluke, red hake and silver hake, butterfish, weakfish, and big eye tuna.

Commercial marine fishery landings (not counting charter, party boat, or other "sports" landings) have more than doubled in poundage and value between the early 1980s and the early 1990s. In 1993 they totalled about 196 million pounds, with a dockside value of $96.3 million.

However, the picture of growth provided by aggregate statistics masks serious problems.

- *Edible seafood (as opposed to bait or industrial use) fish landings have remained essentially flat in poundage, and values have not quite kept pace with the rate of inflation.*
- *Landings of higher value species are declining and being replaced with lower value species*
- *Shellfish landings volumes have grown substantially but economic returns to harvesters have not increased appreciably, because of rising costs and very little change in the average value per pound.*
- *New Jersey prices have been below the national average for some species, including an important set of species for which N.J. landings are at least 25% of the national landings.*

Landings by Species:

Surf clams and ocean quahogs continue to dominate New Jersey commercial fisheries but the geographical distribution of landings is changing rapidly, with changes in the regulatory regimes (state and federal) and signs of low productivity on traditional grounds.

Tilefish, weakfish, red hake, and lobster are no longer in the "top 15" ranking of New Jersey species (1993 compared with 1982). There has also been a decline in fluke (summer flounder), whiting, and oysters, among other species.

Anglerfish (monkfish), herring, sea scallops, and the tunas have moved into the top 15. Other species, including skate, mako shark, menhaden, Loligo squid, blue crab, black sea bass, and surf clams have increased as well.

The largest harvest increases are for species with the lowest values, including Illex squid, skates, dogfish, and herring.

Landings of many high valued species are declining in both absolute and relative terms including scup, black sea bass, fluke, tilefish, the tunas, and scallops.

Landings by County and Port:

1993 landings by county show little in the distribution of commercial fishing effort change over the past decade. Moreover, growth in landings by weight occurred in all counties, especially in the period 1988-91.

The Cape May/Wildwood area remains the largest and most diversified port of the state.

Atlantic County is most heavily reliant on shellfish landings, both ocean (surf clams and ocean quahogs) and bay (hard clams).

Monmouth County landings have the most species diversity; the port of Belford is the site of recent dramatic growth in ocean quahog landings.

Ocean County has two important ports, with a wide diversity of fisheries and species. It includes Point Pleasant, mostly a nearshore, day-trip, multi-species port, and Barnegat Light, home to a distant-water fleet of longliners and scallopers, as well as bay fisheries for clams and crabs.

Other counties and ports of New Jersey are relatively insignificant, and dominated by Cumberland County, where blue crab was the major species landed in 1993, replacing oysters.

Changes in the Fisheries:

The bay hard clam and soft clam fisheries are increasingly dependent on special state programs for utilization of clams from marginally polluted waters, particularly in Monmouth County (including a "relay" to Ocean County). By 1993 48% of hard clam landings depended on these programs. (Aquaculture is also an increasingly important force in this fishery; see Chapter IV).

The situation is very dynamic. For example, in 1990 a large-scale fishery for

menhaden, sold as bait, developed in Cape May/Wildwood, giving a major boost to New Jersey's fisheries in terms of landings, but not much added value. This is basically a revival of the old role of menhaden in New Jersey's fishery landings, replacing the older fish meal, fertilizer, and fish oil product with bait, and hence losing the added value of processing.

On the other hand, by 1994 ocean quahogs were no longer being landed in Cape May but had become the dominant species in Ocean and Monmouth County landings. Reasons range from regulatory changes to changes in firm ownership to decline in supply in the more southern clam beds.

Formerly (pre-1980) underutilized species have become important to N.J. Squid (Illex, Loligo) has become a major product of Cape May, Point Pleasant, and Belford; joint ventures with foreign operations helped in the early phase of this fishery and contributed to the more recent beginning of an Atlantic herring fishery (1991). There was also a spurt of dogfish landings in 1990-92.

There was also a major decline in traditional fisheries. One is the fluke (summer flounder) fishery. Another is the whiting (silver hake) and ling (red hake) fisheries. Ironically, whiting and ling were viewed as underutilized species within the region over the past decade, although they were the major source of value for some of New Jersey's fishing ventures. Causes of decline are many but include increased involvement in these and other "underutilized" species fisheries by operations shifting their geographic focus in response to decline in the New England groundfish fisheries.

Other seemingly "minor" or "underutilized" fisheries that retain or have increased their importance include monkfish (anglerfish); the squids; black sea bass, scup and tautog; winter flounder; blue crabs; dogfish and mako shark. The general pattern is one of intensified search for alternatives and new or expanded markets and market niches. Complicating the situation (see Chapter IX) is the development of complex management structures.

***Species by Gear Type: 1982-1992 -- major changes, trends**:*

Scallopers have increasingly had a "bycatch" of fluke and monkfish.

Atlantic herring, skate, and dogfish have increased in the catches of fish otter trawls.

The pot fishery for tautog (part of the lobster pot fishery) was increasingly replaced by an otter trawl fishery. On the other hand, "fish pots" have become more important for black sea bass.

Longline gear has largely replaced purse seines for yellowfin tuna.

Mid-water pair trawling has appeared in several fisheries, including the albacore tuna fishery, where it has replaced gill nets as the "second place" gear, next to longlining.

Gill-netting is the primary technique for only 2 species: shad and bluefish. Such gear are also important for dogfish and weakfish, but have declined for other species.

Pound-nets continue their pattern of decline but as of 1992 remained significant for bluefish (15% of the state catch). Purse-seining has generally replaced pound-nets for the state's menhaden catch (again, restoring an older pattern).

Monthly/Seasonal Patterns:

New Jersey's 1993 pattern shows a good pattern of dispersion of harvesting activity over the year. An active year-round fishery is vital for the stability of fishing communities, harvesters, marketing efforts and efficient processing operations. 1982-1993 changes have been toward greater monthly uniformity.

Landed Value (Price per Pound):

For most species, New Jersey prices have been and continue to be lower than the nationwide average. Exceptions are primarily species caught by longliners from Barnegat Light (swordfish, tunas and tilefish), plus several "luxury" species, lobsters, sea scallops and blue crab, and, reason unknown, dogfish. The lower New Jersey price holds even for species for which NJ harvests over 25% of the U.S. catch (ocean quahog, surf clam, black sea bass, scup, Atlantic mackerel).

Most species have experienced price increases above the Producer Prices Index for Raw Food over the decade (1.08).

Based on the Consumer Price Index (CPI) for 1982-93 (which was 1.50), it appears that few species have shown price increases in excess of inflation: only fluke, tunas, oysters, sea scallops, and weakfish prices outpaced inflation. Dogfish, mako shark, Atlantic mackerel, herring and surf clams actually dropped in absolute price (irrespective of the CPI) between 1982 and 1993.

Because of the high value of certain species, even modest increases in landings make a big difference to value. This has been true in the recent past for scallops, tunas, and lobster in particular.

For particular ports, seemingly minor changes in species abundance or availability may be very important, as has been the case for Monmouth County (Belford) fishermen with blue crabs since 1988, and with hard clams, once depuration facilities were available in 1993.

Overview - Statewide[1]

In 1993, commercial marine fishery landings in New Jersey totalled 196.1 million pounds, with a total ex vessel (price to the fishing vessel) value of $96.3 million. While these totals reflect fairly steady increases over the past decade, they are still well below the state's record landings in 1956 of 540.1 million pounds when menhaden was a major component of landings. Almost all the New England and Mid-Atlantic states experienced their peaks many years ago. Among these 10 states, New Jersey ranked fourth in poundage and value in 1993 (behind Massachusetts, Maine and Virginia). Nationally, New Jersey ranked 9th in poundage and 10th in value in 1993.

During the past decade, New Jersey has maintained a relatively constant and small share of total U.S. domestic landings: 1.4-2.1% of poundage and 1.9-2.8% of value. (N.J. accounts for 3.1% of the U.S. population.) Despite this small overall share, the state does account for a significant portion of 1993 total landings for certain species, including surf clams and ocean quahogs, Atlantic squids, black sea bass and scup, sea scallops and hard clams, bluefish, tilefish, fluke, red hake, butterfish, weakfish, big eye tuna, and whiting (silver hake).

Exhibit 2-1: Species for Which New Jersey Landings Are a Significant Share of U.S. Landings, 1993

	New Jersey Percentage of U.S.	
Species	Pounds	Value
Shellfish		
Ocean Quahogs	80.3%*	74.8%
Surf Clams	64.9%	64.4%
Atlantic Squid	36.5%*	25.9%
Sea Scallops	12.6%	13.0%
Hard Clams	9.6%	8.3%
Finfish		
Black Sea Bass	41.0%*	33.6%
Scup	39.0%	34.7%
Atlantic Mackerel	26.7%*	18.1%
Bluefish	20.7%	21.4%
Tilefish	18.1%	22.1%
Fluke	16.0%*	10.0%
Red Hake	14.2%	12.9%
Butterfish	12.8%*	6.3%
Weakfish	11.9%	16.4%
Big Eye Tuna	9.3%	10.0%
Whiting	6.8%	7.0%

[1] Unless otherwise noted, all landings data are taken (or derived) from records compiled by the National Marine Fisheries (NMFS), U.S. Department of Commerce. Finfish weights are in round (live) poundage and shellfish weights are meat weight (excluding the shells).

In the past decade, between 1982 and 1993, New Jersey landings have more than doubled in both poundage (116% growth) and value (118% growth) and have experienced fairly consistent increases especially since 1988-89.

Although both landings and value have risen in the past decade, closer analysis of the finfish landings data shows a less positive picture. First, virtually all of the growth in finfish landings has been in the harvest of menhaden, a very low value ($0.05/lb.) species, now used for bait. Prior to 1981, when a menhaden processing plant in Monmouth County closed, large volumes of menhaden were landed for conversion into fish meal for animal feed and other products. Now its abundance and low cost make it a good source of bait. Menhaden landings have grown dramatically from 1.6 million pounds in 1982 (a low point in New Jersey's history) to over 28 million pounds in 1993, when a bait market had resurrected the fishery. This increase started in earnest in 1990, primarily in Cape May. The growth in menhaden seriously distorts the picture of trends in landings of finfish.

Exhibit 2-2
New Jersey Landings, Pounds, 1982-1993

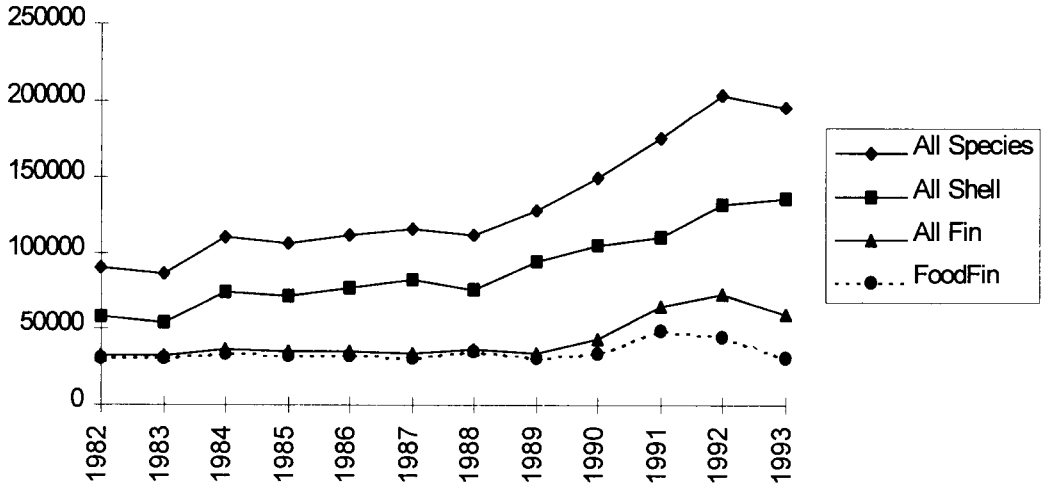
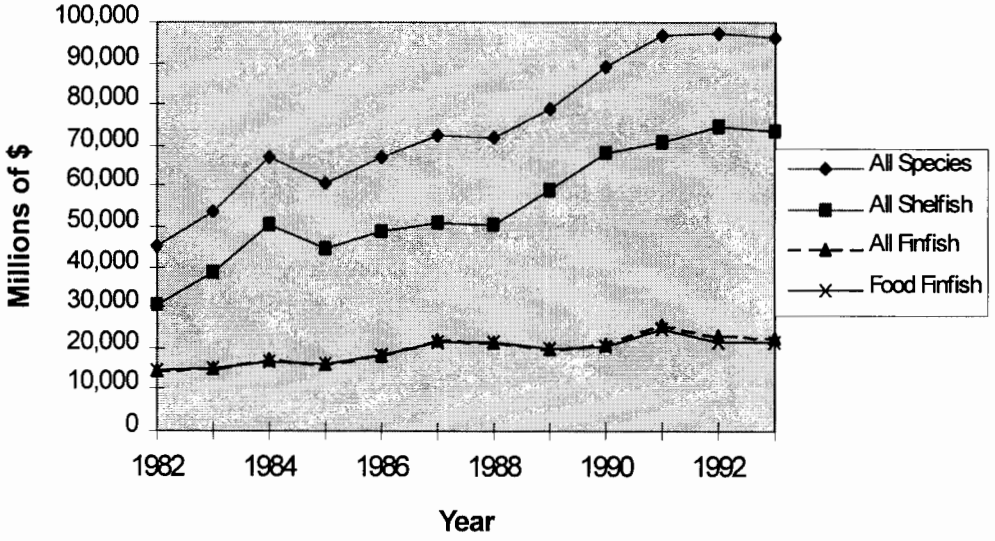
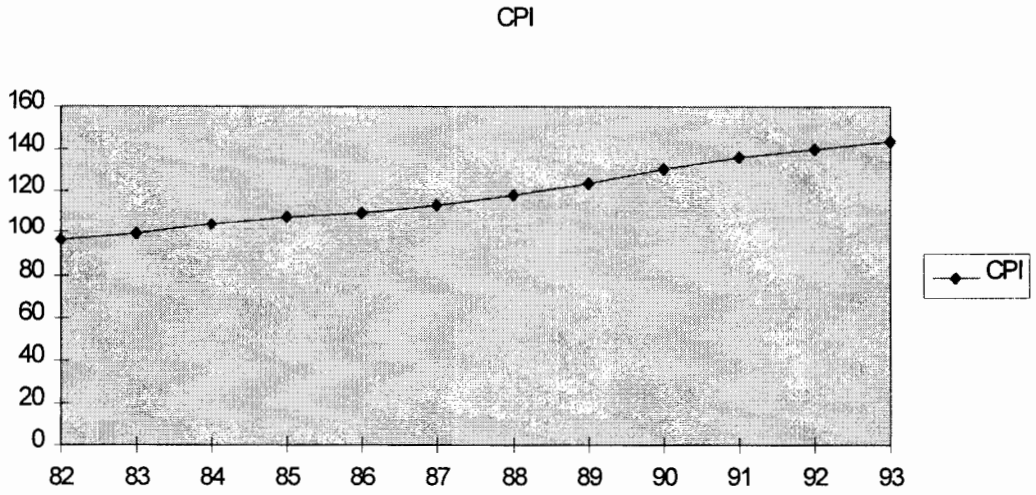


Exhibit 2-3



N.J. Landing Values, 1982-1993



When menhaden are excluded from the data base, and we look solely at "food" as opposed to "industrial" or "bait" finfish landings, it becomes evident that

New Jersey finfish landings have been essentially flat over the past decade. There was a slight poundage increase in 1991-92 (1991, a one year surge in mackerel and 1992, a one year surge in herring), but 1993 landings were only 2% above 1982 levels. As shown in Exhibit 2-3, food finfish did sustain a 46% increase in value but this was not quite enough to keep pace with the 50% increase in the Consumer Price Index (CPI) for 1982-93. Thus, food finfish landings have been essentially flat in volume and "real" value over the past decade. Actually, on a value-per pound basis, few species exceeded or even kept pace with the CPI (see below).

The situation is even more critical because of changes in the species mix of New Jersey landings. Higher value, more marketable species are declining and being replaced with lower value species for which new markets must be created. This is because of declining stocks of the more popular (valuable) species and regulations imposed in attempts to reverse such declines. The issue is discussed in Chapter IX.

The state's shellfish landings (including squid) have grown substantially in both absolute and relative terms over the decade. They accounted for between 65 and 81% of the poundage and 68 to 76% of the value of landings for human consumption each year. However, because of changes in species mix and flat prices in several key shellfish species, the average value per pound has increased only 2% since 1982. Given increases in operating, maintenance and supply costs over this time, it is evident that landing volume increases have not provided comparable economic returns to harvesters.

The following sections provide analysis of current (1993) landings and trends by species, geographic region of the state, gear type, seasonality and value/pound in order to provide a comprehensive data base for evaluation of circumstances, issues, options and policies. Detailed data and tabulations are provided in the exhibits and appendices.

LANDINGS BY SPECIES

Reflecting diversity in both ecology and market demand, well over 100 different edible marine species are landed commercially in New Jersey each year, many in very small quantities. About 40 of these are directed fisheries, in terms of effort, value and markets.

Exhibits 2-4 and 2-5 show the 15 primary species landed in terms of poundage and value in 1982 and 1993. The species, their ranking and percentage share of state landings indicate the significant shifts in New Jersey landing patterns over the past decade. Ocean clams (surf clams and ocean quahogs) continue to dominate New Jersey landings, accounting for over 50% of poundage and 40% of

value. The relative importance of shellfish has increased. For example, in terms of value, the 1982 landings data indicate that 3 of the top 5 species (with over 52% of value) were shellfish. By 1993, all of the top 5 species (with 66% of total value) were shellfish.

Exhibit 2-4: Top 15 Edible Species Landed by Pounds (in millions), New Jersey, 1982 & 1993

1982			1993		
Species	**Pounds**	**Percent**	**Species**	**Pounds**	**Percent**
Surf Clams	24.4	27.4%	Surf Clams	48.0	28.6%
Ocean Quahog	22.9	25.7%	Ocean Quahog	41.4	24.7%
Whiting	7.1	8.0%	Illex Squid	19.8	11.8%
Illex Squid	4.8	5.4%	Loligo Squid	13.2	7.9%
Fluke	4.3	4.8%	Blue Crab	7.7	4.6%
Scup	3.8	4.3%	Scup	4.0	2.4%
Atlantic Mackerel	3.6	4.0%	Anglerfish	3.1	1.8%
Tilefish	2.8	3.1%	Atlantic Herring	2.9	1.7%
Weakfish	2.1	2.4%	Atlantic Mackerel	2.8	1.7%
Bluefish	2.0	2.2%	Fluke	2.5	1.5%
Red Hake	1.0	1.1%	Whiting	2.4	1.4%
Hard Clams	1.0	1.1%	Sea Scallops	2.3	1.4%
Loligo Squid	0.9	0.9%	Bluefish	2.2	1.3%
Lobster	0.8	0.8%	Hard Clams	1.5	0.8%
Blue Crab	0.8	0.8%	Tunas*	1.4	0.8%
Subtotal	82.3	92.0%	**Subtotal**	155.3	92.4%
Other	6.7	8.0%	Other	12.5	7.6%
Total	**89.0**	**100.0%**	**Total**	**167.8**	**100.0%**

*Tunas: Big Eye = 548,000 lbs; Yellowfin = 502,000 lbs; others = 336,000 lbs.

Exhibit 2-5: Top 15 Edible Species Landed by Value (millions $), New Jersey, 1982 & 1993

1982			1993		
Species	**$**	**Percent**	**Species**	**$**	**Percent**
Surf Clams	11.7	25.9%	Surf Clams	21.8	23.0%
Ocean Quahog	6.9	15.3%	Ocean Quahog	15.4	16.2%
Sea Scallops	5.0	11.1%	Sea Scallops	13.7	14.4%
Fluke	3.2	7.1%	Loligo Squid	6.7	7.0%
Tilefish	2.9	6.4%	Hard Clams	4.9	5.2%
Hard Clams	2.3	5.1%	Blue Crab	4.2	4.4%
Lobster	2.2	4.9%	Tunas*	3.4	3.6%
Whiting	1.9	4.1%	Fluke	3.3	3.4%
Scup	1.7	3.8%	Illex Squid	3.3	3.4%
Swordfish	1.2	2.7%	Lobster	3.2	3.3%
Oysters	1.1	2.4%	Scup	2.3	2.4%
Tunas	0.9	2.0%	Swordfish	2.1	2.2%
Weakfish	0.7	1.6%	Anglerfish	1.8	1.9%
Illex Squid	0.6	1.3%	Tilefish	1.6	1.7%
Bluefish	0.5	1.1%	Black Sea Bass	1.1	1.2%
Subtotal	42.8	94.9%	**Subtotal**	88.8	93.5%
Other	2.3	5.1%	Other	6.1	6.5%
Total	**$45.1**	**100.0%**	**Total**	**$94.9**	**100.0%**

*Tunas: Big Eye = $2.03 million; Yellowfin = $0.99 million; others = $0.42 million.

In terms of pounds, those that dropped out of the top 15 between 1982 and 1993 were tilefish, weakfish, red hake, and lobster. Replacing them were anglerfish, herring, sea scallop, and tunas. In terms of value, those that dropped out of the top 15 in the decade between 1982 and 1993 were whiting, oysters, weakfish, and bluefish. Their places were taken by Loligo squid, anglerfish, blue crab, and black sea bass (Exhibit 2-6).

Exhibit 2-6: Species That Moved Into and Out of the Top 15 By Pounds and By Value, New Jersey, 1993 Versus 1982

1993 Versus 1982	Pounds	Value
Dropped from top 15	Tilefish, weakfish, red hake, lobster	Whiting, oysters, weakfish, bluefish
Moved into top 15	Anglerfish, herring, sea scallop, tunas	Loligo squid, blue crab anglerfish, black sea bass

The growth or decline of individual species by weight of landings in the years between 1982 and 1993 is summarized in Exhibit 2-7. The ratio of 1993 to 1982 pounds is in parentheses. It can be seen that summer flounder, red hake, weakfish, tilefish, whiting, and oysters declined overall (despite year-to-year fluctuations); there was little change in a broad and varied group of species, ranging from bluefish and eels to shad, lobster, and scup; and there were overall increases, either fluctuating or on a steady basis, with a large number of other species. Fluctuating but increasing over time were, for example, dogfish, sturgeon, Illex squid, and butterfish (among others); steadily increasing over time were skate, Atlantic herring, Mako shark, menhaden (for bait), and Loligo squid (among others).

Exhibit 2-7: Poundage Growth or Decline of Species Landed, New Jersey, 1982-1993, with Ratios of 1993 to 1982 Pounds Landed

Species With Steady Increases, 1982-93

- Skate (4,145.)
- Atlantic Herring (121.88)
- Mako Shark (19.30)
- Menhaden (Bait) (17.29)
- Loligo Squid (15.50)
- Blue Crab (9.65)
- Anglerfish (8.68)
- Black Sea Bass (2.03)
- Surf Clams (1.97)

Species With Overall Increases But Year-to-Year Fluctuations

- Dogfish (205.27)
- Sturgeon (4.52)
- Illex Squid (4.13)
- Butterfish (3.43)
- Tunas (2.07)
- Ocean Quahogs (1.81)
- Sea Scallops (1.71)
- Hard Clams (1.57)
- Swordfish (1.46)

Species With No Significant Change Overall or Year-to-Year

- Bluefish (1.11)
- Winter Flounder (0.91)
- Eels (0.90)

Species With No Significant Change Overall But Year-to-Year Fluctuations

- Lobster (1.07)
- Scup (1.04)
- Shad (0.91)
- Atlantic Mackerel (0.76)
- Sharks (excluding Mako) (0.67)

Species With Overall Declines But Year-to-Year Fluctuations

- Summer Flounder (0.58)
- Red Hake (0.54)
- Weakfish (0.40)
- Tilefish (0.38)
- Whiting (0.34)
- Oysters (0.001)

Species With Steady Decline

- None

The ratio of 1993 to 1982 pounds is in parentheses

Rising landings for a large number of species masks the severity of the situation facing New Jersey harvesters in recent years. Their problems are reflected in a detailed inspection of the NMFS landings data which shows that by and large those increases were in low-valued species, while the declines were in high-valued ones.

Such analysis requires two steps: (1) the major species are clustered into five groups based on 1993 value per pound, and (2) changes in the net landed poundage between 1988 and 1993 are calculated for all species in that cluster. As shown in Exhibit 2-8, it becomes possible to identify which categories have been gaining or losing landings. The largest harvest increases are at the extreme bottom of the value range (category A: $.20/lb. or less, including Illex squid, skates, dogfish, herring). Landings of many high value species (categories C,D, and E, ranging from scup and black sea bass to fluke, tilefish, the tunas, and scallops) are actually declining in both absolute and relative terms (Exhibit 2-8). Such retargeting of harvest effort is obviously not a matter of preference for the harvesters. Rather it is a response to stock depletion of the higher value species and the consequent imposition of management restrictions designed to allow recovery. This situation has numerous economic, operational and market implications for the New Jersey industry. These are discussed in subsequent sections of this report.

Exhibit 2-8: Comparison of New Jersey Landings, 1988 and 1993, by 1993 Price Category, Selected Species.

	1993 Price Criterion	Species	1988 Lbs (x000)	1993 Lbs (x000)	Ratio '93 ÷ '88
A	$.20/lb or less	Herring, Atlantic Mackerel, Dogfish, Skate, Illex Squid	11,359	27,432	2.42
B	$.21-$.50/lb	Bluefish, Butterfish, Red Hake, Whiting, Ocean Quahog, Surf Clam, Loligo Squid	70,607	109,251	1.55
C	$.51-$1.00/lb	Anglerfish, Scup, Black Sea Bass, Weakfish, Mako Shark, Other Tunas, Blue Crab	12,210	17,262	1.45
D	$1.01-$3.00/lb	Fluke, Tilefish, Yellowfin, Albacore Tuna	7,274	4,197	0.58
E	Over $3.00/lb	Swordfish, Bluefin, Big Eye Tuna, Lobster, Hard Clams, Sea Scallops	7,309	5,936	0.81

LANDINGS BY COUNTY AND PORT

The state's commercial fishery landings are concentrated in four counties - Cape May, Ocean, Monmouth and Atlantic. In addition, Cumberland and Salem Counties house fleets active in Delaware Bay, and Hunterdon County is home to several Delaware River commercial shad fishermen. Some landings are also reported in Union, Bergen and Hudson Counties but these are from transient vessels off-loading harvests at major processors or shippers.

The major ports in each county are:

Atlantic County:	Atlantic City and Bays;
Cape May County:	Cape May/Wildwood;
Monmouth County:	Belford, Highlands/Atlantic Highlands, Belmar/Shark River and Bays;
Ocean County:	Point Pleasant, Long Beach Island (Barnegat Light) and Bays.

1993 Landings by County

The county distribution of landings by weight and value for fin and shellfish (Exhibits 2-9 and 2-10) shows the predominance of Cape May in the state's fisheries activity. In 1993, Cape May/Wildwood reported the highest volume of any port on the East Coast and was third in landed value (behind New Bedford, MA and Portland, ME). Atlantic City was sixth in the region in both poundage and value.

Exhibit 2-9
1993 Landings - County Share Landed Value, Shellfish and Finfish

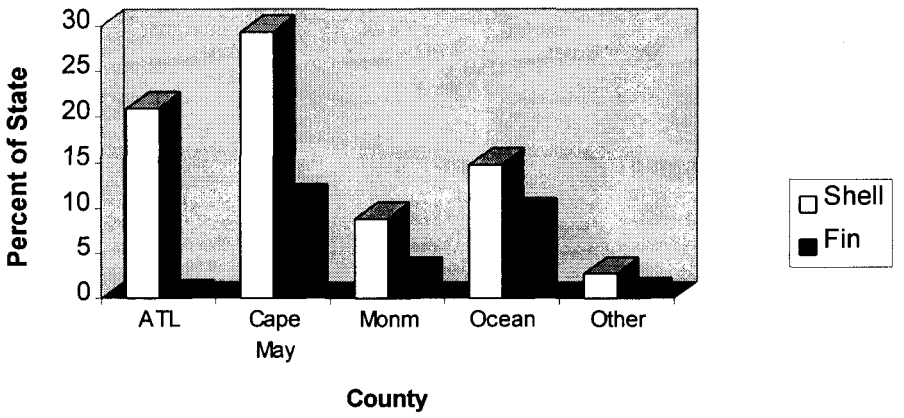


Exhibit 2-10: Landings (Pounds) by County, New Jersey, 1993

	County				
	Atlantic	**Cape May**	**Monmouth**	**Ocean**	**Other**
Pounds (x000)					
Total Finfish	241	40,528	9,452	9,010	774
Total Shellfish	42,240	56,492	12,586	19,452	4,838
Total Landings	**42,981**	**97,020**	**22,038**	**28,462**	**5,612**
Value (x000)					
Total Finfish	280	10,396	2,677	8,916	365
Total Shellfish	20,121	28,242	8,507	14,156	2,641
Total Landings	**20,401**	**38,638**	**11,184**	**23,072**	**3,006**

- Atlantic County:

Atlantic County's landings for 1993 are composed almost exclusively of shellfish (99% of both poundage and value). Finfish landings included a smattering of numerous species, the largest being black sea bass (66,000 pounds, valued at $102,000). The county is the focus of the state's surf clam landings with 38.8 million pounds, which represents over 80% of the total New Jersey landings of that species and 90% of Atlantic County's total landings. Other shellfish species landed included almost 800,000 pounds of blue crab and 455,000 pounds of hard clams taken from local bays.

- Cape May County:

Cape May/Wildwood is the largest and most diversified port in the state. It accounts for 50% of the state's poundage and 40% of its value. Menhaden (bait) accounted for 21.7 million pounds (53%) of the county's finfish landings. Even if this is excluded, Cape May's food finfish landings of 18.9 million pounds are 25% of the county's total poundage and value and represent 60% of New Jersey's food finfish landings. Cape May County shellfish landings totalled 56.5 million pounds with a value of $28.2 million. The major edible species landed in the county are shown in Exhibit 2-11.

Exhibit 2-11: Cape May County Landings, Edible Finfish and Shellfish, 1993

Finfish: Species	**Pounds (x000)**	**$ (x000)**	**Percent of New Jersey Lbs. For This Species**
Scup	3,622	2,011	90%
Herring	2,924	148	100%
Atlantic Mackerel	2,217	154	80%
Anglerfish	1,916	879	62%
Fluke	1,756	2,298	70%
Black Sea Bass	1,218	872	88%
Butterfish	1,191	345	89%
Dogfish	671	172	59%
Skate	658	58	79%
Bluefish	537	85	**25%**
Shellfish:			
Illex Squid	19,747	3,238	100%
Ocean Quahogs	16,539	5,997	40%
Loligo Squid	10,447	5,123	78%
Surf Clams	5,948	3,235	12%
Sea Scallop	1,402	8,395	61%
Blue Crab	897	503	10%
Hard Clams	385	643	26%
Lobster	190	686	21%

- Monmouth County:

Monmouth County landings totalled 22.0 million pounds with a value of $11.2 million. Of this total, menhaden constituted 6.2 million pounds and $0.36 million. Thus, edible seafood landings were 15.8 million pounds and $10.8 million.

Belford, the major port in the county, accounted for all of the menhaden catch and 13.7 million pounds (86%) of the county's edible seafood landings, valued at $6.2 million (57% of the county total). The largest portion of these landings was in Ocean quahogs (10.0 million pounds, with an ex vessel value of $3.4 million). The remaining 3.7 million pounds and $2.8 million at Belford consisted primarily of 57 different finfish species plus squid. The major additional species are shown in Exhibit 2-12; among the top five finfish were whiting, fluke, bluefish, Loligo squid, and Atlantic mackerel. The remainder of Monmouth County landings consisted mainly of shellfish, off-loaded at Highlands/Atlantic Highlands (primarily hard clams) and Belmar/Neptune/Shark River (primarily lobster and blue crab).

Exhibit 2-12: Belford, Monmouth County, Landings, 1993

Finfish:	**Pounds (x000)**	**$ (x000)**
Menhaden	6,200	36
Whiting	846	383
Fluke	480	697
Bluefish	440	129
Loligo Squid	309	182
Atlantic Mackerel	206	46
Scup	141	83
Butterfish	63	55

Shellfish	**Pounds (x000)**	**$ (x000)**
Ocean Quahogs	10,000	3,400
Lobsters	657	2,284
Blue Crab	500	481
Hard Clams	446	1,427

- Ocean County:

In 1993, Ocean County landings totalled 28.5 million pounds with an ex vessel value of $23 million. County landing records are divided into three sites: Point Pleasant, Long Beach Island (Barnegat Light) and "Other" (primarily Barnegat and Little Egg Harbor bays).

Exhibit 2-13: Point Pleasant and Barnegat Light, Ocean County, Landings, 1993

Point Pleasant:	Pounds (x000)	$ (x000)
Ocean Quahog	11,682	4,415
Surf Clams	3,223	1,916
Squids	2,055	944
Whiting	1,268	448
Bluefish	371	97
Atlantic Mackerel	341	36
Sea Scallop	337	2,041
Fluke	257	286
Scup	248	137
Swordfish	174	665
Anglerfish	172	298
Tuna (Yellow Fin and Big Eye)	129	456

Barnegat Light (Long Beach Island):	Pounds (x000)	$ (x000)
Tilefish	723	1,102
Bluefish	638	254
Sea Scallops	540	3,300
Anglerfish	288	519
Swordfish	257	1,039
Big Eye Tuna	252	1,230
Sharks	204	111
Yellow Fin Tuna	197	495
Weakfish	157	203
Other (46 Species)	432	822

Long Beach (Barnegat Light, supports what is essentially a distant-water fleet (i.e., one operating further off-shore). Its catch has a large proportion of higher value species; thus, port landings totalled 3.8 million pounds (13% of the county poundage) with a value of $9.1 million (39% of Ocean County value). Major species were tilefish, bluefish, sea scallops, anglerfish, swordfish, big eye tuna, sharks, yellowfin tuna, and weakfish (Exhibit 2-13).

Point Pleasant, the largest port in the county, reported 1993 landings of 21.5 million pounds (75% of the county total), with a value of $12.2 million (53% of the county total). Landings were concentrated in ocean quahogs and surf clams, squids, whiting, bluefish, Atlantic mackerel, sea scallop, fluke, scup, swordfish, anglerfish, and yellowfin and bigeye tuna (Exhibit 2-13).Exhibit 2-13.

- Other Ocean County:

The 1993 landings at other county locations were 3.2 million pounds (11% of county poundage), with an ex vessel value of $1.8 million (8% of the county value). These included blue crab (1 million pounds, $0.6 million), hard clams (0.2 million pounds, $0.8 million) and other species such as bluefish, weakfish, dogfish and anglerfish.

- Other Counties:

The other New Jersey counties accounted for landings of 5.6 million pounds, valued at $3 million. Two-thirds of this poundage and value were in Cumberland County and consisted primarily of blue crab. The remainder was composed mostly of blue crab landings in Salem County (0.9 million pounds, $0.4 million) and Loligo squid in Union County (0.5 million pounds, $0.4 million).

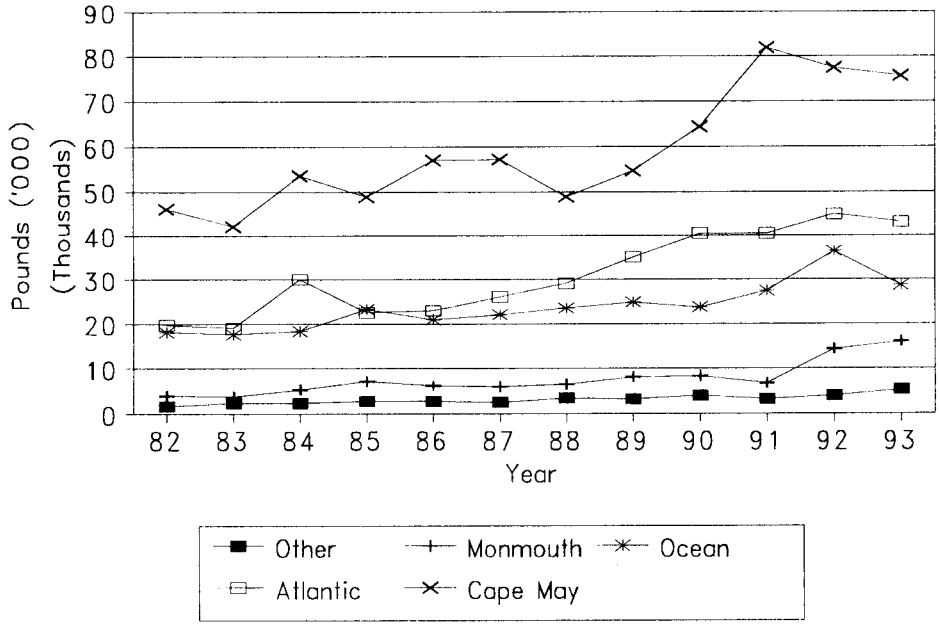
Recent Landing Patterns By County

Between 1982 and 1993 growth in landings by weight occurred in all counties, especially in the period 1988-91, even excluding menhaden landings (Exhibit 2-14).

There were no major changes in each county's share of state landings. With minor year-to-year fluctuations, the pattern has remained as follows. Cape May reports about 45-50% of New Jersey landing volume and about 38-44% of landed ex vessel value each year. (Because of its species mix, the county's share of value is typically 3-6% lower than its poundage share.) Atlantic County has the second largest share, 21-28% of poundage and 17-25% of value (again the difference is due to the composition of its landings mix). Ocean County is a close third, with 17-21% of poundage and 21-27% of value (above average value per pound because of the high relative product value of the longliners and scallop boats at Barnegat Light). Monmouth County is in fourth place with 4-10% of poundage and 6-11% value over the past decade. It has experienced a growth spurt over the past two years, almost doubling its share since 1992. This is primarily due to a change in landing composition (see below). Its share of value has traditionally been about 2 percentage points higher than its poundage share. The fifth major county is Cumberland on the Delaware Bay. This was primarily and originally an oyster harvesting locale. But

since the virtual demise of oysters as a commercial product, blue crab has become the dominant harvest. The county has maintained about a 2-3% share of harvesting activity over the decade (although its role was much larger when oystering flourished). Trends and changes with respect to harvest mix for each county are described below.

Exhibit 2-14:Landings by County, 1982-93
Edible Seafood (Excl. Menhaden)



Trends and Issues by County

Hard Clams and Depuration. Harvesting of hard clams (Mercenaria mercenaria) is permitted in designated waters of northern Monmouth County (i.e. the Sandy Hook and Raritan Bays and the Navesink and Shrewsbury Rivers), but these clams cannot be marketed directly. Before they can be sold, these clams must undergo a self-cleansing process to purge themselves of bacterial impurities or contaminants they may have ingested. Such cleansing may consist of either (1) a 48 hour cycle in a state-approved depuration plant, or (2) a 30-day cleansing period on bottomland in high-quality waters. The latter is referred to as the relay program. It involves controlled trucking of Monmouth clams to clean waters in Ocean County where the clams are replanted on leased lots for at least 30 days. In the statistics, depuration plant output is listed as Monmouth County landings. Relay output is included in Ocean County landings even though the clams were originally harvested in Monmouth.

A single approved depuration plant was operating in Monmouth County until mid-1988 when it was shut down because of operational and quality control problems. A new state-approved depuration facility has been in operation in Monmouth since September, 1992. During that four year closure period, NMFS recorded no hard clam landings in Monmouth County. Once the new plant opened, Monmouth experienced a spurt of hard clam landings primarily due to an increase in the number of active harvesters taking advantage of plentiful resource availability after a four year period of lower harvest activity.

The combination of depuration and relay programs has captured an increasing proportion of the state's hard clam harvest. Statewide, landings of this species grew by about 50% (poundage) between 1982 and 1993. During this period, the percentage of statewide harvest going through "resource recovery" (depuration or relay) has risen substantially. Until 1989, this share was less than 20% of hard clam poundage. It rose from 25% in 1990 to 32% in 1992 (in spite of depuration plant closure). In 1993, the share of depurated/relay clams rose to 48% of the state total. While this rise may be partly due to the reopening of depuration opportunities, state officials indicate it should remain well over 40% in coming years. (Source of resource recovery data: Bureau of Shellfisheries, NJDEP).

Cape May County

Since 1990, menhaden (bait) landings in Cape May/Wildwood have grown from almost nothing in 1989 to over 21 million pounds (20% of port poundage) in 1993. The product is used by local boats and shipped to other locations as well.

The species mix of edible or "food" fish and shellfish has undergone some significant changes since 1982. Ocean quahog's share of edible landings has been reduced from 45% to 22% in 1993 less because of reduced ocean quahog landings than because of overall growth in local landings, about 64% over the period. The 1993 quahog landings of 16.54 million pounds are not far below the 1982 level of 20.5 million pounds. Although Cape May still reflects 40% of statewide quahog landings (1993), its share has declined from 90% in the early 1980's and 60% as recently as 1991. The decline in the county's share of ocean quahog landings in recent years is the result of changing activity patterns. More of ocean quahog harvest is now concentrated in the New York Bight and thus, many of the Cape May boats are off-loading at Befford or Point Pleasant.

Squid has become a major species, from a poundage standpoint, in Cape May. In 1982, squid accounted for almost 12% of landings (over 10% Illex and 1% Loligo), but by 1993, this rose to 40% of total edible fish and shellfish landing (26% Illex and 14% Loligo). All of the remaining species have lost share and, in the case of most finfish species, actual poundage as well. No other species have as much as a 10% share. Of interest is the beginning of an Atlantic herring fishery which

started to emerge in 1991 primarily via joint ventures and a spurt of dogfish landings in 1990-92, which tailed off in 1993.

Atlantic County

Atlantic County is oriented almost exclusively toward shellfish. Over the past decade, surf clams, ocean quahogs and hard (inshore) clams have together consistently accounted for over 98% of landings. Since 1982, landings have more than doubled (in both poundage and value). Hard clams have captured between 1.1% and 2.8% of landed poundage during that time. However, because of the far higher ex vessel price of this species (currently $4.28 per pound versus $.39 for ocean quahogs and $.43 for surf clams), the value share for hard clams generally ranged from 9 - 13 percent, reaching a peak of 19% in 1987 and 1988 before retreating gradually back to 9.5% in 1993.

Surf clams have been the dominant species in county landings during the decade. Their share of poundage has ranged from a low of 81% (1983) to a high of 94% (1988). It dropped slightly (85 - 90%) between 1989 and 1991 and topped 90% in each of the past two years. Ocean quahog landings' shares have varied from a high of 12 - 13% in the early 1980's to a low of 1.0% in 1988. They have since increased, but with no consistent pattern, accounting for 6% in 1993.

Small quantities of blue crab began to show up in county landings in 1986 and recurred in most years since then, never capturing more than 1.8% of county poundage (1993).

Ocean County

Ocean has the most diversified fishing in the state; 14 food species each had over 1% of landings in 1993 (versus 11 species each for Cape May and Monmouth Counties). This is primarily due to the fact that Ocean County contains both Point Pleasant, mostly a near-shore day-trip port and Barnegat Light, home to a distant water fleet of long-liners and scallopers.

Between 1982 and 1993, county landings rose in terms of both poundage (58%) and value (89%). During this period, the composition of landings has undergone significant change, a reflection of changing conditions and circumstances in the New Jersey and Northeastern fisheries. In 1982, the major species in% share were: whiting (31 percent, primarily at Point Pleasant), surf clams (18 percent, also primarily at Point Pleasant) and tilefish (15 percent, at Barnegat Light).

County whiting landings started to decline in share in 1986, recovered somewhat in 1988-90 and then dropped steeply to 3.3% in 1992 and 4.5% of landings in 1993. The share of surf clams in county landings has declined somewhat

since 1989, reaching 11% in 1993 (the lowest share between 1982 and 1993). The proportion of tilefish in county landings dropped in 1984-87 and then (starting in 1988) declined to an even lower plateau, accounting for 2.8% of county poundage in 1993. Over the past decade, tilefish contribution to the value of county has declined from 22% ($2.7 million) to 5% ($1 million).

The primary emergent species in the county has been the ocean quahog (Arctica Islandica), completely different from the hard clam (Mercenia Mercenia), known as "quahog" in New England). Recorded landings of ocean quahogs did not begin until 1984 when they accounted for 8% of poundage. Their share rose steadily in subsequent years, reaching a peak of 48% in 1992 before dropping slightly to 41% in 1993. Statewide annual landings of ocean quahogs increased by 20.0 million pounds between 1984 and 1993. In 1993, Ocean County accounted for 11.7 million pounds -- 58% of this increment and 28% of state landings for this species. This recent influx of ocean quahogs reflects a shift in harvest operations, with new emphasis on major beds off northern New Jersey and south of Long Island, New York.

Several other species increased in importance since 1982. Scallops increased their share of poundage by only a small margin (1.8% to 3%) an absolute increase from .32 to .88 million pounds. But because of the high value of this species, this yielded a value increase from $1.3 to $5.3 million. In 1993, scallops represented 23% of total county landing value (versus 10% in 1982). Similarly, landings of tunas rose from .13 million to .89 million pounds (from 0.8% to 3.1% of landings) but increased in value from $.18 million (a 1.3% share) to $2.34 million (10.1% of landing value).

The share of blue crabs rose from 0.7% in 1982 to 1.8% in 1987 and then to 4.6% in 1988 and to 4.9% in 1993. Loligo squid represented 1.4% of landed poundage through most of the 1980's, rose to 7% in 1989 and has remained at that share in subsequent years. Anglerfish (monkfish) landings represented less than 1% of the 1982 poundage but rose to 4% (1.13 million pounds) in 1993 reflecting a value of $.83 million (3.6%). Dogfish and mako shark landings have shown up in the past three years but are still fairly minor (1.5% of poundage each in 1993).

Landings of fluke, bluefish and red hake have declined in both absolute and relative terms. From an economic standpoint, the decline in fluke has been especially important, dropping from 1.25 million to .26 million pounds, with a corresponding decline in value from $1.02 million to $0.29 million. Hard clams have also declined from 550,000 pounds worth $1.36 million in 1982 to 210,000 pounds with a value of $885,000 in 1993.

Monmouth County

Monmouth is the only one of the state's major fishing locales which has experienced a loss in diversity since 1982: from 15 species with a share of landing poundage over 1% to 11 such species. Overall, county foodfish landings increased in poundage by over 300% (from 3.77 million pounds to 15.85 million) and by over 260% in value (from $2.99 million to $10.82 million).

The dominant change in the county has been the introduction of ocean quahog landings. These began fairly modestly in 1991 with 332,000 pounds (5.0% of food landings) and grew quickly to 9.09 million pounds (63.6%) in 1992 and 10.5 million pounds (66%) in 1993. In the past year (1993), this species represented almost 35% of county foodfish ex vessel value. Monmouth now accounts for 25% of the state's ocean quahog landings, and its total reflects about one-half of the total statewide increase in this species over the past 10 years. The recent sharp increase in county ocean quahog landings is the result of a shift in the focus of harvest activity towards major ocean quahog beds off northern New Jersey and the waters south of Long Island, New York.

County foodfish landings in 1982 were 3.8 million pounds. They ranged between 5.2 million and 7.0 million pounds between 1984 and 1988 and exceeded 8 million in both 1989 and 1990. Poundage dipped to 6.6 million in 1991 and then soared because of the advent of ocean quahogs. The total of all other species in 1992 and 1993 was under 5.5 million pounds. With respect to value, the growth trend has been much more consistent, growing by about $.5 million per year between 1984 and 1990 when it totalled $9.18 million. Value dipped (along with poundage) to $7.6 million and then grew to $9.3 million in 1992 and $10.8 million in 1993. Thus, the recent influx of ocean quahog landings had relatively more impact on volume than on value.

Lobster landings of 630,000 pounds in 1982 accounted for 17% of foodfish volume and, with a value of $1.6 million, 55% of county value. By 1993, lobsters increased to 702,000 pounds (a 12% increase), worth $2.45 million (a 53% increase). However, because of the influx of ocean quahogs, lobsters represented only 23% of county landed value in 1993.

The county's highest poundage species in 1982 was whiting with 1.18 million pounds and a worth of $301,000 (31% of Monmouth volume and 10% of value). Whiting harvests have varied widely over the decade, growing through the early 1980's to a 1985 peak of 3.1 million pounds. They then declined to 2.0 million or less for three years and rose to the 3 million range in 1989 and 1990. The last three years have shown a sharp decline with 1993 poundage at 0.85 million.

The county's most valuable finfish species is fluke (summer flounder).

Landings in 1982 were a modest 78,200 pounds, which had a value of $71,400 (2.4% of county value). Fluke landings peaked at 480,300 pounds in 1985 when the value ($475,600) reached its highest share of county value at 9.4%. From 1986 to 1988 declined somewhat, ranging from 320,000 to 352,000 pounds with a share ranging from 7 - 7.9% ($440,000 to $480,000). Landings dropped sharply in 1989 (to 89,000 pounds) and have increased steadily since then. In 1993, landings returned to the earlier peak of 480,000 pounds with a new high in value of $697,300. This was sufficient to capture 6.4% of county value.

Most of the other finfish species (black sea bass, Atlantic mackerel, winter flounder and scup) showed increases of over 100% from their 1982 volumes of 100,000 - 200,000 pounds. Bluefish and red hake had smaller increases (about 40%) from their 1982 levels of 250,000. Only tautog and weakfish declined during the period (by 21% and 72 percent, respectively).

Blue crabs were not reported in quantity in 1982 (700 pounds) but have grown to significant levels since 1988 reaching 600,000 pounds in 1993. County hard clam landings were dormant from 1989 to 1992 (when the county was without a depuration facility)[2] but posted 446,000 pounds in 1993 worth $1.43 million (13% of county foodfish value).

Landings By Gear

Major Gear Types

The composition of New Jersey landings by gear type has shifted in relatively minor ways between 1982 and 1992 (the latest year for which detailed gear breakdowns are available). Given the large capital investment in gear and the need to match gear and vessel characteristics, significant shifts would not be expected. Ocean clam dredges were the most important gear type in 1982. They retained this position through 1992 with only a small decline in share of landings both in terms of poundage and value. The important gear types are shown in Exhibit 2-15. Most of these shifts are due to changes in the species mix of landings.

[2] Harvesting activity in Monmouth County continued during this period, but all the clams were "relayed" to beds in Ocean County for purification prior to sale.

Exhibit 2-15: New Jersey Landings by Gear Type, 1982 and 1993, Percentage of Pounds and Value

	1982		1992	
Gear Type	% Lbs	% $	% Lbs	% $
Ocean Clam Dredges	52.1	41.1	45.3	39.4
Otter Trawl-Fish	31.6	20.2	28.8	18.7
Longlines	3.9	9.5	2.1	8.1
Pots-All Types	2.8	6.2	3.9	8.2
Scallop Dredges	1.9	11.5	2.5	16.5
Hoes/Rakes/Tongs	1.4	6.1	0.6	3.6
Gill Nets	2.3	1.6	2.2	1.6
Pound Nets	1.7	0.5	1.1	0.3
Purse Seines	0.9	0.6	12.7	1.3
Oyster Dredges	0.7	2.4	0.0	0.1
Otter Trawl-Scallop	--	--	0.2	0.9

Species By Gear Type

The proportion of gear types used to harvest each of the major species was compared for 1982 and 1992 to determine any shifts in harvest operations and/or gear usage.

There are a number of species/gear type combinations which are (and have been) perfectly correlated, i.e., all of a given species are caught with a single gear type and no other species are harvested with that gear type. Such "unique" combinations (all shellfish) are:

- Ocean clams (surf clams and ocean quahogs) - all caught by hydraulic ocean clam dredges.
- Inshore hard clams - all via hand tools (including hoes, rakes and tongs).
- Oysters - all via oyster dredges.

For these species, changes in gear share of landings are a direct function of relative growth/decline of that species.

The remaining gear types are multispecies (i.e., more than one species caught with a given gear type). The most common of these is the fish otter trawl. (There are also otter trawls specifically designed for other species, e.g. lobster or scallops,

but such gear are now rare in this region). There are five species which were caught exclusively (99 - 100%) by otter trawls in 1982 and 1992. These were squid (Illex and Loligo), Atlantic mackerel, scup and whiting.

In 1992, 99% of fluke was caught by otter trawls, but by 1992, this percentage dropped slightly (to 95%) with the remainder landed by scallop gear (dredges and scallop otter trawls). Primarily because of the decline in fluke poundage over the decade, the fluke share of fish trawl catch has declined from 15% to 5%.

There were six other species which reported a majority of 1982 and 1992 landings via fish otter trawls: butterfish, herring, yellowtail, red hake, winter flounder, and weakfish. Five of these species have a small share of total poundage and an even smaller share of fish trawl catch (under 3%). The exception was herring with landings growing dramatically from 24,000 pounds in 1982 to 8.3 million pounds in 1992. In 1992, herring accounted for 14% of the New Jersey fish trawl harvest. Skate, which accounted for only 500 pounds total in 1982, has also risen rapidly to 589,000 pounds in 1992. In that year, 94% of skate landings came from fish trawls. The other 6% were caught using gill nets.

Dogfish is another species with dramatic landing growth over the decade, from 5,500 pounds in 1982 to 3.34 million pounds in 1992. In 1982, the small volume (largely bycatch) was split among gill nets (48%), fish otter trawls (30%) and pound nets (22%). In 1992, the targeted fishery was divided between fish otter trawls (57%) and gill nets (43%). That year, dogfish represented 3% of the fish trawl catch.

The only other species which reported over 50% of its 1992 landings via fish otter trawls was tautog. Harvesting of this species underwent a major refocus of gear. In 1982, 89% of tautog harvest was via pots (primarily lobster pots), with only 2% by fish trawls. By 1992, this distribution had shifted to 55% fish trawls, 40% pots and 2% each for gill and pound nets.

Longline Gear

Longlines have been the dominant gear for harvest of a number of species. These are: tilefish (100%), swordfish (98% in 1982, 100% in 1992), mako shark (99%), bluefin tuna (100% and 98%). Longline gear also accounted for 77% of the 1982 albacore tuna catch (the other 23% were gill netted) and 82% of the 1992 harvest of this species (the remainder were landed with mid-water pair trawls). Yellowfin tuna were harvested primarily by longlines in 1992 (97 percent, with 2% for purse seines). This is a turnaround from 1982 when only 28% were caught by longlines (with 70% via purse seines).

Pots/Traps

The species for which pots and traps represented the major gear in 1992 were lobster, blue crab and black sea bass. Pots accounted for 97% of lobster landings in both 1982 and 1992 (the remainder in both years were harvested by fish trawls). However, the proportion of lobster landings from inshore pots versus offshore pots increased from 63% in 1982 to 74% in 1992. Blue crab harvest in 1992 was 82% pots and 17% via crab dredge, compared to 98% and 2 percent, respectively, in 1982. The relative importance of pot gear for black sea bass harvest has grown over the decade from 51% in 1982 to 64% in 1992. In both years, the remainder was caught by fish trawls.

Scallop Dredges

Scallop dredges accounted for 94% of the state's scallop harvest in 1992 (versus 99% in 1982). In 1992, the remainder of the scallop catch (6%) was taken by scallop rigged otter trawls which first made their appearance in NMFS records in 1985. Scallop dredges also were responsible for 56% of the 1992 catch of anglerfish (versus 71% in 1982). Most of the remainder in both years was caught with fish trawls, although scallop trawls did harvest 3% of the 1992 anglerfish landings. As noted earlier, scallop dredges also accounted for one-third of 1992 landings of yellowtail flounder, up from 11% in 1982.

Gill Nets

Gill nets are the primary gear for two species: shad (92% in 1992 and 93% in 1982) and bluefish (64% in 1992 versus 55% in 1982). In addition, as noted above, gill nets are an important gear for dogfish (43% in 1992 versus 48% in 1982) and weakfish (33% in 1992 versus 21% in 1982). Gill nets took 12% of the menhaden in 1982, but only 1% in 1992.

Pound Nets

In 1992, pound nets were used to harvest some portion of seven different major species. Their highest proportion was for bluefish (15%) and menhaden (6%). This is somewhat different from 1982 when pound nets accounted for 68% of the menhaden harvest, 10% of mackerel and percentages of the fledgling skate, dogfish and mako fisheries.

Purse Seines

In 1992, purse seines accounted for 92% of the menhaden harvest, a change from 20% in 1982. This gear category also was the major harvest mode for "other" tunas (blackfin, skipjack, little eye and "unknown").

Major Species Components of Each Gear Type

The preceding paragraphs described the relative importance of each gear type in harvesting key species. The species composition of landings (pounds) within each gear type (primarily a function of absolute and relative changes in landed poundage by species) is summarized in Exhibit 2-16.

Exhibit 2-16: Landings by Gear Type and Species, New Jersey 1982 and 1992

GEAR TYPE	1982		1992	
	Species	% Catch Via Gear	Species	% Catch Via Gear
Otter Trawl (Fish):	Whiting	25%	Illex Squid	30%
	Illex Squid	17%	Loligo Squid	15%
	Fluke	15%	Atlantic Mackerel	15%
	Scup	13%	Herring	14%
	Atlantic Mackerel	13%		
Longlines:	Tilefish	81%	Tilefish	27%
	Swordfish	13%	Yellowfin Tuna	23%
			Sharks	20%
			Swordfish	19%
Pots/Traps:	Lobsters	37%	Blue Crab	68%
	Blue Crab	34%	Lobster	15%
	Black Sea Bass	15%	Black Sea Bass	10%
Scallop Dredges:	Sea Scallops	78%	Sea Scallops	62%
	Anglerfish	15%	Anglerfish	35%
Gill Nets:	Bluefish	60%	Dogfish	32%
	Weakfish	25%	Bluefish	31%
	Menhaden	10%	Shad	8%
			Menhaden	7%
			Weakfish	7%
Pound Nets:	Menhaden	73%	Menhaden	80%
	Bluefish	15%	Bluefish	15%
	Weakfish	9%		
Purse Seines:	"Other" Tuna	51%	Menhaden	98%
	Menhaden	38%	"Other" Tuna	2%
	Yellowfin	8%		
Ocean Clam Dredge:	Surf Clam	52%	Surf Clam	57%
	Ocean Quahog	48%	Ocean Quahog	43%

Monthly/Seasonal Patterns

An active year-round fishery is vital for the stability of fishing communities, harvesters, marketing efforts and efficient processing operations. New Jersey's 1993 harvesting activity is fairly well dispersed through the year (Exhibit 2-17). The monthly distribution for major species in 1993 is set forth in Exhibit 2-18.

Exhibit 2-17
Monthly Distribution of Landings, New Jersey, 1993

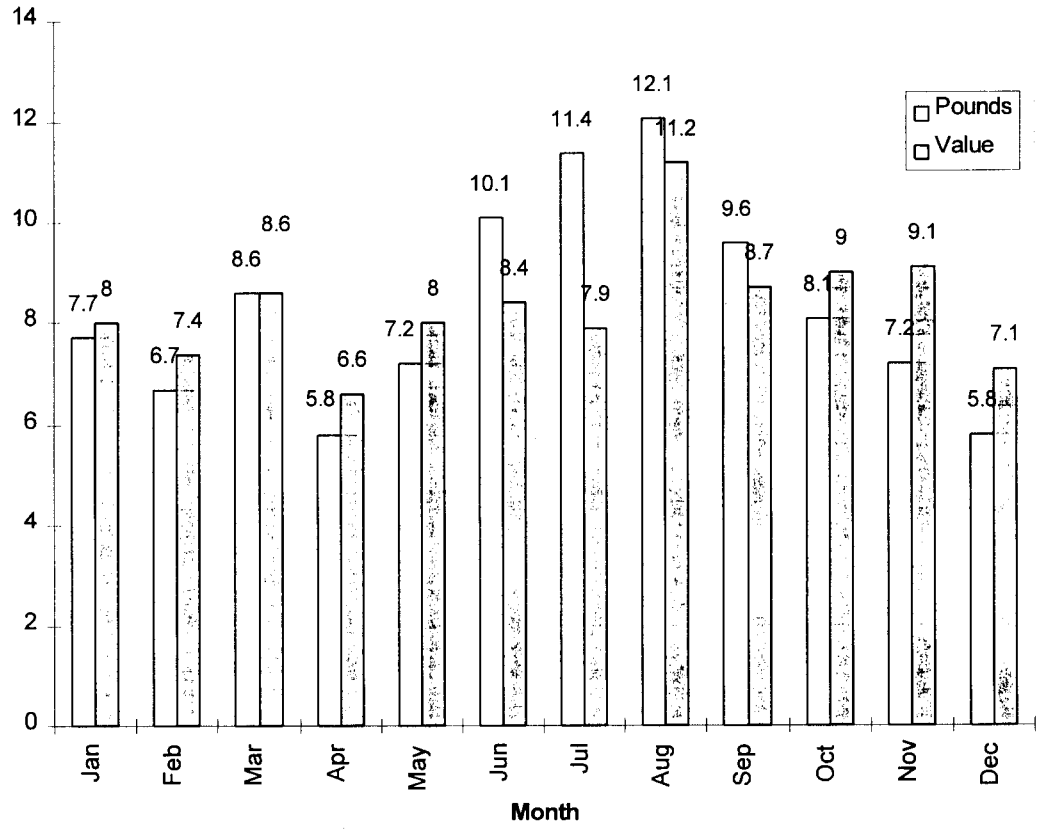


Exhibit 2-18a: Monthly Distribution of Landings, Key Species, New Jersey 1992, Part 1

SPECIES	J	F	M	A	MY	JN	JY	AU	S	O	N	D
Angler			—		—	—						
Bluefish					▬	—				▬	—	
Butterfish									▬	—	▬	
Winter Flounder	—			—	▬						—	
Summer Flounder									▬	—		
Yellowtail	—	▬	▬	—	—							
Herring	▬	▬	—									
Atl. Mackerel	▬	▬	▬	▬								
Menhaden					—	▬	▬	▬	—			
Scup	—	—	▬	▬								—
Black Sea Bass					—	—					—	
Weakfish									—	▬	▬	
Shad				▓								
Shark-Other							▬	▬	▬			
Dogfish	▬				▬						▬	—
Mako Shark							—	▬		—	—	
Skate						▬			—		▬	
Swordfish							—	▬		▬		
Tautog						—	—			—	▬	—
Tilefish			—	—	—			—				
Whiting	—	—	▬	▬								

Key: —— 10-19% of Annual Landings

▬ 20-29% of Annual Landings

▬ 30-49% of Annual Landings

▓ 50%-100% of Annual Landings

Note: An empty cell means between 0 and 9% of Annual Landings were reported for that species that month.

Exhibit 2-18b: Monthly Distribution of Landings, Key Species, New Jersey 1992, Part 2

SPECIES	J	F	M	A	MY	JN	JY	AU	S	O	N	D
Tuna-Other												
Tuna-Bluefin												
Tuna-Little Eye												
Tuna-Big Eye												
Tuna-Albacore												
Tuna-Yellowfin												
Blue Crab												
Lobster												
Hard Clam												
Ocean Quahog												
Surf Clam												
Oyster												
Sea Scallop												
Loligo Squid												
Illex Squid												

Key:

10-19% of Annual Landings

20-29% of Annual Landings

30-49% of Annual Landings

50%-100% of Annual Landings

Note: An empty cell means between 0 and 9% of Annual Landings were reported for that species that month.

As species composition and mix has changed over the decade, the monthly distribution has undergone some shifts, generally becoming more uniform. Between 1982 and 1993, the proportion of annual landings in each of the first five months of the year has gradually declined, while the June - August percentages have increased. The percentage of landings in the first quarter of the year has declined from 33% to 22.5%. The second quarter has remained relatively stable (with gains in June offsetting declines in April and May); accounting for between 23% and 28% of each year's harvest. The composite for the first half of the year produced a decline over the period from 57.2% in 1982 to 45.9% in 1993. The percentage increase in landings during the July - September period grew from 21.5% (1982) to 33.1% (1993).

Price Per Pound:

In an earlier section, it was noted that the state's landed value had increased but that such growth reflected poundage growth, not widespread increases in the price per pound of individual species. Here, the current and recent price patterns for key species are examined. Variations and growth patterns in prices for any species can be a complex function of a number of possible variables, which can, and usually do, differ from one species to another. These factors can include:

- Market Characteristics - E.g., location, size, market share, type, price elasticity, seasonality, strength, margins, alternate sources of supply;
- Transportation - Time and cost of shipping from landing port to markets, processors, exporters or other destinations;
- Volume - Beyond simple supply and demand, to include baseline nonprice sensitive demand and critical mass related to ability to create new markets;
- Season - Including not only fluctuations in landings and demand for certain species, but also seasonal variations in fish characteristics (e.g., fat content);
- Fish Size/Weight - For most species, bigger fish bring a higher price per pound; and
- Quality and Freshness - Fish that is landed with minimum delay, properly iced on-board and not damaged by either handling or gear often will bring a higher price.

Exhibit 2-19 also shows the ratio of 1993 to 1982 prices for each species for the U.S. and New Jersey. As noted, the Consumer Price Index for 1982-93 was 1.50. Thus, only a small segment of these key species have demonstrated price increases in excess of inflation. Nationally, these include butterfish, fluke, tunas, whiting, blue crab, oysters and sea scallops. For New Jersey, the list was essentially similar - excluding butterfish, whiting and blue crab. Weakfish, dogfish

and mako shark were the species which outpaced inflation in New Jersey, but not nationally. Atlantic mackerel and surf clams actually dropped in price during the period both nationally and in the state.

Exhibit 2-19: Value Per Pound By Species, 1982 and 1993, U.S. and New Jersey

	1982		1993		1993 ÷ 1982*	
Species	U.S.	N.J.	U.S.	N.J.	U.S.	N.J.
Anglerfish	n/a	0.56	n/a	0.56	n/a	1.00
Bluefish	0.23	0.24	0.28	0.29	1.22	1.21
Butterfish	0.32	0.28	0.67	0.33	2.09	1.18
Fluke	0.73	0.75	1.47	1.32	2.01	1.76
Atlantic Herring**	0.05	0.17	0.06	0.05	1.20	0.24
Atlantic Mackerel	0.15	0.09	0.13	0.08	0.87	0.88
Menhaden***	0.04	0.08	0.06	0.05	1.50	0.63
Scup	0.45	0.43	0.63	0.56	1.40	1.30
Black Sea Bass	0.72	0.62	0.97	0.79	1.35	1.27
Weakfish	0.46	0.34	0.60	0.83	1.30	2.44
Dogfish	0.08	0.10	0.12	0.20	1.50	2.00
Mako Shark	n/a	0.79	n/a	0.70	n/a	0.89
Skate	n/a	0.21	n/a	0.10	n/a	0.48
Swordfish	2.75	2.60	2.53	3.03	0.92	1.17
Tilefish	0.92	1.00	1.20	1.46	1.30	1.46
Tuna: Albacore	0.69	0.46	0.87	0.79	1.26	1.72
Big Eye	0.60	1.55	3.48	3.70	5.80	2.39
Bluefin	0.79	1.85	6.03	6.00	7.63	3.24
Yellowfin	0.57	0.76	1.64	1.98	2.88	2.61
Whiting	0.22	0.26	0.36	0.34	1.64	1.31
Blue Crab	0.25	0.36	0.51	0.54	2.04	1.50
Lobster	2.31	2.60	2.69	3.52	1.16	1.35
Hard Clams	3.34	2.46	3.78	3.28	1.13	1.33
Ocean Quahog	0.31	0.30	0.40	0.37	1.29	1.23
Surf Clams	0.52	0.48	0.46	0.45	0.88	0.94
Oysters**	1.41	1.66	2.58	3.88	1.83	2.34
Sea Scallops	3.66	3.78	5.83	6.03	1.59	1.60
Atlantic Squid-Loligo	0.25	0.34	0.42	0.50	1.68	1.47
Atlantic Squid-Illex		0.12		0.16		1.33

*Consumer Price Index for 1982 to 1993 = 1.50. Thus, any price/lb. growth less than this ratio, indicates failure to keep pace with inflation.

**1982 New Jersey herring landings and 1993 New Jersey oyster landings were very small, making prices for that year unrepresentative for these species.

***1982 New Jersey menhaden was used primarily for fish meal/oil production, in later years, only for bait.

Comparison of New Jersey versus U.S. Prices:

Exhibit 2-19 examines ex-vessel price per pound for key species, comparing current U.S. and New Jersey prices. For most species, the New Jersey price has been, and continues to be, lower than the nationwide average. The exceptions are primarily the species caught by longliners from Barnegat Light (swordfish, tunas and tilefish), plus lobsters, sea scallops, blue crab and dogfish. The lower New Jersey price holds even for those species (ocean quahog, surf clams, black sea bass, scup and Atlantic mackerel) for which New Jersey harvests over 25% of the U.S. catch.

Exhibit 2-19 also shows the ratio of 1993 to 1982 prices for each species for the U.S. and New Jersey. The Producer Price Index (PPI) for raw food (meat, fish, grain, etc.) rose by 1.08 between 1982 and 1993. Almost all species with the exception of herring, Atlantic mackerel, mako shark and surf clams exhibited rates of price increase above this PPI. However, a far smaller number of species experienced growth above the Consumer Price Index (CPI) rate of 1.50 over the decade. This latter index reflects general inflation, including such items as fuel, supplies, repairs and maintenance, new electronics, etc. Only species with price increase rates above 1.5 yield sufficient incremental income to outpace inflation.

The failure of most landings to keep pace with the CPI and the sharp difference between the PPI and CPI indices also reflect the declining share of price margins for the harvester. Prices are increasing substantially at the consumer level but almost all of the increase goes to the middlemen and retailers.

Price Comparison By County:

The price per pound for a number of species varies by county. For those species with substantial 1993 landings in more than one county, the price by county is shown in Exhibit 2-20.

Given the many factors that are involved in determining prices, it is not surprising that no consistent relationships emerge from these data. A number of species (scup, albacore, lobster, ocean quahogs and scallops) show minimal variation across counties. Cape May landings exhibit a higher price for swordfish, tilefish and bluefin tuna. On the other hand, Cape May prices are lower for anglerfish, bluefish, weakfish, big eye tuna, whiting and hard clams.

Exhibit 2-20: Price Per Pound, Selected Species, 1993 by County

COUNTY:		County					
Species	NJ Average Price	Atlantic	Cape May	Cumberland	Monmouth	Ocean	Other
Anglerfish	$0.56	-	$0.46	-	-	$0.73	-
Bluefish	0.29	-	0.16	-	0.29	0.35	-
Fluke	1.32	-	1.31	-	1.45	1.12	-
Atlantic Mackerel	0.08	-	0.07	-	0.22	0.10	-
Menhaden	0.05	-	0.05	-	0.06	-	-
Scup	0.56	-	0.56	-	0.59	0.55	-
Weakfish	0.83	-	0.59	-	-	1.41	-
Skate	0.10	-	0.09	-	0.17	0.09	-
Swordfish	3.03	-	3.30	-	-	2.97	-
Tilefish	1.46	-	1.64	-	-	1.40	-
Tuna: Albacore	.79	-	.80	-	.79	.80	-
Big Eye	3.70	-	3.60	-	-	3.86	-
Bluefin	6.00	-	4.33	-	9.02	4.17	-
Yellowfin	1.98	-	1.78	-	-	2.05	-
Whiting	0.34	-	.23	-	.45	.35	-
Blue Crab	0.54	.55	.56	.54	.86	.46	.50
Lobster	3.52	-	3.60	-	3.49	-	-
Hard Clams	3.28	4.28	1.67	-	3.20	4.21	-
Ocean Quahog	0.37	0.39	0.36	-	0.37	0.38	-
SurfClams	0.45	0.39	0.36	-	-	0.59	-
Scallops	6.03	-	5.99	-	-	6.09	-
Loligo Squid	0.50	-	0.49	-	0.59	0.46	0.80

Monmouth is highest in prices for fluke, mackerel, skate, bluefin tuna, whiting and blue crabs. Ocean County received the highest prices for anglerfish, bluefish, weakfish, big eye and yellowfin tunas and hard clams (together with Atlantic County). Its prices were not significantly lower than other counties for any species.

Prices By Gear Type:

There are several species which are harvested in significant proportions by

more than one type of gear. For these, it is possible to assess price differentials by gear type. Since gear type is not independent of geographic location or volume, the differences noted are not necessarily a pure reflection of gear. The species prices by gear type for 1992 which can be isolated are shown in Exhibit 2-21.

These data indicate no consistent trend. Eight of the listed species were harvested in part by fish trawls. Three of these yielded a higher price for trawl gear, but the other five species had lower prices for harvest via such gear. All three of the species which were caught in part by gill nets exhibited the highest price for this gear. Pots provided the higher price for two of the four species. Scallop dredges yielded lower prices for anglerfish and yellowtail flounder but produced a higher price for scallops.

Exhibit 2-21: Price per Pound by Gear Type, Selected Species, New Jersey 1993

	Price Per Pound by Gear Type						
Species	**Otter Trawl-Fish**	**Gill Nets**	**Pots**	**Pound Nets**	**Scallop Dredge**	**Crab Dredge**	**Otter Trawl-Scallop**
Anglerfish	.58	-	-	-	.54	-	-
Bluefish	.19	.27	-	.25	-	-	-
Yellowtail Flounder	.95	-	-	-	.48	-	-
Red Hake	.27	-	.64	-	-	-	-
Black Sea Bass	.71	-	.80	-	-	-	-
Weakfish	.45	1.09	-	-	-	-	-
Dogfish	.09	.12	-	-	-	-	-
Tautog	.68	-	.62	-	-	-	-
Blue Crab	-	-	.52	-	-	.52	-
Scallops	-	-	-	-	4.82	-	4.07

CHAPTER III: FISHING FLEETS AND PORTS

Summary

New Jersey participated in a national trend of increase in the number of commercial fishing vessels until the late late 1980s; numbers have fluctuated since then. For 1992 NMFS estimated 1,879 fishing craft in New Jersey, of which 487 were U.S. Coast Guard documented vessels, over 5 net registered tons. There are no reliable data on the proportion of craft actually fishing or on levels of their use for fishing. New Jersey has a higher proportion of smaller, "undocumented," vessels than the nation at large because of the continued importance of bay and inshore fisheries to the state.

NMFS data on fishing vessels with federal permits for regulated fisheries give a view of New Jersey's commercial fishing fleet (including party and charter boats). The vessels tend to be old, most built in the mid-1970s, and the party boat fleet is even older. Larger, more powerful vessels tend to be found in Cape May and Wildwood; smaller vessels predominate at other ports in the state.

Studies done in the 1980s provide more detail on the operations and capital worth and investment of a large sample of New Jersey fishing vessels (again including charter and party boats). In 1986 the inflation rate outpaced depreciation of vessels, but by the early 1990s this situation had reversed or at least leveled off.

Among limiting factors to New Jersey's commercial and recreational fisheries is the scarcity and high cost of adequate waterfront facilities for unloading, berthing, repair, etc. Competition for waterfront property is intense, as shown in the recent history of the port of Belford, where the local fishermen's cooperative continues to struggle with development pressures.

Cooperatives (at Belford and Point Pleasant) persist in northern ports and have provided numerous services to members; they are experiencing problems due to downturns in the fisheries as well as local development pressures. Belford, Point Pleasant Beach, and other more northern ports have experienced decline in some of their traditional fisheries, such as the winter dragger fishery for whiting and red hake. They have increased involvement in squid fishing, improved their market position by expanding local retail operations, and become the site of expanded surf clam and ocean quahog operations as that industry moves northward in response to changing abundance of clams.

Successful hard clam "relay" and "depuration" programs have also enhanced the alternative of bay clamming, and other bay fisheries, particularly for

crabs and flounders, are strong in places.

The experience at Barnegat Light shows that commercial food fisheries and charter and party boat fisheries can co-exist and mutually profit. It also suggests the importance of flexibility based on the ability to switch species focus, in the recent history of tilefish longlining expanding into pelagic longlining.

Decline in the Atlantic City fishing fleet in recent years is mostly due to the effects of "ITQs" (individual transferable quotas) in the surf clam and ocean quahog fisheries, particularly the sharp decline in active vessels as owners consolidate their operations.

Several of New Jersey's ports have depended heavily on the surf clam and ocean quahog fisheries, both harvesting and processing. Atlantic City is almost entirely dependent on ocean clamming; Cape May and Wildwood were important surf clam and ocean quahog ports but very recent changes in clam populations and the industry have resulted in the near-demise of these fisheries there, and their resurgence at Point Pleasant and Belford.

Cape May and Wildwood remain the most important fishing ports of the state. In 1992 Cape May accounted for over 80% of the total value of New Jersey fish and shellfish and was home to 180 permitted vessels: 5 party boats, 15 charter boats, and 160 commercial vessels, one third of which were otter trawlers, 34 sea scallop dredgers, 11 scallop trawlers, 10 gillnetters, and 6 sea clam dredgers. The remainder included pot boats, handliners, purse seiners, and other gear types. The larger, steel hulled vessels of Cape May include many now equipped with on-board flash freezers or refrigerated sea water systems, giving them a quality advantage. Freezer-trawlers and RSW vessels target Loligo and Illex squid and other species, such as scup or fluke, as conditions dictate. A survey of 3 of the 5 major docks at Cape May shows the high degree of innovativeness at this port.

Gill-netting is a small-scale but widespread and often overlooked inshore fishing activity in New Jersey. Here, as in other states, commercial gill-netting is threatened by pressures from sports anglers and environmentalists to close many inshore fisheries to commercial gears. Recent referenda and laws passed in California, Texas, and Florida against gill-netters appear to be part of a larger social movement that can threaten New Jersey's small gill-net fishery.

Marine fishing takes place out of many other ports of New Jersey, including the traditional oyster ports of the Delaware Bay, which are now almost entirely devoted to crabbing, gill-netting for weakfish, and recreational fishing, as well as experimental aquaculture. Other aquaculture operations are found in the southern bays of Ocean, Atlantic, Burlington, and Cape May Counties.

Trends in Fishing Fleet: National and New Jersey

In 1970, the U.S. commercial fleet consisted of 87,200 craft. In the mid-1980s the figure was about 127,000 craft. In NMFS statistics, the craft are divided into two classes: U.S. Coast Guard documented vessels, over 5 gross registered tons, and "boats," under 5 GRT. The number of documented vessels increased from 13,600 to 24,000 (76%) and the number of the smaller boats increased from 73,600 to 103,000 (40%). This increase was in response to a number of factors including increased domestic demand, the 1976 creation of the EEZ which essentially removed foreign vessels from U.S. waters, and federal loan guarantee and tax incentive programs promoting vessel construction.

Comparable data on N.J. fishing craft are not available because the NMFS did not publish craft estimates by state prior to 1991; however, it is reasonable to assume, based on landings data, observations and reports from people in the industry, that New Jersey participated in the larger national trend. That trend showed a significant slowdown in the late 1980s. The total U.S. fleet size dropped substantially in 1987 to 93,400 craft. It has maintained a level between 92,000 and 94,500 each year through 1992. This decline was all in the smaller boat category, which dropped to under 70,000 and has remained at that level (64,500 in 1992). The documented vessel component remained in the 23-24,000 range in the later 1980's and reached 30,000 in both 1991 and 1992.

In recent years (1991-92), documented vessels, those over 5 GRT, accounted for about 33% of the total U.S. fleet. The comparable percentage for New Jersey has been about 25%. This difference is primarily due to the nature of the state's fisheries -- a large inshore fishery (hard clams, crabs) and a limited distant water focus. If the decline in the smaller boats shown in the national figures was experienced in New Jersey, it can be supposed that New Jersey has experienced much more of a slow-down in growth or even absolute decline in fishing.

The most recent (1992) NMFS estimate indicates that there are a total of 1,879 craft in the state's commercial fleet. Of these, 487 are U.S. Coast Guard documented vessels (over 5 net registered tons), and the remaining 1,392 are smaller boats. This 1992 estimate is virtually identical with that for 1991 (1,855 craft; 447 documented, 1,408 boats). There are no reliable data on the proportion of craft that are active (actually fishing) or on their use levels so no comparison of these factors is possible.

The most detailed data base on New Jersey's commercial fleet is the NMFS

file maintained on those craft which hold permits required for participation in various federal fisheries (taking place beyond 3 miles). Data on permitted vessels for the squid/mackerel/butterfish; fluke; and multispecies fisheries were examined. In 1992, 801 vessels held such permits, accounting for some 42 percent of the state's fleet. The boats included in the permit file are primarily those engaged in nearshore and offshore finfishing using trawls and nets. They also include party and charter boats. Not included or underrepresented are primarily the small inshore shellfish (hard clam and crab) boats, many of the surf clam/ocean quahog dredges and longliners targeting only migratory species (tunas, swordfish, shark). Permit files through June, 1994 indicate 600 permitted vessels to that date, most of which (85%) also held 1992 permits. This figure was likely to change because a number of vessels only obtain permits later in the year.

The characteristics of the 1992 permitted vessels are useful indicators of the nature of the state's fishing fleet, with qualifications about underrepresentation of some classes of vessels noted above. The characteristics available from NMFS data files are summarized in Exhibit 3-1.

Exhibit 3-1: Characteristics of Permitted Craft, New Jersey, 1992

Location	No. Craft	Average				
		Length (Ft.)	Crew Size	Gross Tons	Horse-Power	Year Built
Statewide	801	45.5	3.5	36.3	486.4	1977.5
Selected Ports						
Atlantic City	27	39.3	3.1	17.1	427.9	1973.2
Barnegat/ Barnegat Light/LBI	86	49.1	3.4	43.3	540.6	1977.1
Belford	52	46.5	2.7	29.7	327.3	1970.5
Brielle	46	42.5	3.6	23.7	588.7	1976.2
Cape May	121	62.6	4.6	84.2	588.8	1977.7
Highlands	30	44.6	3.7	26.5	530.9	1980.6
Point Pleasant	113	45.6	3.6	32.4	499.8	1978.7
Sea Isle City	16	50.9	2.4	33.1	451.8	1978.8
Shark River/Belmar/ Neptune	69	39.8	3.1	22.2	436.0	1976.2
Wildwood/ Wildwood Crest	30	61.3	3.5	66.8	562.8	1974.5

Note: These data are for vessels with permits to fish for squid, mackerel, butterfish, fluke, or a complex of multispecies groundfish (cod, haddock, whiting, etc.) in federal waters, 3-200 miles from shore, through the federal fisheries management system.

The New Jersey fleet is generally made up of older vessels. Most permitted vessels were constructed in the mid-1970's in the period of optimism immediately before and after establishment of the 200-mile EEZ (1976). Only 31 percent of the statewide permitted fleet were built after 1984. Older boats are particularly dominant at Belford, Wildwood/Wildwood Crest, Atlantic City, and Sea Isle City.

The permit file also includes commercial sportfishing (party and charter boats) almost all of which (especially the party boats) hold multi-species permits. The 1994 permit file allows for identification of party and charter boats. Even though the available file only covers 1994 permits issued through June, most of these vessels obtain their permits early in the year and should be on this list. The 1994 listing includes 67 permitted party boats and 84 charter boats (maximum of 6 passengers each) in the state. The actual totals may be slightly higher. The state's party boat fleet included in this data base are even older than the

commercial craft: an average construction date of 1971, only 16% built after 1984.

Differences between Cape May and Wildwood and the other major commercial ports in New Jersey are highlighted in the permitted vessel data (Exhibit 3-1). These two ports are home to larger, more powerful vessels used in longer trips and in waters further from shore. In contrast, Belford's fleet composition (smaller, older, less powerful boats) is a reflection of its general emphasis on near-shore, day-trip fisheries.

1986 Survey

A 1986 study provides greater detail about the fishery as well as points for comparison with 1992 data. The study[3] was based on a mail survey of a sample of N.J. commercial and charter and party boat owners, representing 128 commercial craft, 109 party and charter boats, and 660 crew members including captains. The sample was made up of vessel owners interested in participating in a fishermen's mutual insurance company or cooperative, who therefore agreed to participate in the survey. It represents a broader cross-section of the fishery than the NMFS permit files do.

The results were analyzed by vessel/gear type to provide comparative information on vessel characteristics, fishing activity and crew composition. The findings are summarized in Exhibit 3-2 below. The fleet was aggregated into categories based on primary activity. "Inshore" includes hard clam, crab, and oyster harvesters and inshore pot, gill net and pound net fisheries. "Longline" includes the off-shore fleet targeting migratory species (tunas, swordfish, shark) and tilefish. "Otter trawl" consists of vessels which are primarily finfish draggers, some of which may also engage in pot, seine or dredge fisheries. "Sea clam" vessels are used exclusively for dredging surf clams and/or ocean quahogs, and "scallops" refers to scallop dredging vessels, some of which might also be converted to otter trawling.

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[3]Cattell, Jr., E.V., G. Grant, B. McCay, and W. Belvin, "A State-Supported Fisherman's Mutual Insurance Company," Report to the National Marine Fisheries Service and the New Jersey Fisheries Development Commission, 1986.

Exhibit 3-2: Summary, Survey of Commercial Fishing Craft, 1986**

Variable	Primary Fishery						
	Inshore	Longline	Otter Trawl	Sea Clam	Scallop	Party Boat	Charter Boat
Fishing Range (Mi)	1-25	25->100	1-100	1-25	1-25	1-25	1-25
Average Vessel Length (Ft)	39	70	65	78	82	67	38
Average Draft (Ft)	4	7	8	13	10	4	6
Average Year Built	1971	1973	1968	1954	1977	1970	1970
Average Horsepower (Main Engine)	261	475	414	414	626	786 (2)	408
Hull Composition % Wood	52	15	64	35	11	62	67
% Steel	0	54	32	65	89	0	0
% Other*	48	31	4	0	0	38	33
Average Trip Length (Days)	1	6-20	1/1-5	1	7-16	1	1
Average Crew Size	2.5	4.3	3.5	4.0	9.0	4.0	2.0
Average Crew Tenure % < 1 Year	22	25	25	20	50	N/A	N/A
% > 2 Years	45	59	46	68	36	N/A	N/A
% Fish > 6 Months/Year	88	100	94	100	100	63	59
Crew: % H.S. Grad.	83	100	57	73	63	89	89
Average Original Vessel Cost x00 (x$000)	48	218	199	362	441	183	67
Average Vessel Market Value (x$000)	53	286	219	521	447	232	76
Average Vessel Replace (x$000)	83	445	327	701	717	378	124

*Fiberglass, other materials or combinations.

**Source: Cattell, Jr., E.V., G. Grant, B. McCay, and W. Belvin, "A State-Supported Fisherman's Mutual Insurance Company," Report to the National Marine Fisheries Service and the New Jersey Fisheries Development Commission, 1986.

The inshore boats operate mostly within 25 miles of shore, make day trips and rely primarily on hand gear (rakes, hoes, pots, etc); they report the smallest, least powerful and least expensive boats and the smaller crews. The largest, most powerful vessels are found in the fisheries which typically go further offshore (longliners), fish for extended periods (longliners and scallopers), and use gear with heavy power demands (scallop dredgers). Party boats are high in horsepower because they typically use diesel dual engines for speed to maximize time on the fishing grounds.

The overall average vessel length reported by this survey was 57.9 feet. This is longer than the average of 45.5 feet shown in the 1992 permit list (see Exhibit 3-1, p.). This may seem surprising given that the new vessels entering the fleet between 1986 and 1992 typically were longer than the ones they replaced. However, the 1992 permit list under-represents the larger boats; many of the longliners, sea clam dredgers and sea scallop dredges do not target species covered by the multiple species permits and thus do not apply. Moreover, it is likely that the 1986 sample was biased somewhat toward larger boats, the owners of which may have been more likely to be concerned about insurance costs.

The scallop dredges carry larger crews because of the operational workload, the extended trip duration and the labor involved in shucking at sea. These vessels also report the highest crew turnover and the youngest median age.

The original cost of a vessel is a function of vessel/engine size, equipment and year of purchase/vessel age at purchase. Thus, smaller, lower powered inshore and charter boats report the lowest initial cost. In 1986, market values were consistently higher than original purchase prices (an overall average of 20%). This differential indicates that in the 1970's and early 1980's the inflation rate outpaced depreciation. Given the depressed market for used fishing craft; the recent relatively low rate of inflation (CPI rose by 32% from 1986 to 1993, an average of less than 2% per year) and the accelerating real depreciation of older vessels, this differential for vessels still active has probably reversed or at least leveled off. The smallest difference existed in the scallop fishery which had by far the newest vessels.

Overall, the 1986 reported replacement cost was almost twice the original vessel cost and over 1.5 times the fair market value. Replacement costs have risen by about 33% since 1986, but these price ratios have been altered because about 30% of the fleet has been replaced since 1986.

In 1986, 45% of the responding commercial owners indicated that their vessels were fully paid for. However, these were mainly smaller boats (median original purchase price of $93,000). Another factor to be considered is that a number of harvesters assumed second or even third mortgages on their homes to

pay off their boats, so that they could operate without increasingly expensive insurance (bank loans on boats require insurance). Another 14% of owners reported owing about 25% of the original purchase price (median of $180,000), almost 25% owed about one-half of the original price (median of 156,000) and the remainder still owed 75% or more against a median price of $200,000. The pattern was similar for party/charter boats although the median purchase prices for such craft were lower by some 50%.

The larger indebtedness on higher price vessels is a function not only of the limitations of capital available for down payments, but also the relationship between price and recency of purchase. Fewer payments have been made on the newer, more expensive boats.

Docks and Shoreside Facilities

N.J.'s commercial and recreational fisheries depend on the retention and preservation of the access to waterfront property. This is increasingly difficult, in the face of escalating shorefront property values and taxes and increasing demand for waterfront residential uses. It is generally understood that once a fishing dock is shut down it will never again be used for commercial or recreational fishing purposes. Thus, the future of the state's fisheries can be seriously damaged by any such loss.

A 1986 survey of N.J. fishing dock owners and operators[4] investigated dock conditions and pressures on these operations. Although development pressures have eased somewhat in recent years, because of the general economic downturn and the imposition of more stringent coastal development constraints, the trends noted in 1986 continue, and thus findings of the survey are still pertinent.

Interviews and site inspections covered 30 large and small commercial docks, from Raritan Bay to Cape May, excluding only the Delaware Bay. The survey docks range in size from less than 250 LF (linear feet) of berthing space (33%) to over 850 LF (17%). The largest dock had some 1,500 LF and the median size was 450 LF, 75% of the docks had less than 20 vessel berths; only 2 docks (7%) had space for more than 50 boats. The larger docks (over 40 berths) were operating at capacity, but the smaller docks reported a small number of vacancies at the time of the survey.

The median water depth at low tide was reported as less than 8 feet at dockside and 10 feet on the channel. The greatest channel was 32 feet (one dock).

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[4] McCay, B. J., E. B. Levine and J. Tiemens, "Survey of Commercial Fishing Dock Owners and Operators," A Report to the New Jersey Fisheries Development Commission. New Brunswick, N.J.: Department of Human Ecology, Rutgers University, 1987.

Twenty-seven of 30 docks (90%) berthed commercial fishing vessels; of these, the median number of such boats was under 11 and 3 of the docks reported over 21 commercial boats. Of the 25 docks indicating specific fisheries for their commercial vessels, the major fisheries reported were clamming (52% of the docks), trawlers (38%), lobstering (28%), scallopers (24%), longlining (20%) and gill netting (20%).

Eight of the docks indicated that they berthed party/charter boats. Of these, 6 had fewer than 11 party/charter boats; the other two housed between 11 and 31 commercial sportfishing vessels. Only 9 of the docks surveyed (30%) berthed private recreational boats (not necessarily all engaged in angling). Two-thirds of these (6 docks) had less than 11 boats and one had 41-51 boats.

Twenty-nine of the 30 docks provided berthing and most provided a variety of other services to commercial vessels. 70% provided fuel and almost two-thirds offered off-loading (63%) and wholesaling (60%). Ice is available at half the docks and almost as many (47%) had vessel repair facilities. 43% packed landed product, one-third had a retail sales store and 30% sold bait.

Interviewers observed each facility and reported that the properties were generally in good condition; only 10% of the docks and 7% of the backland property need some major repair or clean-up. None of the properties were judged to be seriously deteriorated.

The major adjacent land uses were were: marinas (77% of the docks); residential (67%); retail/commercial (33%) and hotels/restaurants (33%). The conditions of these adjacent properties were almost all judged to be good (70%) or very good (19%). Sixty percent of the docks had a retail market and/or commercial business on their premises.

Most of the surveyed commercial fishing docks (60%) were organized as corporations and another 23% were family owned. Slightly more than half (53%) were acquired since 1970; another 20% acquired the dock prior to 1950. Half of the owners owned other waterfront property near the dock, 23% owned another commercial dock in New Jersey, and over 80% of dock owners owned at least one commercial fishing vessel.

Of the 30 docks surveyed, 47% indicated that recent development near their dock had "significant" impact on their operations. Another 20% reported "moderate" impacts. The major impacts noted were: increases in property taxes (33% of the surveyed docks); decreases in affordable and/or available dock space for fishermen (20%); pollution (air, water, noise) and municipality favoring developers over commercial fishing operations (10%). Responses were essentially similar with respect to the severity and nature of impacts from future development.

Two-thirds of the dock owners had been contacted about selling dock property within the past 3 years (1983-86). Of those that had been contacted only 5 seriously considered selling and 4 of these were still seriously considering the offer. The primary reasons for not considering such sale were: desire to retain family business (12 docks); adequate financial offer not yet made (4 docks); and plans to expand on their own (2 docks).

Of the 30 respondents, 27% indicated that economic conditions for the NJ commercial fishing docks were "good" or "excellent;" 37% rated conditions as "average" and the same proportion of them as "below average" or "poor." The problems noted included: insufficient income generated (6 docks); depletion of fish resources (3 docks), inadequate current market (2 docks); and inadequate government support of the fishing industry (2 docks). Respondents indicated that the three most important problems facing the docks at the time of the survey and over the subsequent 10 years were development pressure, ocean pollution, and insurance availability or premiums.

Facilities and Operations of Key Ports[5]

Belford

The port of Belford (with neighboring Port Monmouth) is on Raritan Bay, inside Sandy Hook. Its commercial fishery is focused at Compton's Creek on Raritan Bay and dominated by the Belford Seafood Cooperative. Commercial fishing has taken place at this site since the 19th century, when it was the center of menhaden fishing and fish processing as well as an important port for shipping of farm, fish, and shellfish products. It has been a center for many kinds of fishing since then. The Co-op was started in 1953. The property used by the Co-op as well as some used by private parties was part of an 85 acre parcel owned by a large fish meal (menhaden) plant from the early 1900's until 1987 (it had ceased operation in 1982). During this entire time, the plant owners permitted the fishermen to operate at the Creek, on a 2.5 acre site which was leased to them at $1.00 per year on a year-to-year basis. More detail on the land tenure and development pressures is provided below; Belford is one of the ports that has experienced intense development pressure that has the potential of hurting commercial fishing.

The land tenure arrangement was a mixed blessing to the fishermen; it gave

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[5] Material in this section is based on : B. McCay et al, "Report, Part 2, Phase I, Fishery Impact Management Project, to the Mid-Atlantic Fishery Management Council," Rutgers University, Dec. 1993; NMFS records; and discussions with NMFS port agents and industry representatives.

them rent-free space, but the absence of any longer-term commitment prevented them from obtaining any financing for rehabilitation or expansion of their antiquated facilities. After protracted negotiations the Co-op finally acquired the entire 85-track bayfront parcel in 1988. The Co-op then sold most of the land to a developer (for up-scale residential/mixed use/marina development) retaining some 5 acres, including: both sides of the Creek; backland on the west bank; their dock, packing area and retail store; and several out-buildings.

The bayshore land to the west is still owned by development interests. The old fishmeal plant structures have largely been razed, but no improvement or new construction has occurred. Re-use has been delayed (due to Township opposition to extensive development, environmental related wetlands and bayfront dredging and the recent weak market for expensive waterfront residences) but not abandoned. The land use to the south is wetland and small single-family homes, many owned by fishing families.

The 265 acre property east of the Co-op strip along the east bank of the Creek is controlled by Monmouth County and houses the regional sewage plant. Much of the land is a former landfill, which is currently vacant. The County has been actively pursuing use to the site as a terminal and parking area for the Bayshore--NYC ferry; development which would require area for ferry boats.

Since the Co-op acquired ownership of its parcel, new facilities and improvements have been undertaken (with financial assistance from the Port Authority of NY & NJ). These include: a new, expanded 400 LF concrete bulkhead/apron dock for off-loading, servicing and berthing and a new building housing pack-out and ice facilities and a new retail sales store. In addition, in 1991 the U.S. Army Corps of Engineers completed a maintenance dredging of the Creek and access channel in Raritan Bay.

With ownership and these improvements, the Co-op and its facilities are in relatively good physical condition for continuation of fishing activity. The major potential complications in the near future would be: 1) county taking of the east bank of the Creek for ferry operations (taking berthing space currently used by smaller and non-Coop boats and causing possible conflicts in use of the Creek channel during certain hours) and 2) development of the bayshore property to the west (which could cause problems with vessel congestion, complaints about early morning noise, odors, etc.)

Co-op membership has remained at 36-37 over the past decade. The members operate 35 boats, mostly trawlers and other net fisheries. In addition, the port is home to some 25-30 independent boats, mostly smaller than the Co-op boats and engaging in near-shore shellfishing and finfish harvest. The NMFS files showed 52 Belford vessels with permits for squid/ mackerel/ butterfish/ fluke/

mixed groundfish in 1992. Almost all fishing at Belford consists of 1-day trips within 30 miles of shore. None of these vessels have on-board freezers or refrigerated sea water systems.

Trends in Belford's landings, both current and historical, are described in earlier sections of this report. It was noted that in recent years, the bulk of the port's edible (non-bait) fish value (55%) and poundage (73%) came from ocean quahogs. This species is landed from 5-6 transient boats (mostly from southern NJ) operating on beds in the NY bight. They are off-loaded by their crews and trans-shipped to shuckers in Southern NJ and other states. These transients pay a landing fee for use of the Co-op dock, but the Co-op does not share in any of the profit margins.

The Co-op has historically depended on finfish, especially whiting. Catch of this species has declined in recent years, but reports indicate that the Sept-Oct, 1994 whiting harvest has been strong enough to re-institute self-imposed trip limits among Co-op members, a practice shared by the N.J. fishing cooperatives for some fisheries to help them balance catches against facility limits and market demand.

The NMFS Port Agent's 1992 records indicate the following activity at Belford (not including hard clam harvesters):

Otter trawls--full-time (11-12 mos.) = 10
Otter trawls--part-time (7 mos. or less) = 12
(other mos: purse seining for menhaden or crab dredging)
Lobster/crab boats = 18
Sea clam dredges (transient) = 6
Pound net boats (7-8 mos.) = 3
Purse seine - Menhaden (5 mos.) = 1

The bulk of the lobster and crab landings at Belford go directly to a shellfish dealer located adjacent to the Co-op dock. The finfish and squid landings are handled and marketed by the Co-op. Non-members' landings also are unloaded and marketed by the Co-op; non-members pay a fee to the Co-op for these services, which is typically deducted from the sale proceeds.

In 1984, the Co-op handled 7 million pounds of finfish and squid (5 million pounds of edible product and 2 million pounds of menhaden (bait)). By 1993 this volume (excluding the ocean quahog transfers) had grown to a total of 9.9 million pounds over the decade. However, food finfish landings (excluding ocean quahogs) actually declined from 5 million to 3.7 million pounds. Over the decade, Co-op ex-vessel revenues increased from $2.2 million to $2.8 million. The increase of 27% is less than the 40% increase in the CPI over that period.

About one-third of the Co-op sales revenues came from the on-site store operated by the Co-op. The remainder of sales were to local markets and restaurants (about 30%) and to wholesalers in NYC (primarily the Fulton Fish market) (25%). Sales were almost all of fresh fish, whole, headed and gutted or filleted (at retail).

Like many other fishing communities, the Belford fishing community is defined not only by shared commitment to and dependence on fishing but also by a high degree of kin relatedness. Fourth and fifth generation fishermen can be found at Belford, as well as newcomers. Many of the current fishermen are closely related to each other. In a survey done in 1985[6] only two respondents (5%) indicated having no relatives in the fishery, past or present.

It is somewhat surprising, for a port very close to the center of a major metropolitan area, to find that most of the fishermen and dock workers live very close to the port, contributing to a strong sense of community. The "Bayshore" communities of Belford, Port Monmouth, East and West Keansburg, etc., are still places where people with modest and uncertain incomes can afford home ownership. Homes are also important for some functions of the fishery: net drying, dipping, and handing; net and gear storage, lobster and eel pot work and storage, baiting pots, and bait storage are often done at home, which is feasible given the close proximity of many homes to the port. Marshlands are also used for aspects of the fishery such as laying out pound-net and tarring poles and pots. Development pressures threaten most of the above values.

Belford fishermen surveyed in 1984 by the Fishermen's Wives Organization of Belford had little skilled work experience besides fishing and thus were particularly dependent on fishing. Only 25% had any other work. Traditionally, in bad times the fishermen may be forced to "to go up the road," as they say, to find other employment, but it is relatively unspecialized and unskilled work, similar to fishing in being seasonal and "independent" (construction work, driving an oil truck, dock work, boat building, etc.). The 1984 survey showed a very high level of concern for the fate of families if fishing opportunities declined.

Other Monmouth County Ports

There are a number of other diverse commercial fishing operations and locations in the county. Highland, Atlantic Highlands and Leonardo are bayfront communities which house 20 small hard clam boats. These boats harvest the bottoms of Raritan/Sandy Hook Bay and the Navesink and Shrewsbury Rivers;

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[6] Grant, G., B.J. McCay, et al, "Study of the Fishing Industry at the Port of Belford, N.J.", Princeton Economic Research Inc., 1985.

providing product for both the depuration and relay programs (see previous discussion). The boats are based at various private docks and marinas in these communities, which also provide berths for a dozen party boats and 3-5 charter boats. Over a dozen (mostly smaller) commercial crab and lobster commercial boats are also berthed in these three locales.

The Belmar/Neptune/Shark River area is home to some 50 commercial boats and over a dozen party boats. The commercial boats are mostly engaged in the crab and inshore/nearshore lobster fisheries and housed at private docks and marinas. The party boats are concentrated at docks along the Shark River, in an area with fairly heavy tourism traffic.

Manasquan River/Brielle is the southernmost commercial fishing complex in Monmouth County. It includes approximately 60-70 boats (81 permitted in 1992, 46 as of June, 1994), split about equally between small (mostly under 40 ft) commercial boats and party/charter boats. The local commercial fleet focuses mostly on the nearshore shellfish and net fisheries. The commercial sportfishery consists of 15 party boats and 18 charter boats housed at private docks and marinas, respectively.

Point Pleasant (Ocean County)

The town of Point Pleasant is located at the mouth of the Manasquan inlet in Ocean County. The town's economy is geared towards the summer tourist and recreational economy. The commercial, party/charter boat, and recreational fishing industries are very important to the local economy, employing many local residents and supporting related industries such as seafood markets, restaurants, marine supply houses, welders and salvage, as well as tourist-oriented businesses.

At present there are two commercial docks in Point Pleasant. One is a cooperative whose members drag or gillnet for finfish. The other dock supports surf clam and ocean quahog dredgers. The two docks represent only a fraction of the businesses that once thrived in the port. Decline in the number of commercial docks has many causes including declining landings, competition for dock space with private marinas, and a general lack of interest in commercial fishing in the younger generations. Decline continues. One dock closed in 1992-93 and another in the winter of 1993. The remaining commercial fishers are struggling to maintain their niche in the tourist-oriented community.

As of 1992, Point Pleasant had 113 permitted commercial fishing craft. It is too early to assess the precise effect of the local dock closures and other conditions on the fleet, but it is estimated that the current (1994) fleet numbers less than 100: mid-1994 files show 72 permitted vessels.

According to the 1992 NMFS port agent's records, 20 draggers based in Point Pleasant regularly landed product in Ocean County. (Five other draggers from other NJ ports off-loaded in the county on a sporadic basis.) Thirteen of these Point Pleasant trawlers fished exclusively and regularly (11-12 months) for finfish. Six others trawled for finfish for 5-8 months and targeted scallops for the remainder of the year. In addition to a number of new and pot boats, the port housed 4 party boats and some dozen charter boats and six sea clam dredges (full time at the port docking or at several including Point Pleasant).

The Fishermen's Dock Cooperative

The Point Pleasant fishermen's cooperative owns and operates two docks adjacent to a party/charter boat dock and across from a Coast Guard station. These docks can accommodate a little more than twenty vessels, a mixture of trawlers and gillnet boats. The Co-op provides an ice-making machine, cold storage facility, retail store, and a station for loading trucks. The retail store deals in both locally caught and fish from other states. It sells fresh and frozen fish and prepares food as a restaurant. It employs eight workers in winter and fifteen in summer. All workers are hired locally.

The cooperative has three offloading stations, each of which can be operated simultaneously. The co-op can offload all of its trawlers in a day if the trawlers stand and wait to be offloaded. There are six full time dock employees. This number grows to fourteen during busy days, when people from party and charter boats are hired to work. All employees are locals.

In 1993 the cooperative handled fourteen member trawlers and six gillnetters. It also offloaded two non-member boats. Although dock space is scarce, it has handled transient vessels from Belford and from other states in the winter months. It is possible to land at the cooperative without charge, but docking is usually reserved for cooperative members because of the scarcity of space. Entry into the co-operative is difficult, depending on a vacancy plus proof of being an able fisherman and purchase of a share. The strength of the Point Pleasant Co-op, like the Belford Co-op, lies in its marketing strategy and in its services to its members. Besides marketing, the cooperative offers ice, packing, and fuel at discounted prices to its members. Most gear is purchased from a marine supply house located near the cooperative. Net repairs are done on the boat or at the supply house. The cooperatives have proved effective in aspects of marketing and also serve as vehicles for political action.

There were 14 member otter-trawlers at the cooperative in 1993, a decrease from 18 or 19 in the late 1970s. They are all wooden hulled vessels from 45-65 feet in length. They are geared only for bottom fish trawling, but carry several cod ends depending on what they anticipate trawling for, where they are trawling, and

the gear laws governing certain nets (such as the ones governing summer founder nets). In general the trawlers will carry three nets: the targeted species' net, a backup, and mixed trawl net.

Including the captain, the vessels usually have a two or three man crew. As is widespread in the fisheries, they are paid a share of the profit the catch makes, a system called "the lay."

In 1993 there were 6 gill-netters at the cooperative, too. All are smaller boats averaging around 45 feet. They were rarely manned by more than one person, the owner, and tend to operate year round. There are three types of gill nets employed at the cooperative: runaround, sink, and drift gillnets. Major species landed by runaround gillnets include weakfish, bluefish, spanish mackerel, tuna, and scup. Drift and sink gill nets landings include dogfish, bluefish, angler, sturgeon, bonito, and weakfish.

The Co-op markets fish in a variety of modes in addition to its local retail store. Loligo squid is sold primarily to processors in northern N.J. and N.Y. The absence of on-board refrigeration places the product at a disadvantage with regard to Cape May docks, especially for international markets. It also makes it very difficult to market Illex squid in warmer weather. Fluke and anglerfish (monkfish) are sold primarily in fresh form to local markets and restaurants and to markets in NY and Philadelphia. The sea clam dock ships its landings of surf clams and ocean quahogs to shuckers and processors in southern NJ and other states.

Barnegat Light/Long Beach Island (Ocean County)

The community of Barnegat Light is located on the northern section of Long Beach Island, a barrier island along the New Jersey shore. The island up to and including Barnegat Light is intensely developed with summer and beach/boarding houses, and much of the community is heavily geared toward the summer beach economy. During the winter, Barnegat Light's economy slows significantly, and one of the major forms of employment becomes commercial fishing. About 150 people work on the fish docks.

The commercial fishery on Long Beach Island consists of two large docks in Barnegat Light and a smaller dock "across the bay." In 1993 the docks at Barnegat Light supported a total of 36 full time resident commercial fishing boats as well as a few transients and about 40-42 recreational and charter boats. (The 1992 NMFS permit files listed 78 vessels at Barnegat Light (including 5 party and 6 charter boats), 8 vessels at Barnegat (on the mainland) and 14 small inshore commercial boats at marinas in Beach Haven on the southern end of Long Beach Island.) There is reportedly little competition for dock space between the commercial and recreational boats; they share at least at one dock.

The 1992 NMFS permit files show 26 longline vessels at Barnegat Light of which 12 fished at least 8 months during the year. Longlining has been an important fishery at Barnegat Light, having developed in the 1960s and 1970s with the rise of a major fishery for tilefish, on the edge of the continental shelf. Decline in tilefish landings has led to the development of a pelagic distant-water longliner fishery, for swordfish, tunas, and other species. The remainder were active for less than 5 months in 1992.

Gill-netting is the second major fishery of the port: there were 21 permitted gillnet boats, of which 14 were active for at least 6 months during that year. In addition there were 5 hand line vessels, each of which operate for less than 4 months; and a dozen scallop dredges.

There are two important docks at the port, which are here described as "dock 1" and "dock 2." The following is based on interviews and observations done in 1993.

Dock 1:

Dock 1 is an entirely commercial dock that accommodates eight scallopers, eight boats that longline for swordfish, tuna, and tilefish, seven gillnet boats, and three bottom longliners that fish for tilefish year round. The docks handle no transient vessels, partially because of a lack of space and partially because of the difficulty of navigating Barnegat inlet.

The dock has three offloading stations, but can only offload two large boats at once. Offloading is accomplished by 5-6 fulltime employees (hired locally) and the captain and crew of the vessel. During peak season, however, more people are hired to help in the offloading.

The dock is privately owned by two partners, both of whom are commercial fishermen themselves. These partners do some of the marketing, selling primarily to fresh fish market in Boston, Philadelphia, Maryland, and New York. In addition to the fresh fish market, the dock also sells to wholesalers, retailers, and local restaurants. It also operates its own fresh fish market from April-October. However, the dock allows the boats that use its dock space to find their own markets if they so desire.

In addition to marketing, the dock supplies the services of packing (for a fee) and sells ice, fuel, and bait to the boats. There is no fee to dock and there is no membership.

The sea scallop dredges are steel hulled, 75-90 foot vessels equipped with no other gear. They are specialists in sea scallops, but they do have some

marketable by-catch: monkfish, fluke, blackback founder, and yellowtail flounder.

In 1993 there were three full time tilefish boats operating from Dock 1. However, the number of longliner boats increases during the winter when some of the pelagic longliners enter the tilefish fishery. These vessels are generally about 75-90 feet with wooden or steel hulls. They use squid as bait, which they can either buy from the dock or purchase for themselves.

Each tilefish boat has an average of a four man crew that is hired locally, but is seldom an all family crew. The boats are owner operated, and the captains of the boats appear to be relatively young (30-40 years old).

A tilefish boat will run trips from 12-13 days and will fish from Washington Canyon to Lidonia. Longliners fish in deep water, right to "the edge" of the continental shelf, and in the gullies and canyons. With appropriate licenses they can land in Montauk, NY, Ocean City, MD, and North Carolina. However, they often land in Barnegat because of family and fuel expenditures.

The captains can sell to the dock, but occasionally choose to sell independently if they can get a better price. If selling independently, the captains will sell to the fresh fish markets of Boston and New York.

The tilefish fishery is relatively clean, with little by-catch of other species. A rough dock average for the tilefish boats is about 90% tilefish. Most of the bycatch is conger eel. Conger eels are marketed in the fresh fish market. The rest of the bycatch are whiting, cod, or pollack. They are sold or eaten by the crew.

There were eight pelagic longliners at Dock 1 in 1993. Most of these boats are converted tilefish boats that left the fishery during the summer months because of poor landings. The vessels used in the fishery are 75-90 feet in length and have steel hulls. Most pelagic longliners carry pelagic and bottom longlines at various times of the year to switch from tilefish to swordfish and tuna. A few of the boats that use pelagic longlines during the summer months switch to bottom longlines and tilefish during the peak winter months. Much of the same marketing conditions and special conditions associated with the full time tilefish boats are applicable here. The pelagic longliners will target yellowfin tuna, bigeye tuna, and swordfish from summer to fall, although they prefer tuna over swordfish. The bycatch from the fishery includes mahi mahi and mako sharks.

In 1993, there were seven gillnet boats at Dock 1. These boats are fiberglass or wooden hulled vessels that average between 35 and 45 feet in length. They all carry gillnets, and a few carry longlines and pin hooks. The gillnet boats at Barnegat Light employ runaround gillnets, drift gillnets, and sink gillnets. Of these nets, the sink gillnets enjoy the longest period of utilization during the year,

while the other two nets are summer and fall.

Including the captain, either one or two people work from the boat on the average trip. If there are any other crew members besides the captain, they are hired locally. Crew (if any) is paid a share of the catch. The average trip is 12 hours in duration. These trips can be as much as 2-3 days during the spring, but at other times in the year weather does not permit such long trips. Indeed, during the winter gillnetting falls off substantially, although it does continue. They can fish anywhere within a 25 mile radius of the inlet before fuel and open ocean limit their travels. They can land in Pt. Pleasant and can move their boats to fish and land as far south as Cape Hatteras, but few choose to travel because their family is in Barnegat and the added cost to the trip is seldom justified. The gillnetters can sell to the dock or sell independently, and the decisions to do so depend on what is caught, how the market is faring, and what price the dock is offering. All are owner operated.

Dock 2:

Barnegat Light has one other private dock which accommodates 10 commercial boats, 15 charter boats, and 25 recreational vessels. It has offloading facilities for up to five vessels, with two people at the docks working at offloading and the crew of the boat doing the lion's share of the work. The dock is an offloading facility only. All fish is marketed by the captains of the vessels, and all sales are handled by the captains, who sell to local fresh fish markets. (A third dock is located "across the bay" from Barnegat Light. The third dock deals primarily with bay shellfish and inshore and bay fish.)

There are currently four pelagic longliners and six gillnetters at Dock 2, engaged in the same fisheries as those at Dock 1. There are also several transient boats that come in from Long Island, New England, and Florida. All the vessels are owner operated and the crew is hired locally on the resident boats.

Atlantic City (Atlantic County)

The Atlantic City commercial fishery consists of a sizable sea clam (surf clam and ocean quahog) fleet and a small number of inshore crab, hard clam, net and pot vessels. The sea clam fleet, located at bayside docks near Absecon inlet, has declined sharply in recent years. This is due to the introduction of the federal individual transferable quota (ITQ) system which allowed consolidation and transfer of individual quotas, and related state provisions allowing consolidation of boat quotas. The number of local sea clam vessels dropped from 90 in 1989 to 24 in 1994. The displaced boats have either been retired or moved to other ports in New Jersey or elsewhere.

Atlantic City is also the home port of of 2 party and 3 charter boats, docked near Gardiner's Basin, plus some 25-30 smaller (30 - 40 feet) commercial boats involved in nearshore bay fisheries, between Brigantine and Margate. Dock and berthing space is generally not a problem. There is little competition for bayshore property at this time and the residential redevelopment on the southern side of Absecon Inlet is not that close to the bayfront. However, as in many shore locations, residential concern about orders, noise and gulls have begun to surface.

Sea clams are marketed directly to processors or shuckers. This transfer has been simplified in recent years. The ITQ system has increased the number of processors who own (or underwrite) vessels, and the sea clam fishery is experiencing an increase in vertical integration. The hard clams, crabs, black sea bass and other species are usually sold to local dealers or restaurants.

Cape May/Wildwood (Cape May County)

The ports at Cape May and at Wildwood across Jarvis Sound are combined in the NMFS landing files, but they are geographically distinct. Cape May, the largest port in New Jersey, accounted for over 80 percent of the combined total value and was home to 180 permitted vessels (multispecies; fluke; squid/mackerel/butterfish permits) in 1992. The situation was much the same in 1993. The permitted fleet included 5 party boats and 15 charter boats and 160 commercial vessels. One-third of the commercial vessels are identified as fish otter trawlers, 34 as sea scallop dredges, 11 as scallop trawlers, 10 gillnetters and 6 sea clam dredges. The remainder include pot boats, hand liners, purse seiners and other gear types and multiple gear vessels. It is estimated that about 75 percent of the smaller permitted vessels are active.

The Cape May trawler fleet differs from those at other New Jersey locations in several respects. First, it consists primarily of larger, steel hulled vessels which fish in more distant waters and make longer duration trips. The Cape May fleet also contains vessels equipped with either on board flash freezers or refrigerated sea water (RSW) systems. None of the other ports have vessels with such capability. This gives Cape May vessels a quality advantage, especially for summer species such as Illex squid. Finally, Cape May has a significant fleet of scallop trawlers, some of which have traditionally switched between sea scallops, using dredges, and finfish, using otter trawls. Recent changes in federal fisheries management for both sea scallops and multispecies groundfish disadvantage some of those engaged in such switching.

In 1993, there were 7 freezer-trawlers at local docks. These are newer, 90-120 in length and large storage capacities. They typically are manned by a crew of 6 (including the captain) and carry at least a mixed and a squid net. These vessels usually fish the canyons and the edge of the continental shelf in water

depths from 90-140 fathoms. They can range from Cape Cod to Cape Hatteras but usually fish between the Hudson and Wilmington Canyons, the primary squid harvesting areas. Because of their size, they are limited with respect to use of alternate ports. When they do land elsewhere, the home dock arranges shipment of the catch back to Cape May.

There were 16 RSW trawlers docking at Cape May in 1993. These are also newer vessels, slightly smaller than the freezer-trawls, with a length of 60 - 90 feet and an average crew of five. (Crews of both these types of trawlers are hired locally but not related to the captain.) Most of the RSW vessels target Loligo and Illex squid and scup or fluke as conditions (market and catch opportunities) dictate.

The remainder of the local trawler fleet (estimated at 25 - 30 active vessels) consists of 50 - 75 foot vessels that focus primarily on fluke, scup and mackerel. They carry a variety of nets, depending on the species targeted for each trip. They typically operate closer to shore, with shorter trips (3 - 4 days) and smaller crews (3 - 4) than the larger freezer/RSW trawlers.

The port's sea clam dredges landed primarily ocean quahogs in recent years (74 percent ocean quahogs, 26 percent surf clams in 1993). However, ocean quahog landings at Cape May ceased in April, 1994, with the closure of a major processing facility due to its sale and supply-related changes in the fleet. Because of a switch to more productive grounds off northern New Jersey and the New York Bight, the Cape May boats are now off-loading in Belford and Point Pleasant.

Cape May is in Lower Township, the southernmost town in New Jersey and its economy relies heavily on its summer tourism and beach economy. While there are many marinas and other waterfront uses in the town, there is relatively little space conflict with commercial fishing docks. These are separated from the rest of the community. The major commercial docks are located along one stretch of road abutting the Cape May Canal. There are five commercial fishing docks in Cape May. Three docks are described, based on research done in 1993 (McCay et al. 1993):

Dock 1:

Dock 1 is the largest finfishing operation in Cape May. The dock consists of 7 off-loading stations, an 18,000 MT freezer/frozen storage facility, separate areas for sorting/cleaning/cutting squid and finish, and a central marketing in addition to docking space. In late 1993, there were 6 freezer-trawlers, 14 RSW trawlers and several other trawlers using this dock. There were also 6 trap/pot boats and several gillnetters unloading at this facility. Transient boats can be accommodated, and some 20 such boats occasionally dock here. All vessels using this dock on a full-time basis are independently owned and operated.

In 1993, there were 110 - 125 people working at the processing in the dock's processing operation throughout the year. An additional 40 or so full-time workers are added during peak periods. Most of the key personnel are from Cape May County. The rest are hired from Philadelphia and are predominantly Southeast Asians.

Dock 2:

Dock 2 is smaller; it specializes in squid, mackerel and a mix of other finfish. The catch composition varies from year to year according to market, stock and economic conditions. Facilities include a processing room, a cutting room, freezers/frozen storage, a large retail market, a restaurant and 2 off-loading stations.

The vessels berthed at the dock in 1993 included 32 trawlers, 6 pot boats, 3 - 4 scallopers and 2 hook/line boats. One of the trawlers was a freezer boat and 2 were equipped with RSW systems. Processing at this dock employed some 30 workers, mostly Southeast Asians from Philadelphia. They handled substantial amounts of squid for the export market as well as fluke and other finish species. In addition to the export trade, this dock's output is marketed via local fresh fish markets and the on-site retail store and restaurant.

Dock 3:

The third finfish dock surveyed at Cape May handled 12 boats, with a variety of gear in 1993. It deals in dogfish, mackerel, scup and other species. It processes most of the port's dogfish for domestic and export markets (to Germany and Great Britain).

Wildwood

The 1992 Wildwood-based fleet consisted of about 25 boats, including 2 party boats, 6 - 8 large (85 - 110 feet) sea clam dredges and the same number of trawlers. There are purse seiners, gillnetters and pot boats. They harvested a variety of species, both shellfish and finfish. As of mid-1994, Wildwood was the only location in the township which still lands ocean quahogs. The sea clam dredges are large (85 - 100 feet), and the draggers range from 60 - 85 feet. The smaller pot and net boats are berthed at several concentrated locations along the sound and are served by three small docks which handle much of the off-loading and distribution.

Cumberland County

Port Norris and Fortescue on the Delaware Bay are traditional oyster ports. With the recent failure of that industry, these sites have converted to crabbing and some gillnetting for weakfish. In addition, Fortescue has 4-5 party boats which concentrate on weakfish in the bay.

CHAPTER IV: AQUACULTURE

Summary

By 1991 aquaculture accounted for almost 40% of worldwide fisheries value, and 16% of the weight of fish and shellfish landed. The increase over 1984 was three-fold to almost four-fold. The U.S. is a minor player in this field, representing only 4% of the value of worldwide aquaculture in 1991. The recent rate of increase in U.S. aquaculture is significant although lower than global trends. Catfish is the dominant species in U.S. aquaculture. The other major species are crawfish, trout, bait-fish, and oysters.

The largest gains over the decade were in aquaculture of salmon, shrimp and "other" (hybrid striped bass, tilapia, ornamental fish and aquatic plants). Oyster culture value represents over 70% of oyster harvest value. The culture of hard clams is not as well-established, representing only 21% of harvest value in 1992.

Examination of U.S. aquaculture output prices per pound by species over the 1983-92 decade indicates that marine species with emerging culture production have performed well but that fresh water species have had problems. Only oysters, salmon, shrimp and "other" (hybrid striped bass and tilapia) have yielded price performance which outpaces inflation (with price per pound increases two to three times above the 1983 levels).

In terms of 1992 farm gate value, the two dominant states in the northeast were Connecticut ($61.8 million, primarily oysters) and Maine ($42.9 million, primarily pen-reared salmon). Together, these two states account for 71% of regional aquaculture value. New Jersey with $2.4 million represents less than 2% of regional aquaculture value. It ranks seventh in overall value among the twelve Northeastern states and fifth in production value of marine species (after Connecticut, Maine, New York and Massachusetts).

A Northeast Regional Aquaculture Center study of aquaculturists has identified expectations for the immediate future concerning supply and demand, as well as perceived constraints to and potentials for development.

Aquaculture has a long history in New Jersey: oyster culture was underway by the beginning of the 1800s, and a private trout hatchery operated in the 1860s, followed by a public freshwater finfish hatchery program. In the past decade or

so numerous experiments with other kinds of aquaculture have been considered or implemented but little has come of most of them.

Meanwhile, oyster culture has declined to nothing because of the oyster diseases MSX and Dermo; the harvesting sector of the industry has dwindled to a handful who are turning to harvests from the natural oyster beds, and the processing sector is dependent on Connecticut culture oysters.

Hard clam culture has become the major aquaculture activity in New Jersey. Hard clam hatcheries and grow-out operations accounted for about 25% of the 1992 state hard clam harvest. There were 7 seed-producing hatcheries in 1994. Estimates of the value of hard clam aquaculture production range from $2 million to $3 million.

Although culture of certain species being produced in other Northeastern states may be problematic because of New Jersey's climatic conditions and water temperatures (e.g., possibly too cold for catfish and too warm for salmon and mussels), other species such as hybrid striped bass, bay scallops, soft shell clams and crabs, black bass and aquatic plants (for the state's pharmaceutical industry) may offer opportunities, if barriers and constraints can be mitigated. A state plan for aquaculture development has been completed and accepted by the Governor.

A recent survey of consumers, retailers, and food service businesses has recently been completed. Consumers appear to be aware of aquacultured products and to judge them by factors other than price, including being "environmentally friendly," higher quality, and safer than non-aquacultured seafood. Almost all retailers (90%) identify product as "farm-raised" or "aquacultured," but there are discrepancies between retailers' appraisals of what consumers are looking for and what consumers say attracts them. The survey also indicated that retailers are not always aware of which specific products are cultured.

Food service establishments see the advantages of aquacultured seafood as including safety, better quality, consistent quality, and better portion control. The perceived disadvantages included higher prices, less flavor, and limited variety.

Actually the increased culture of Salmon and shirmp has resulted in significant price decreases at the wholesale and consumer level. Catfish has been a consistently low priced product. These price reductions have resulted in increased consumer demand.

Worldwide Aquaculture Activity and Trends (1984-1991)

As defined by the United Nations' Food and Agriculture Organization (FAO), aquaculture is "The farming of aquatic organisms, including fish, mollusks, crustaceans and aquatic plants. Farming implies: 1) some form of intervention in the rearing process to enhance production (i.e., regular stocking, feeding, protection from predators, etc.) and 2) ownership of the stock being cultivated." Thus, aquaculture can include ponds and raceway systems, close-system tanks, estuarine and near shore bay bottom, ocean pens and various combinations of such facilities.

Aquaculture has been described as a major ingredient in expanding fisheries supply and diversity, reducing pressure on traditional capture fisheries, providing controlled and wholesome products and providing economic alternatives for displaced commercial harvesters and rural/urban landowners. It is relatively under-developed in New Jersey, except in the form of oyster planting, hard clam hatcheries, and recreational trout hatcheries. The questions raised are therefore as much ones of potential as present and past activity. Consequently, this section begins with information about global, national, and regional trends in aquaculture.

Exhibit 4-1: Worldwide Aquaculture, 1984-1991, Pounds and Value

	1991		1984-1991 Increase	
Category	**% Lbs**	**% $**	**Lbs**	**$**
Fish	54%	60%	98%	143%
Aquatic Plants	21%	11%	13%	39%
Mollusks	19%	11%	55%	133%
Crustaceans	5%	18%	255%	348%
	99%	100%		

FAO records for 1991 indicate that worldwide aquaculture accounted for 16 million metric tons (MT) with a value of $28.4 billion (U.S.). These reflect a 60% increase from the 1984 poundage (10 million MT) and a 120% increase in value (from the 1984 value of $12.9 billion). Between 1984 and 1991, aquaculture production has gradually risen in relation to "capture" harvest, increasing its share of total worldwide fishery poundage from 12% to 16% By 1991, aquaculture accounted for almost 40% of worldwide fisheries value.

In 1991, Asia was the dominant focus of aquaculture activity, reporting 80% of worldwide poundage and 75% of value. The U.S. had only 3% of poundage and 4% of value. Exhibit 4-1 shows the breakdown of worldwide aquaculture by category. Although fish dominate, aquatic plants (such as kelp) and mollusks are also significant in poundage.

U.S. Aquaculture Activity and Trends (1992)

NMFS statistics indicate that in 1992 U.S. aquaculture accounted for 691.2 million pounds of product, with a value of $724.4 million. This is equivalent to 7% of landed poundage and 20% of the value of the commercial marine harvest in that year. Included are culture of major freshwater species such as catfish and trout that are not included in commercial marine landing totals.

This 1992 output represents a poundage increase of 124% over the decade (from 308.4 million pounds in 1983) and a value increase over the period of 178% (from $260.8 million in 1983). The dominant species in U.S. aquaculture in 1992 was catfish which accounted for 66% of total U.S. poundage (457.4 million pounds) worth $273.5 million (38% of U.S. value). This dominance has increased over the past decade. In 1983, catfish represented 45% of poundage and 32% of value (137 million pounds, $84 million).

Crawfish, the second highest poundage species in 1992 (63 million pounds, 9%), declined in both poundage and share since 1983 (70 million pounds, 23%).

Trout landings of 56 million pounds in 1992 accounted for 8% of aquaculture production (7% of value). In spite of a slight absolute poundage increase since 1983 (48 million pounds), its share in 1992 reflects a decline from 19% in 1983.

Bait fish production has stayed relatively constant over the decade (at 21 million pounds) resulting in a drop in share (from 7% to 3% in volume and from 17% to 8% in value). Oysters exhibited only a slight increase in poundage (from 19 to 24 million pounds), but, because of a large increase in value per pound, its share of 1992 value stayed at 12%.

Together, the top five aquaculture species (catfish, crawfish, trout, bait and oysters) accounted for 89% of total U.S. production poundage and 69% of value in 1992. This reflects more diversity than in 1983 when these same species produced 97% of poundage and 93% of value.

The largest gains over the decade were in aquaculture of salmon, shrimp and "other" (hybrid striped bass, tilapia, ornamental fish and aquatic plants). Between 1983 and 1992, salmon jumped from 1.8 to 23.9 million pounds, with a

value growing from $2.5 million to $54 million. During this same period, salt water shrimp production grew from 0.3 million to 4.4 million pounds, with an increase in value from $0.5 to $17.6 million. The "other" category also grew dramatically during the decade growing in production poundage from 7.0 to 36.7 million with a corresponding increase in value from $7.0 million to $111.0 million.

NMFS statistics show that in 1992, the nationwide value of cultured oysters was equivalent to 72% of the landed value of this species ($82.4 million cultured, $114.5 million landed). This proportion may be skewed upwards as the result of floods which destroyed much of the oyster production in the Pacific Northwest and Gulf of Mexico. For hard clams, 1992 cultured value ($11.5 million) was equivalent to 21% of marine harvest value ($55.6 million).

On a price per pound basis, the NMFS data indicate that cultured oyster meats yielded a slightly higher price ($3.44/lb.) than captured product ($3.17/lb.) in 1992. This is a composite of highly diverse prices by region. Oregon and Louisiana oysters typically range under $2.00 per pound, while New England oysters can yield as much as $10 or more per pound due to differences in taste, size and type.

Based on NMFS 1992 data, captured hard clams yielded $4.50 per pound while cultured hard clams had a value of only $2.69/lb. This is surprising since cultured clam sales typically consist almost entirely of "little necks" (smaller, more valuable clams). This should yield a higher price per pound for cultured product. (Indeed, price data developed by the Northeast Regional Aquaculture Center are at variance with these NMFS data, see below.)

Examination of U.S. aquaculture output prices per pound by species over the 1983-92 decade indicates that marine species with emerging culture production have performed well but that fresh water species have had problems. Catfish production has tripled in this period, but farm gate price has remained unchanged at $0.60 per pound. Trout prices per pound have declined slightly (from $1.03 to $0.96) in spite of a modest production increase. Crawfish prices have increased by only 17% (from $0.47 to $0.55 pound), far below the CPI increase of 1.40 during the decade. Clams exhibited a significant increase (150%)in volume but suffered a 30% decline in price per pound (from $3.79 to $2.69). Only oysters, salmon, shrimp and "other" (hybrid striped bass and tilapia) have yielded price performance which outpaces inflation (with price per pound increases two to three times above the 1983 levels).

Exhibit 4-2: Northeast Region Aquaculture, Quantity and Gate Value, by Species, 1992

Species	Quantity (x000)	Gate Value (x000)	Value % of Total
Shellfish:			
Oysters	1,020 bu.	$63,428	43%
Hard Clams	216 bu.	15,553	11%
Other (Mussels, Scallops)	n/a	600	*
Subtotal Shellfish		**$79,581**	**54%**
Finfish:			
Salmon	13,500 lbs.	$42,145	29%
Trout	4,721 lbs.	12,862	9%
Hybrid Striped Bass	947 lbs.	2,280	2%
Tilapia	280 lbs.	563	*
Catfish	263 lbs.	474	*
Bait and Ornamental	n/a	6,322	4%
Subtotal Finfish		**$64,646**	**44%**
Other Aquatics:			
Plants and Crayfish	n/a	$2,182	2%
TOTAL		**$146,409**	**100%**

*Less than 0.5%

Regional Aquaculture Activity

Product Mix-Volume and Value:

A recent report from the Northeast Regional Aquaculture Center[7] describes the 1992 situation and prognosis for commercial aquaculture in the twelve Northeastern states (Maine to Maryland). The findings of this study are presented in some detail because they describe the regional context for attempts to expand aquaculture in New Jersey.

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[7] Bush, M.J. and J.L. Anderson. "Northeast Region Aquaculture Industry Situation and Outlook Report", N.R.A.C., North Dartmouth, MA, November 1993.

Based on surveys and interviews with participants in aquaculture, the reported regional output value of total activity in the region in 1992 was calculated at $146.4 million. This represents 20% of the value of U.S. aquaculture output in that year. Oysters, salmon, trout, oysters, hard clams, and hybrid striped bass were leading species, by value, in that order (Exhibit 4-2).

In terms of 1992 farm gate value, the two dominant states in the northeast were Connecticut ($61.8 million, primarily oysters) and Maine ($42.9 million, primarily pen-reared salmon). Together, these two states account for 71% of regional aquaculture value. New Jersey with $2.4 million represents less than 2% of regional aquaculture value. It ranks seventh in overall value among the twelve Northeastern states and fifth in production value of marine species (after Connecticut, Maine, New York and Massachusetts).

The N.R.A.C. study reports approximately 240-260 commercial shellfish aquaculture operations with direct employment of 475-500 full-time and 625-650 part-time individuals in the northeast in 1992. Most of these were small, but several were "relatively large" (size undefined). Shellfish leases in the region were estimated at 81,700 acres (94% of these were in Connecticut, New York and Maryland).

Oysters:

Oysters dominated regional aquaculture; Connecticut accounted for 88% of this species. About 2% of northeast oyster production is for the halfshell market and is sold directly to restaurants. The remainder of oyster sales are primarily to wholesalers. About one-third of the regional production is shipped to New Jersey for shucking prior to sale.

Regional oyster producers were surveyed with respect to five-year expectations for the industry; constraints on industry growth; factors determining expansion pace; and major research needs. Most of the respondents expected a five-year increase in demand, which would slightly exceed projected production growth and cause some increase in real prices. The majority estimated that permit and lease costs would increase in the near future.

Producers who were satisfied with the progress of their operations cited proper selection of growout sites; experience; proper equipment; good water quality; and good employees as the major reasons. Those whose operations had not yet met their objectives cited disease and weather-related mortalities; insufficient availability of MSX-free and resistant seed (developed by Rutgers University); inability or delays in obtaining permits; and insufficient access to financing as primary reasons. With respect to constraints on industry growth, the two most important problems noted were regulatory delays for expansion of leased

lots (with an average of seventeen months to obtain a new lease) and disease which was of concern even to producers who said they had no current problems.

Availability of financing was noted as the third most significant constraint on oyster industry growth. Personal funds and other nonbank sources were cited as the primary sources of funding, especially for the initial period until a positive cash flow position is reached (as long as 4-5 years). Less than 20% of respondents relied on banks as the primary source of financing. Predators, water quality and poaching were noted but judged to be lesser constraints than those noted above.

Because of the high quality and taste preference for northeastern oysters, their 1992 price ranged from $.20-$.50 each; yielding an average price of $62.20 per bushel or $10.37/lb. (N.R.A.C.). This is substantially higher than the national average for cultured oysters ($3.44/lb).

Hard Clams:

The N.R.A.C. study estimates that in 1992, there were over 70 hard clam aquaculture operations in the northeast. Connecticut also was the primary source of cultured hard clams (57% of the region) followed by Massachusetts (21%) and New Jersey (12%). In that year, there were 12 commercial hard clam hatcheries, half of which sell seed to other producers for growout. Half of the growout operations operate nurseries where seed clam are raised until they reach plantable size (at least 10 mm). The rest buy larger seed at substantially higher prices for direct planting.

Cultured hard clam sales were primarily to wholesalers (82%). Other outlets were: retailers (7%), direct to consumers (4%), brokers (6%) and restaurants (2%).

Producers responding to the N.R.A.C. survey anticipated that real clam prices would remain fairly stable over the subsequent 5 years, while production and demand would both increase slightly over the period. Permit costs were expected to rise while seed prices would be stable. The three factors judged to be most constraining on industry growth were: predators, availability of financing and capital and the regulatory environment. Water quality, marketing and disease were judged to be lesser constraints.

N.R.A.C. reported prices for hard clams are of interest because they differ substantially from NMFS price data. They are also more logical given market preferences. Smaller "little neck" clams (primarily for the half-shell market) are more valuable per pound of meat than larger clams (in the northeast, about $.15 per clam for little necks and $.05 for large chowder). Aquaculture output is geared towards these smaller clams and a far greater size uniformity than captured

product. Thus, the price per pound for cultured clams should be higher.

NMFS national statistics for 1992, based on an average of 300 clams and 10 pounds of meat per bushel, yield a captured clam average price of $4.50 per pound and a cultured clam average of $2.69 per pound ($.09/clam). In contrast, the N.R.A.C. surveys indicated that the market size, little neck clams yielded farm gate prices ranging from $0.14 to $0.25 per clam, with 450-500 clams per bushel. The 1992 weighted average price per bushel for the region was $72, at 10 pounds per bushel, yielding $7.20 per pound. This appears to be a reasonable number for northeastern cultured hard clam product and also exhibits the expected positive differential for cultured over captured product.

New Jersey Aquaculture Activity and Trends

The state's history of aquaculture dates back well over a century, starting with oyster culture operations in the early nineteenth century and a private trout hatchery in the 1860s. The state began an extensive freshwater finfish hatchery program in 1912 and has expanded it several times since then (in the 1930s and most recently in 1982). Operated by NJDEPE and supported by user fees, these facilities provide a number of species, primarily rainbow, brook and brown trout, to stock recreational streams and ponds.

Over the past twenty years, a number of private aquaculture operations were initiated; some lasting only for short intervals. Those which ceased operations included culture programs by public utilities and closed-system tank culture of tilapia. These former operations closed for a variety of technical, economic and market reasons. During this time, individuals have discussed or explored a variety of culture operations, ranging from salmon and catfish to soft shell clams, mussels and brine shrimp. However, none of these have come to fruition.

Oyster culture, once widespread in estuarine systems throughout the state, especially along the Delaware Bay, has been essentially shut down in recent years because of infestations of MSX and Dermo, which have decimated stocks. Rutgers University has had significant success in developing a strain of MSX-resistant oysters, but the subsequent appearance of Dermo significantly retarded experimental and commercial propagation programs. The oyster culture operations involve: preparation of estuarine bottom (scraping and spreading of cultch to encourage larvae setting); harvesting of seed oysters; transfer to private, leased growout grounds; and final harvesting when oysters reach market size. They may be revitalized at some future date when the MSX and Dermo situation is eliminated or improved. Rutgers, together with other research institutions in the region, is continuing its research efforts toward this objective.

The major species presently cultured in New Jersey is the hard clam. Culture of hard clams has grown in recent years from 11,000 bushels in 1990 to 25,900 bushels in 1992. These operations produced the equivalent of 25% of the state's 1992 hard clam capture harvest. These operations typically consist of: spawning and rearing of larvae and juveniles in on-shore hatcheries; planting of larger juveniles on prepared and protected lease bottoms; and harvesting when the clams reach market size. Culture activities presently occurring take place in the coastal sounds and bays in the southern section of the state, with less than 100 leased acres under intensive production.

The New Jersey Aquaculture Development Task Force indicates that there are currently (1994) seven hatcheries producing hard clam seed. All of these operate their own nurseries and growout bottoms and most provide seed to other culture operations (within and outside New Jersey). The Task Force estimates that culture operations in 1993 employ 60-100 individuals and that the gate value of production was some $3.0 million. (Note: The NRAC survey identified $2.4 in farm gate values for all of New Jersey aquaculture, primarily hard clams. Based on these data, the value of clam culture in the state is probably not much more than $2.0 million.)

In addition to the potential for regeneration of New Jersey's oyster culture industry, the state has additional options for developing aquaculture. Although culture of certain species being produced in other Northeastern states may be problematic because of New Jersey's climatic conditions and water temperatures (e.g., too cold for catfish and too warm for salmon and mussels), other species such as hybrid striped bass, bay scallops, soft shell clams and crabs, black bass and aquatics (for the state's pharmaceutical industry) may offer opportunities, if barriers and constraints can be mitigated.

If New Jersey is to take advantage of its proximity to major markets and aquaculture is to become a major product source and economic factor in the state, a myriad of issues must be integrated into a cohesive aquaculture development and management plan. These include biological questions, water supply and quality, siting, use and control of near-shore land, licensing and regulation, predator control, waste discharge, financial access, technology and technical assistance and marketing. The New Jersey Aquaculture Development Task Force, established by a governor's executive order has prepared such a plan, and it was approved in early 1995.

A recent report[8] examined the purchasing practices, needs and perceptions of consumers, retailers and food service businesses in northern New Jersey and

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[8] O'Dierno, L. and K. Gall. "Aquaculture Marketing Survey," Northeast Regional Aquaculture Center, No. Dartmouth, MA. 1994.

New York with respect to seafood in general and aquacultural products in particular. The aim was to provide data to assist aquaculturalists in identifying relevant issues and appropriate marketing and merchandising strategies to better position their products in various marketplaces. The data were based on survey responses from 760 consumers, 497 retailers and 100 restaurants/institutional feeding facilities. The results can be summarized as follows:

- Consumers

  Ever purchased aquacultured product?
  - Yes (61%)
  - No (30%)
  - Don't know (10%)

  Aquacultured products purchased:
  - Salmon (23%)
  - Catfish (22%)
  - Clams (13%)
  - Trout (12%)
  - Mussels (11%)
  - Shrimp (8%)
  - Tilapia/Striped Bass/Oysters (together 9%)

  Perceptions of aquacultured product(s):

  - Environmentally friendly (36%)
  - Better quality (19%)
  - Safer (17%)
  - More available (15%)
  - Lower price (12%)

- Seafood Retailers

Retailers using cultured product
- Chain stores (99%)
- Independent retail seafood markets (90%)

Major cultured species used most often
- Tilapia (77% of outlets)
- Trout (11% of outlets)
- Catfish (5% of outlets)
- Hybrid striped bass (1% of outlets)
- Shrimp (1% of outlets)

Shellfish (shrimp, mussels, oysters, clams) (2% of outlets)

Aquaculture as a marketing tool:

Identified product as "farm raised" or aquacultured" (89%)

- Food Service Operations

Use of aquaculture

Aware of having purchased farm raised product (highest percentage among suburban restaurants with average entree prices above $15) (41%)

Used "farm raised", "aquacultured" or some similar phrase as a marketing tool (39 percent, most restaurants)

Type of product

Restaurants most frequently cited tilapia, catfish, shrimp and mussels. Institutional food service operations cited catfish, trout and tilapia.

Business's assessment of cultured product's benefits as perceived by their patrons

Safety (32%)
Environmentally friendly (18%)
Better quality (15%)
Less expensive (14%)

Perception of cultured product from food service operators' viewpoint:

Advantages - safer, better quality, consistent quality, better portion control
Disadvantages - higher prices, less flavor, limited variety

Exhibit 4-3: Retailers' Perceptions of Customer Attitudes Toward Aquacultured Products.

	Chain Stores	Independents
Better Quality	<1%	21%
Safer	94%	41%
Lower Price	6%	38%

Retailers' perceptions of customer attitudes toward aquacultured products do not coincide with the customer responses shown above. For example, the chain store retailers seem to have had no appreciation at all of the consumer perception of higher quality from aquacultured product (Exhibit 4-3). Retailers' own perceptions of aquacultured products focus on safety as a major advantage, and higher price as a major disadvantage (Exhibit 4-4).

Exhibit 4-4: Retailers' Own Perceptions of Aquacultured Products

Advantages		Disadvantages	
Consistent Supply	6%	Less Flavor	10%
Consistent Price	9%	Lower Nutrition	<1%
Lower Price	3%	Inconsistent Supply	<1%
Better Portion Control	4%	Higher Prices	74%
Safer	78%	Different Source	6%

CHAPTER V: PROCESSING

Summary

Major shifts in New Jersey processing over the past decade include: decline in the oyster industry, the emergence of activity in frozen prepared products and a decline in independent ocean clam shuckers.

The number of plants included in the NMFS voluntary reporting system declined from 28 to 18 (a decline of 36%) between 1983 and 1992 and a decline in annual employment from 1,051 to 791 (25%). However, the average number of employees per plant increased, from 37.5 to 44, reflecting the fact that the plants that closed or stopped reporting during the decade were mostly the smaller ones.

There are serious problems relying on the NMFS voluntary reporting system for information on processing activity. Many processors do not report. It is estimated that there are an additional 28 New Jersey firms which do some form of processing as part of wholesale, retail, or export operations. Accordingly, the following discussion does not necessarily represent the entire industry.

The value of seafood processing by product type (canned, frozen, etc.) as reported to the NMFS over the past 10 years, shows a picture of fluctuating overall value and importance of particular product types. A comparison of 1983 and 1992 alone would suggest increase, but 1986 values were almost as high as those of 1992, and 1989 values were similar to those of 1983. The only clear trend is increase in frozen product. Similar conclusions apply to changes in numbers of plants and employees.

New Jersey has fared slightly better than the Mid-Atlantic region as a whole, in terms of processing plants and employment, but the region had the greatest level of decline in the U.S. during the decade between 1982 and 1992. The U.S. as a whole experienced an increase in plants, coupled with a decrease in employment.

The historical pattern of reliance on fresh-fish markets, with little valued added by processing, has not changed much in the past decade. Analysis of processing and landings data for 1992 showed that the only fish species where processing volume is equivalent to 25% or more of the landings volume are fluke (summer flounder), winter flounder, and squid. Surf clams and ocean quahogs are all processed, but much of that processing takes place in other states as well.

In turn, seafood processors do not rely heavily on New Jersey-caught species. A 1988 survey found that only 31% of the processors relied on N.J.-caught fish or shellfish for half or more of their raw material. Current oyster shucking and mussel processing relies on product from outside the state.

Calculation of value added is possible only for shucked shellfish meats and finfish fillets. In 1992 for surf clams it was some 200% of the ex-vessel price; for oysters it was about 50%; for finfish fillets it was 10-40%.

Surf clams and ocean quahogs remained the most valuable species for processors over the decade, although the mix had changed to favor surf clams by 1989. Most ocean quahogs landed in New Jersey are now shipped outside the state for shucking and processing.

Even with a large number of oyster shucking plants in 1983, oysters represented only 8% of the processing value; by 1992 the oyster industry had declined even more, and the shucking houses depended on oysters from Connecticut.

Output prices per pound outpaced inflation for only one product: summer flounder fillets. They kept pace with inflation for minced canned ocean quahogs, bluefish fillets, and shucked raw oyster meats. They were below inflation for 8 products: surf clam raw meats, sliced canned conch, canned squid meats, surf clam juice, canned minced surf clams, canned surf clam chowder, canned surf clams in sauce, and gefilte fish.

Surveys done in 1988 with 19 new and 29 older seafood processors show their perceptions of the advantages and disadvantages of doing business in New Jersey. Among the advantages were proximity to markets and ports; availability and quality of raw products, the image of the state, the lower cost of shipping, the strictness of water quality/pollution regulations, and various labor variables. Among the disadvantages were some of the same factors: labor, but seen as unavailable; the image of the state, here in a negative vein; the strictness of and cost of compliance with environmental regulations, with a focus on solid waste management; and insufficient supply of raw seafood products.

Processing Activity

According to a comprehensive directory of the U.S. fish and seafood industry,[9] in 1994 there were 168 firms operating in New Jersey in all sectors of the fishing industry (producers, processors, wholesalers, brokers, distributors, export, import and retail). Of these, 46 New Jersey firms include some form of processing as a sole activity or in conjunction with wholesale, export or other activities. This appears the best estimate of the number of New Jersey locations engaged in some form of processing activity.

The U.S. Bureau of the Census periodically publishes a "Census of County Business Patterns" by state. The most recent available is for 1991. The definition and categorization of these data (by Standard Industrial Classification (SIC) code) are different from and more restricted than those employed by the NMFS. According to the census, in 1991 there were 7 "canned/cured seafood manufacturers" and 10 "fresh/frozen packaged fish processors." Comparison of pertinent codes for 1991 and 1983 census data (Exhibit 5-1) indicates a drop in number of establishments but an increase in average employment by plant, a pattern also shown in the NMFS data base to be discussed at greater length in the rest of this section.

Exhibit 5-1: Census Data on New Jersey Seafood Processing Establishments, 1983 and 1991.

SIC Code	1983	1991	Percent Change
#2091-Canned/Cured Seafood Manufacturers:			
Number of Establishments	10	7	-30%
Average Employment	470	701	+49%
Average Employment/Plant	47	100	+113%
(Note: Roughly equivalent to NMFS canned category)			
#2092-Fresh/Frozen Packaged Fish Processors:			
Number of Establishments	12	10	-17%
Average Employment	287	605	+111%
Average Employment/Plant	24	61	+154%
(Note: Not directly comparable to any NMFS category)			

Source: U.S. Bureau of the Census, Census of County Business Patterns, 1983, 1991.

9 Who's Who in the Fishing Industry, 1994-95. Toms River, NJ: Urner Barry Publications, Inc.

The NMFS maintains an annual voluntary data base on seafood processing activity. The latest date available is 1992, when 18 firms were recorded. This file includes only some of the major canneries and frozen processed product plants and most of the shellfish shucking operations. It does not cover most of the finfish filleting (fresh or frozen) which occurs at a large number of cooperatives, docks, wholesalers, brokers, institutions, seafood markets and retailers. Information from other sources suggests that this data base covers about 35% of the locales which do any type of processing (and probably less than 50% of the total New Jersey value).

Although incomplete, the NMFS processor file contains the only detailed time series of data on employment and output. Moreover, it includes most shellfish processors and prepared product plants and reflects a consistent data base which can be analyzed for changes over time. The following is based on analysis of the most recent available NMFS data (1992) and trends over the decade since 1983. Individual plant information is confidential; the following discussions aggregate data as necessary to retain such confidentiality.

Current (1992) New Jersey Activity

In 1992, 18 New Jersey plants processing edible seafood products were included in the NMFS files (Exhibit 5-2). These plants produced 106.3 million pounds of product with an output value of $89.6 million. (Two other plants produced nonedible products: shellfish buttons and shark hides.) The 18 seafood plants reported a total annualized employment of 791, averaging 44 employees per plant (range from 3 to 151 employees per plant). Shellfish canneries and shucking houses predominate (11 of the plants); the rest were plants engaged in filleting and other processes involving finfish, sold either fresh or frozen.

Plants by Product Form

The NMFS divides processed edible output into fresh, frozen, canned and smoked/cured (Exhibit 5-3). In 1992 canned product led in terms of both weight and value, constituting fully 70% of processed value, primarily shellfish. Frozen and fresh products made up 16% and 14% of the value, respectively; there was no reported smoked or cured fish product.

Exhibit 5-2: New Jersey Seafood Processors, by Primary Processing Method, Number of Plants and Number of Employees, 1992

Type	Number of Plants	Number of Employees
Shellfish Canneries	5	362
Frozen Fin/Shellfish Processors	4	221
Oyster Shuckers	3	208
Finfish Filleters	2	
Hard Clam Shuckers	2	
Ocean Clam Shuckers	1	
Gefilte Fish Processors	1	

Source: NMFS Processor Files

Exhibit 5-3: New Jersey Processed Edible Seafood, 1992: Value and Weight by Product Type

Form	$ Value	% Value	Pounds	% Pounds
Canned	62.5M	70%	91.9M	86%
Frozen	14.6M	16%	7.5M	7%
Fresh	12.5M	14%	7.0M	7%
Smoked/Cured	-0-		-0-	

Source: NMFS Processor Files

The difference between percentage shares based on value versus poundage is a function of the lower value/pound of canned products ($.68 versus $1.95 for frozen and $1.79 for fresh). This is due in large part to the fact that the outputs are based on total value and weight. Thus, canned outputs such as chowders, which have a relatively high proportion of lower value ingredients, have lower value per pound.

Major Species and Sources

For reasons noted above, finfish and squid are under-represented in the NMFS processor files. They do not cover most of the finfish filleting (fresh or frozen) which occurs at a large number of cooperatives, docks, wholesalers, brokers, institutions, seafood markets and retailers, perhaps two-thirds of the actual total. The finfish and squid reported in the files, together accounted for about 20% of reported processed value, primarily as frozen products. Ocean clams (surf clams and ocean quahogs) contributed about 70% of total value (60% surf clams and 8% quahogs), almost all in canned form or in shucking operations supplying canners. The remainder (almost 10%) came from other shellfish species (mussels, oysters, lobsters, hard clams, crabs, scallops, shrimp, conch, etc.) in all three categories, especially fresh meats.

Based on estimates of processing yields and the proportion of seafood in various canned and processed products, it is possible to compare the 1992 poundage of New Jersey processed product for several species (from the NMFS processor file) with the New Jersey landings of these species in 1992. This does not necessarily imply that a given percentage reflects actual in-state processing of fish or shellfish landed in New Jersey. Some landings are shipped out of state for processing, and some processed product is based on fish or shellfish landed elsewhere (domestic or import). Also recall under-representation of finfish in the processor files. With those qualifications, the following observations suggest the extent to which there is parity between fish and shellfish landed by New Jersey boats and in-state processing of these species. :

- Processing of winter flounder is approximately equal to landings.
- Fluke processing is equivalent to about 50% of landings.
- Squid processing by firms in the NMFS files is equivalent to 25% of landings; firms not included in the NMFS files account for the equivalent of another 30% of NJ squid landings.
- Surf clam processing equals almost 50% of New Jersey landings of that species; ocean quahog processing reflects only 10% of landings. (Most ocean quahogs were sent to Maryland and Virginia for processing.)
- Virtually, all of the oyster shucking and mussel processing relies on product from outside the state (oysters primarily from Connecticut, mussels

from a number of other sources).

- None of the processing of other shellfish species makes up a significant proportion of landings. Sea scallops are shucked at sea and the meats are shipped directly to wholesalers and markets upon landing. Thus there is no on shore processing of this species.

An earlier (1988) survey of New Jersey seafood processors[10] found that only about 31% of the processors in the survey reported relying on N.J.-caught fish or shellfish for 50% or more of their raw material:

All N.J. Product	=	14%
50-75% N.J. Product	=	17%
Less than 50% N.J. Product	=	41%
No N.J. Product	=	21%
Don't Know	=	7%

Processor Margins

Because of uncertainty and variation in the nature and/or proportion of nonseafood ingredients (e.g., water, breading, vegetables, sauce, etc.) in various plants (and even within the same plant, for different labels), it is not possible to calculate the margin between cost of product to the processor and the value of plant output for products other than shucked meats and finfish fillets.

For shucked oyster meat, the 1992 margin was is about 50% of the ex vessel price (i.e., value of shucked output = 1.5 times the ex vessel price). For surf clams, the margin was is some 200% (output value = 3 times ex vessel price) and for finfish fillets, it is 10 - 40% (output price = 1.1-1.4 times ex vessel). Note that value added does not necessarily relate directly to profitability because of differences in transport costs to and from plants, labor intensiveness of production, extent of capital equipment/automation, etc.

Historical Perspective (1983-92)

Overview

Examination of 1983 data with comparable 1992 figures indicates that reported edible seafood processing increased by 50% for poundage and 40% for value over the decade. In 1983, the NMFS data base reported a total of 28 plants

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[10]Lopez, R, and N. Henderson. 1988. "Impediments to Increased Agricultural and Seafood Processing in New Jersey", Department of Agricultural Economics and Marketing, Rutgers the State University, Agricultural Experiment Station.

processing edible seafood products, with an output value of $63.5 million and a weight of 70.9 million pounds. In addition, there were 3 industrial processors with a combined output valued at less than $1 million.

During the period 1983-1992, the number of reporting seafood plants declined from 28 to 18 (36%) and annual employment at these plants declined from 1,051 to 791 (75%). However, reflecting the fact that most of the plants that closed (or stopped reporting) during the decade were small ones, and the ones which began operations were relatively large (see below), the average number of employees per plant increased from 37.5 to 44 over the decade.

Neither the growth in output nor the apparent declines in plants and employment should be interpreted as consistent trends. From 1983-86, the reported number of plants and employees was relatively constant, while processed product values increased. All activity measures exhibited significant declines in 1989 and have rebounded in the subsequent three years (Exhibit 5-4).

Exhibit 5-4: Changes in Number of Processing Plants, Employment, and Value, New Jersey 1983-1992.

	Number of Plants	Employment	Average Employee/Plant	$ Value
1983	28	1,051	37.5	63.5M
1986	27	1,052	39.0	86.2M
1989	15	638	42.5	60.0M
1992	18	791	44.0	89.6M

Source: NMFS Processor Files

In this timeframe, New Jersey fared slightly better than the region as a whole. The Mid-Atlantic region exhibited the greatest rate of decline in the nation between 1982 and 1992, with respect to both the number of plants and the total average employment in processing of marine products (edible and nonedible). The rates of decline in the Mid-Atlantic states were: 41% for plants (from 290 to 169) and 38% for employment (from 9,973 to 6,156). New Jersey fared slightly better than the region as a whole, with declines of 38% and 25%, respectively.

Over the period, the U.S. as a whole exhibited a 9% increase in number of plants and a 22% loss in employment. However, these changes were not uniform by region. Most of the reported growth was in Alaska (109% increase in plants

and 46% increase in employment). Plant increases between these years (in addition to Alaska) were reported for the Pacific Coast (31%), Gulf Coast (12%) and Hawaii/Puerto Rico/ Pacific Possessions (250% , but starting from a very small base, growing from 8 to 28 plants).

In addition to the Mid-Atlantic, regions with reported declines were: South Atlantic (-33% plants, -13% employment) and the Inland states (-33% plants, -26% employment). Employment decline occurred in all regions with the exception of Alaska (+46%) and the Islands (Hawaii, Puerto Rico, et al. +16%). After the Mid-Atlantic, the largest percentage declines in employment were in the Inland region (-26%), the New England region (-22%) and the South Atlantic region (-13%).

In terms of employment per plant, the Mid-Atlantic Region, and especially New Jersey, outpaced the rest of the nation. The national figures showed an overall decline of 13% , in contrast to a 6% increase in the Mid-Atlantic region and 20% increase in New Jersey. This ratio grew by 31% in the South Atlantic and 10% in the Inland region. It appears that most of the new plants were relatively small and that New Jersey (and the South Atlantic states) retained most of their larger plants.

Plant Type and Product Form, 1983-1992

There has been significant change in the types of plants processing edible seafood since 1983 (Compare Exhibit 5-5 with Exhibit 5-2). The reported decline in seafood processing plants in New Jersey reflects an apparent loss of 16 plants between 1983-92 and the addition of 6 new plants during the period; a net loss of 10 plants. In addition, a few plants were opened or closed sporadically during these years.

Exhibit 5-5: New Jersey Seafood Processors, by Primary Processing Method, Number of Plants and Number of Employees, 1983

Type	Number of Plants	Number of Employees
Oyster Shuckers	10	166
Shellfish Canners	6	513
Ocean Clam Shuckers	4	145
Gefilte Fish Processors	3	78
Finfish Filleting	2	149
Frozen Shellfish	1	
Smoked Eels	1	
Pet Food	1	

Source: NMFS Processor Files

The activity can be summarized as follows:

- 6 oyster shuckers closed during the decade, primarily between 1987-89, as New Jersey oyster landings continued to decline because of severe outbreaks of disease on the Delaware Bay oyster beds. In addition, 2 plants closed temporarily during the mid-1980s but had reopened by 1992, and 1 plant switched from oysters to surf clam shucking by 1989. As of 1992 the 3 remaining oyster plants are all shucking products trucked from out-of-state.
- 2 of the 3 gefilte fish processors, the 1 eel smoker and the 1 pet food manufacturer active in 1982 had closed (or ceased to report) by the mid-1980s.
- 2 shellfish canneries closed in the early 1990s, as did 3 ocean clam shuckers in the mid-1980s. One shucking plant switched to canning in 1992. (Note that there have been further closures since 1992).
- The 6 new (since 1982) plants consist of 3 relatively small hard clam shuckers, 2 large processors of frozen prepared fin and shellfish products and 1 mid-sized finfish filleter.

Thus, the major shifts in New Jersey processing over the past decade include: a shift in the oyster industry (as discussed above), the emergence of activity in frozen prepared products and a decline in independent ocean clam shuckers. For economic and product control reasons, several of the larger canners

have shifted from reliance on separate, independent shucking plants to in-house operations.

In the value and share of seafood processing over the past 10 years. The only clear trend is the rise in frozen product; otherwise the picture is one of fluctuating value and importance of particular product types.

Processing by Major Species, 1983-1992

Ocean clams were the most valuable species for processors in 1983. Fresh and canned product accounted for over $38 million ($27 million in canned product and $11 million in shucked meats). This represents just over 60% of the total processing value in that year (somewhat less than the 70% share for these species in 1992).

What has changed over the past decade is the mix between surf clams and ocean quahogs. In 1983, ocean quahogs accounted for 34% of total value and surf clams for 27%. By 1992, processed surf clams represented 61% of annual value and ocean quahogs only 8 percent. This is in spite of the fact that landings of both species grew at almost the same rate over the period. Apparently, most of the ocean quahogs landed in New Jersey are now being shipped outside the state for shucking and processing. The shift in balance between the two species had begun by 1986 and by 1989, surf clams had achieved a clearly dominant position.

In 1983, "unclassified" finfish accounted for almost $14 million of output value (22%) primarily because of use in gefilte fish and pet food operations. The bulk of the species used in gefilte fish (pike, carp, whitefish, etc.) are shipped into the state for processing and not landed in New Jersey.

Despite the number of oyster shuckers operating in 1983, (over one-third of the New Jersey plants in the NMFS database), oysters represented only 8% of that year's processing value, split almost evenly between shucked meats and canned oyster stew. The remainder of processed value (9%) reflected finfish filleting and canning of other shellfish species (conch, turtle, shrimp, lobster, etc.).

Price Performance, 1983 versus 1992

Output price per pound for individual products was compared for 1983 and 1992 to determine increases in value relative to the Producer Price Index (PPI) for Finfished Food Products. Over the period in question, the PPI rose by 1.23. Prices would have to increase by this factor merely to keep pace with inflation.

This analysis is valid for raw meats and fillets and for processed products, as long as portion sizes, formulations and ingredients are not changed significantly. The results can be summarized as follows:

- Species/Products Which Outpaced Inflation
  (Factor = 1.42-1.62)
  - Summer flounder fillets
  - Minced canned ocean quahogs
  - Blue fish fillets
  - Shucked raw oyster meats
- Species/Products Somewhat Below PPI
  (Factor = 1.00 - 1.20)
  - Surf clam raw meats
  - Sliced canned conch
  - Squid meats, canned
  - Surf clam juice
- Species/Products Substantially Below PPI
  (Factor = 0.59 - 0.93)
  - Canned minced surf clams
  - Gefilte fish
  - Canned surf clam chowder
  - Canned surf clams in sauce

It must again be emphasized that the preceding description of processing activity is limited to operations which participate in the NMFS voluntary reporting program and, therefore, provides an incomplete picture of statewide activity. We have assumed that additions to the roster of firms represent new start-ups and deletions reflect firms going out of business. This may not be true in all cases.

The most recent data base available is now eighteen months old. Since 1992, at least one large ocean clam cannery has ceased shucking operation, although its new owner is still processing. In addition, one other large cannery has indicated that it might have to curtail operations because of its inability to resolve issues relating to handling of its discharge wastes.

Processor Perceptions of Growth Opportunities and Constraints

A 1988 study of New Jersey seafood processors[11] included two surveys: (1) a survey of 19 plants in existence for less than 5 years to determine the factors most influential in deciding to locate in New Jersey and (2) a survey of 29 older plants to identify changes in plant size and the reasons for such changes, obstacles to expansion in New Jersey and perceived advantages or disadvantages of New Jersey as a site for seafood processing operations. The results are summarized below:

Survey #1 - Ten most important factors in choosing New Jersey as a plant site:

1. Availability of an existing plant facility
2. Availability of raw seafood supplies
3. Availability of labor (supply)
4. Already reside or do business in state
5. Proximity to markets
6. Availability of waste treatment/disposal facilities
7. Labor productivity and work ethic
8. Attractive place to live
9. Proximity to ports
10. Land costs

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[11]Lopez, R, and N. Henderson. 1988. "Impediments to Increased Agricultural and Seafood Processing in New Jersey", Department of Agricultural Economics and Marketing, Rutgers the State University, Agricultural Experiment Station.

Survey #2 - Change in Processing Capacity/Volume During Prior Five Years:

Expanded	59%
Constant	14%
Contracted	28%

Ranking of reasons for expansion:

1. Increased demand for plant's output
2. Developed new markets
3. Avoid higher costs involved in relocation
4. Lower transportation costs at this location
5. Development and tax incentives in New Jersey
6. Increased availability of seafood products in New Jersey
7. Economies of scale

Perceived obstacles to expansion in New Jersey:

1. High insurance costs (worker's compensation and unemployment insurance)[12]
2. Difficulty in complying with environmental regulations
3. Shortage of workers
4. Costs of complying with environmental regulations
5. Lack of state development incentives
6. Image of the state
7. Shortage of seafood products
8. High land costs
9. Local zoning laws
10. Land use restrictions

The concluding table summarizes seafood processors' views, in 1988, of the relative advantages and disadvantages of New Jersey for their businesses.

Perceptions of New Jersey versus other states as site for location/operation:[13]

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[12]This perception is not consistent with the facts. In 1988, New Jersey was second lowest in the Mid-Atlantic region in average employer U. I. contribution and lowest in worker's compensation rates.

[13]Lopez, R, and N. Henderson. 1988. Cited above.

New Jersey Advantages		New Jersey Disadvantages	
1.	Proximity to markets	1.	Insurance costs/availability (see above)
2.	Proximity to ports	2.	Unavailability of labor
3.	Availability of raw products	3.	Strictness of solid waste regulation
4.	Quality of raw products	4.	Insufficient availability of raw seafood products
5.	Image of state	5.	Utility costs
6.	Lower cost of truck/railroad service	6.	Local property taxes
7.	Availability of labor	7.	Cost of compliance with environmental regulations
8.	Strictness of water/pollution regulations	8.	Image of state
9.	Unionization of labor	9.	Inadequate state development incentives
10.	Wage rate	10.	Difficulties/slowness of state response re: environmental compliance

CHAPTER VI: MARINE RECREATIONAL FISHING

Summary

NMFS data on saltwater angling are available for the region and in part for the state. The NMFS survey shows a consistent decline in marine angling trips since 1983. However, the average catch per trip has remained roughly constant, averaging between 5.2 and 6.8 fish per trip.

Findings about catches over the past decade include the following:

- *The overall catch in the Mid-Atlantic region has fluctuated over a wide range, but the 1993 catch total is less than 50% of the 1983 total.*
- *Species diversity as measured by the percentage of "other" species increased in 1989 and has stayed constant through 1993.*
- *The fluke catch has rebounded from a very low level in 1989; while the 1993 catch again yields the highest share, the number of fish caught are less than 50% of the 1983 level.*
- *The croaker catch has fluctuated, but in recent years its share of the region's recreational catch has increased.*
- *Black sea bass catches declined after their 1986 peak but have maintained a relatively constant share since then.*
- *Spot, bluefish, scup, winter flounder and weakfish each have declined in numbers and shares in recent years.*
- *Decline in total catch numbers appears to be a function of the number of angler trips each year.*

An attempt was made to directly compare recreational and commercial landings of species favored by marine saltwater anglers. The results, for 1991, suggest that the recreational fishery takes more fish by weight than does the commercial fishery for four of the top five marine angler species: fluke, bluefish, tautog, and black sea bass. The only exception in the top five in 1991 was Atlantic mackerel.

Data analyzed by the Sports Fishing Institute for 1991 indicated that 745,600 anglers (over the age of 16) participated in marine angling, making 5.76 million trips. Based on survey responses, saltwater angling yielded a total direct expenditure of $417.2 million which converts into an annual average of $560 per participant and $72 per trip.

Largely because of decline in the number of angling trips, total direct expenditures in 1993 are estimated to be $321.3 million, down 23% from 1991.

There are two primary sources of data on recreational fishing in the U.S. available for this study. The NMFS carries out the Marine Recreational Fishery Statistical Survey (MRFSS). The U.S. Fish & Wildlife Service (F&WS) carries out the National Survey of Fishing, Hunting and Wildlife Associated Recreation.

The NMFS data, compiled annually and with estimates reported by region, focus only on marine (as opposed to freshwater) angling. It excludes recreational harvest of species which are exclusively estuarine or in state waters, e.g., hard clams and blue crabs. Data are derived from both angler intercepts and random telephone interviews. The F&WS survey was conducted by random telephone interviews on all forms of outdoor recreation, but reports saltwater angling as a distinct category. Because of differences in methodology, criteria, content and focus, the two surveys are not directly comparable. This section summarizes both surveys and provides a composite of their findings.

Regional Activity and Trends

The 1993 NMFS survey results reveal the following picture of Mid-Atlantic marine angling activity. The region had 2.38 million anglers who made a total of 11.7 million trips during the year; an overall average of 4.9 trips per angler. Analysis of trips by participants' residence location indicates that anglers living closer to the coast (within 25 miles) are more likely to fish and make a greater number of trips than those living farther inland or out-of-state.

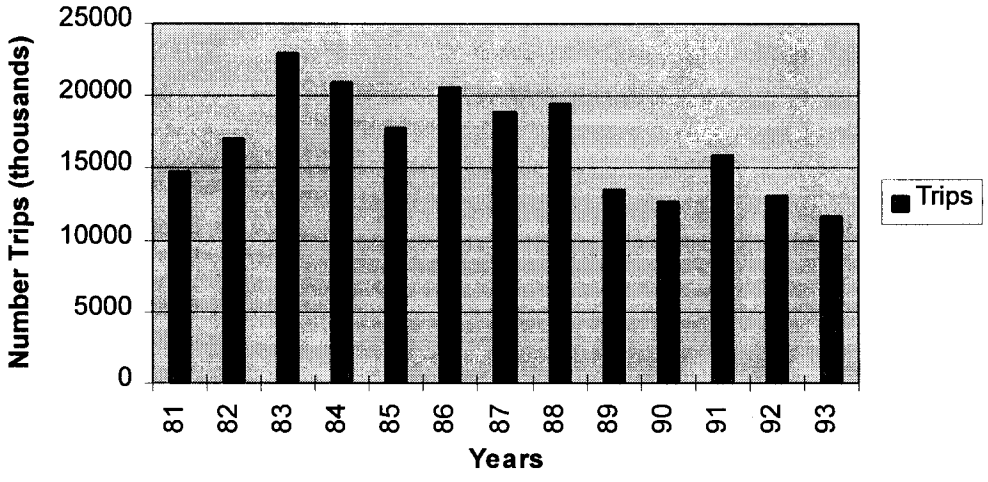
Exhibit 6-1: Participation in Saltwater Angling by Area of Residence, Mid-Atlantic Region, 1993.

	Coastal Residents	Non-Coastal Residents	Out-of-State Residents
Number of Participants (x000)	1,550	60	773
Percent of Participants	65%	3%	32%
Number of Trips (x000)	9,390	221	2,120
Percent Trips	80%	2%	18%
Trips Per Participant	6.1	3.7	2.9

Source: NMFS Marine Recreational Fishery Statistical Survey (MRFSS), 1993.

Annual marine angling trips in the Mid-Atlantic region have declined fairly steadily since 1983. During this period, the proportions by locale and other activity patterns have remained relatively constant. Coastal residents (those living within 25 miles of the shore) reflect a slight increase in share. Between 1981 and 1986, they represented between 71% and 76% of annual trips. These proportions rose slightly in subsequent years, ranging between 75% and 78% in 1987 to 1992). This increase in share reflects a corresponding decrease to trip share by out-of-state residents (22% to 27% of annual trips from 1981 through 1986; 19% to 22% in

Exhibit 6-2: Marine Angler Trips
Mid-Atlantic Region, 1981-1993



1987-1992. This decline may have been the result of changing economic conditions and tourism activity. Inland residents have consistently recorded only 2-3% of trips.

Since 1986, when marine recreational catch and activity were first reported by mode of fishing, the distribution of trips by mode remained relatively constant in spite of fluctuations and declines in the total number of annual trips. In each year, 27% to 32% of the marine trips involved fishing from shore (beaches, banks, pier, jetties, bridges). Angling from private or rental boats accounted for between 54% and 62% of each year's activity.

The remainder of the trips were made on party/charter boats. These showed the greatest share fluctuations from year to year. From 1986 to 1990, this mode accounted for 11-15% of the region's annual trips, but its share dropped to 6% in 1991 and 9% in 1992 before rebounding to 14% in 1993 (Exhibit 6-3).

Despite fluctuation and decline in the number of marine angler trips in the region, the average catch per trip has remained relatively constant. In almost all years since 1981, the annual average catch has ranged between 5.2 and 6.8 fish per trip. The peak years were 1986 (8.0 fish per trip) and 1991 (8.2 fish per trip).

In 1991 (the last year for which this kind of breakdown is available), party boat trips were the most productive, and shore based trips yielded the fewest fish per trip.

Exhibit 6-3: Marine Angler Trips, Party and Charter Boats, Mid-Atlantic Region, 1986-1993

Year	Number of Trips (x000)
1986	2,805
1987	2,132
1988	2,147
1989	2,011
1990	1,592
1991	960
1992	1,132
1993	1,665

Exhibit 6-4: Average Fish Per Trip, by Fishing Mode, Mid-Atlantic Region, 1991

Mode	Average Fish Per Trip	% Trips With No Fish	% Trips With 1-5 Fish	% Trips With 6 or More Fish
Party/Charter Boat	10.2	11%	42%	46%
Private/Rental Boat	6.8	25%	40%	35%
Shore	3.8	54%	27%	19%

The two leading species targeted (not necessarily caught) by marine anglers in the Mid-Atlantic region in 1991 were fluke (23%) and bluefish (16%). Other important targeted species, with percentages ranging from 9% to 2%, were striped bass, winter flounder, tautog, weakfish, and scup, among other species. Fully 17% said they had no preference.

Regional Catch and Landings By Species

The annual numbers of marine fish caught by anglers in the Mid-Atlantic in the period 1983 to 1993 are shown in Exhibit 6-5 These data can be summarized as follows:

- The overall catch in the region has fluctuated over a wide range, but the 1993 catch total is less than 50% of the 1983 total.

- Species diversity as measured by the percentage of "other" species increased in 1989 and has stayed constant through 1993.

- The fluke catch has rebounded from a very low level in 1989 and, while the 1993 catch again yields the highest share, the number of fish caught are less than 50% of the 1983 level.

- The croaker catch has fluctuated but in recent years, its share of the region's recreational catch has increased.

- Black sea bass catches declined since their 1986 peak but have maintained a relatively constant share since then.

- Spot, bluefish, scup, winter flounder and weakfish each reflect declining numbers and shares in recent years.

The decline in total catch numbers appears to be a function of the number of angler trips each year. As noted above, the average number of fish caught per trip has remained within a narrow range in most years. This average peaked in 1986 and 1991, both years with high total catch numbers. The majority of the catch of each of the major marine species was from waters within three miles of shore (including bays and estuaries).

Exhibit 6-5: Number of Fish Caught By Mid-Atlantic Anglers - Species (x million) in Selected Years

	1993		1991		1989		1986		1983	
Species	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Fluke	16.0	22%	14.4	11%	2.2	3%	18.4	11%	36.9	25%
Croaker	9.9	14%	18.1	14%	4.6	6%	13.0	8%	7.1	5%
Black Sea Bass	6.8	9%	10.9	8%	8.2	11%	30.3	19%	8.0	5%
Spot	5.8	8%	22.6	17%	10.5	14%	15.7	10%	22.0	15%
Bluefish	3.5	5%	9.9	8%	12.7	17%	18.4	11%	18.8	13%
Scup	2.1	3%	6.4	5%	4.8	6%	10.7	7%	5.6	4%
Winter Flounder	2.0	3%	3.4	3%	4.1	5%	5.0	3%	11.4	8%
Weakfish	1.2	2%	2.1	2%	1.6	2%	11.1	7%	5.8	4%
Other	25.1	34%	41.7	32%	25.9	36%	41.1	24%	33.7	21%
Total	**72.4**	**100%**	**129.6**	**100%**	**74.6**	**100%**	**163.7**	**100%**	**149.3**	**100%**

Translating Catch Numbers Into Landings & Weight

The preceding discussion has dealt with recreational data in terms of number of fish caught. In order to compare recreational and commercial fisheries, it is necessary to convert numbers of fish caught into landings (excluding those released live) and to convert numbers landed into pounds. Since both the release rate and the typical weight per fish are species-specific, overall averages are inadequate for such analysis. The following discussion describes the analytic steps used to derive reasonable estimates of these values for the major species. The data used are from the 1991 MRFSS, the most recent disaggregated information available.

The MRFSS report provides data on the number of fish caught for each species, divided into four categories: total catch, catch retained and directly identifiable, catch retained but not directly identifiable (filleted, cut for bait, etc.), and catch released live. (Note: Identification by species, both in the preceding and subsequent discussions, is subject to some error, i.e., misidentification by either the interceptor/interviewer or the angler. It is assumed that such errors were minimal for the major, common species of interest.)

Using the total Mid-Atlantic recreational catch for each species and subtracting the number released, it is possible to estimate both the total number landed and the percentage of fish released live for each species. These data, provided in Exhibit 6-6, show a landed distribution by species which is very different from the catch distribution.

Exhibit 6-6: Number of Angler-Caught Fish: Catch Vs Landing Data by Selected Species, Mid-Atlantic Region, 1991 (x000)

Species	Total - Catch	Released = Live	Landings	% of Regional Landings	Release %
Total All Species	**129,617**	**71,959**	**57,658**	**100%**	**56%**
Spot	22,580	10,524	12,056	21%	47%
Bluefish	9,862	3,628	6,234	11%	37%
Croaker	18,065	12,600	5,465	9%	70%
Black Sea Bass	10,892	5,660	5,232	9%	52%
Scup	6,398	1,318	5,080	9%	21%
Fluke	14,413	10,553	3,860	7%	72%
Tautog	3,941	1,832	2,108	4%	47%
Winter Flounder	3,388	1,310	2,078	4%	39%
Weakfish	2,131	83	2,048	4%	4%
Atlantic Mackerel	1,988	82	1,906	3%	4%
Herring	2,332	591	1,741	3%	25%
Sea Robins	7,254	6,849	407	1%	94%
Cunner	2,000	1,854	146	*	93%
Sharks/ Rays/ Skate	1,815	1,681	134	*	93%

The release percentages range widely from 4% to 94%, averaging 56%. Releases are due to a number of factors including sportsmanship, perceived species edibility, size limits and bag limits. Thus, for example, species considered "undesirable" by most anglers, such as sea robins, cunner, dogfish and rays, all show extremely high release rates. Release rates for targeted, popular species such as fluke, black sea bass, etc. are a reflection of size and/or catch restrictions. Herrings are probably retained mostly for use as bait.

The proportion of live releases which survive varies from species to species and is also a function of their condition as release. No generalized data on survivability exist; one estimate for fluke (by a staff biologist at the Mid-Atlantic Fishery Management Council) places the survival rate of released fish at 75 percent.

From this same 1991 MRFSS data base, the subcategory of fish which were available for inspection and weighting (a total of 44,400 fish) was used to estimate the average weight per landed fish. This may result in some minor overestimation of average weight per landed fish (because the smaller fish are more likely to have been cut for bait or filleted to circumvent size restrictions), but the results are deemed adequate for the present analysis. Calculations yield the following average landed weight for each major species. The overall average across all species was 1.0 pound Exhibit 6-7.

Exhibit 6-7: Estimated Average Weight Per Landed Fish, 1991 MRFSS Fish Available for Inspection and Weighing

Species	Average Weight Per Fish (Lbs.)
Spot	0.3
Bluefish	2.4
Croaker	0.4
Black Sea Bass	0.9
Scup	0.6
Fluke	1.3
Tautog	2.4
Winter Flounder	0.9
Weakfish	1.2
Atlantic Mackerel	0.9
Herring	0.5
Sea Robin	0.7
Cunner	0.4
Sharks/Rays/ Skates	4.6

New Jersey Marine Angling

The 1991 MRFSS also provides limited data on New Jersey marine angling activity and catch. These are described below and used as the basis for the extrapolation of state data from regional statistics in the absence of direct state data.

The state's long and accessible coastline and its history and focus on recreational fishing and tourism have generated a heightened level of recreational fishing compared to the region as a whole. In 1991, New Jersey had 845,000 participants in marine angling (26% of the regional total) and a total of 5.33 million fishing trips (33% of the regional total). New Jersey accounted for a larger proportion of out-of-state participants and of trips by these visitors than the other states in the region and for a higher overall trip rate per angler than the rest of the Mid-Atlantic states.

Exhibit 6-8: New Jersey and Other Mid-Atlantic States, Percent Marine Angling Trips, 1991

	New Jersey	Other Mid-Atlantic States Combined
Out-of-state Participants	39%	30%
Trips by Out-of-state Visitors	23%	17%
Annual Trips Per Participant: Coastal Residents	7.9	5.4
Inland Residents	6.3	3.1
Out-of-state Residents	3.8	2.5
Overall	6.3	4.4

In 1991, the New Jersey marine recreational catch totaled 31.8 million fish, accounting for 25% of the Mid-Atlantic recreational catch. This yielded an average catch per trip of 6.0 fish, a level somewhat lower than the regional average of 8.2 fish per trip in that year. The species composition of the New Jersey catch is shown in Exhibit 6-9, together with each species share of the total New Jersey catch and of the regional catch of that species.

Exhibit 6-9 New Jersey Recreational Catch for Major Species, 1991

Species	No. of Fish (x000)	% of New Jersey Total Catch	% of Mid-Atlantic Total Catch of Species
Fluke	6,606	21%	46%
Sea Robins	5,242	16%	72%
Black Sea Bass	3,205	10%	29%
Bluefish	3,149	10%	32%
Tautog	1,629	5%	41%
Atlantic Mackerel	1,363	4%	69%
Cunner	1,319	4%	66%
Winter Flounder	1,243	4%	37%
Sharks/ Skates/Rays	906	3%	50%
Scup	819	2%	13%
Weakfish	715	2%	34%
Mullet	637	2%	98%
Herring	494	2%	21%
Spot	184	1%	1%

Note: All figures are for recreational catches.

Release Rates

The MRFSS data includes information on both catch and landings --by number of fish-- for the Mid-Atlantic and for individual states. The difference between catch and landings is the number of fish released once caught, the basis for estimating release rates by species.

The 1991 release rates for New Jersey's catch are similar to the regional rates for most species (Exhibit 6-10) The major differences reflect differences in such factors as state and regional (for catch within three miles of shore), coastal variations in fish size, anglers' expectations and/or preferences, and perceptions of enforcement effort (i.e., the likelihood of being caught with excess or undersized catch).

The 1991 statewide average release rate across all species was 59 percent, slightly higher than the comparable regional rate of 56% (Exhibit 6-9). The New Jersey release rate for each species was used to calculate the number of fish retained (landed) for each species.

Other than the species with very high release rates (sea robins, cunner and sharks/skate/rays), the species distribution of landings is not drastically different. The top six species are the same, but in a slightly different order, with fluke having the largest share of both New Jersey catch and landings (Exhibit 6-11).

Exhibit 6-10: Species With Significant Differences in Release Rate, New Jersey and Mid-Atlantic Region

Species	New Jersey	Mid-Atlantic
Fluke	57%	47%
Bluefish	46%	37%
Tautog	39%	47%
Winter Flounder	48%	39%
Weakfish	30%	4%
Herring	3%	25%

Exhibit 6-11: Recreational Landings for Major Species, by Number of Fish, 1991, as Percent of Total New Jersey Total Recreational Landings and Mid-Atlantic Recreational Landings for Species

Species	No. of Fish (x000)	% of New Jersey Total Recr. Landings	% of Mid-Atlantic Landings of Species
Fluke	2,854	22%	51%
Bluefish	1,713	13%	27%
Black Sea Bass	1,507	12%	29%
Atlantic Mackerel	1,326	10%	70%
Tautog	990	8%	47%
Winter Flounder	651	5%	31%
Mullet	636	5%	99%
Scup	626	5%	12%
Weakfish	497	4$	33%
Herring	477	4%	27%
Sea Robins	160	1%	39%
Cunner	109	1%	75%
Spot	88	1%	1%
Sharks/Rays/Skates	40	*	30%

Comparison of New Jersey Recreational and Commercial Landings

Exhibit 6-12: Comparison of Estimated Recreational Landings and Commercial Landings, by Weight and for Selected Species, New Jersey, 1991

Species	New Jersey Recreational Landings, 1991 (Estimated Lbs. x000)	New Jersey Commercial Landings, 1991 (Lbs. x000)
Bluefish	4,111	2,448
Fluke	3,710	2,341
Tautog	2,376	93
Black Sea Bass	1,356	1,034
Atlantic Mackerel	1,193	18,549
Weakfish	596	1,174
Winter Flounder	586	258
Scup	376	4,320
Herring	239	809
Sharks/Skates/Rays	184	4,000

Comparing recreational and commercial landings requires the use of landed weight. The MRFSS data for New Jersey are, however, only for numbers of fish. The 1991 average weight per fish by species for the Mid-Atlantic recreational landings (without adjusting for release) were applied to the New Jersey fish landings to arrive at an estimate of angler-landed poundage for each species. It is assumed that the average weight per species landed in New Jersey is approximately equal to the regional values. The results are with the 1991 New Jersey commercial landings of each species (Exhibit 6-12).

Such comparison of recreational and commercial New Jersey 1991 poundages indicates that landings of four of the top five marine angler species -- fluke, bluefish, tautog, and black sea bass --exceeded the commercial landings for that species. Ony mackerel, scup, sharks and, to a lesser extent, weakfish and herring were dominated by commercial activity. These data are for landings; comparable data for actual catches might alter these proportions. However, data on commercial at sea discards are not available.

The F&WS Survey of Marine Angling in New Jersey

The U.S. F&WS carries out the National Survey of Fishing, Hunting and Wildlife Associated Recreation. The 1991 survey reported 745,600 saltwater anglers active in New Jersey in that year. These anglers reported 5,757,600 trips, an average of 7.7 trips per angler.

The number of marine anglers is somewhat lower than that reported for New Jersey in the 1991 MRFSS (845,000). A part of this difference is due to the fact that the MRFSS included anglers of all ages, while the F&WS sample covers only those aged 16 or older. Since those under 16 years old accounted for some 7% of the MRFSS, adjustments for this differential in sample composition narrows the gap between the two surveys to "only" 40,000 anglers, a relatively small difference (5%) for two totally independent samples and surveys.

The difference in New Jersey annual marine angling trips between the two surveys is somewhat larger: 5.76 million trips (F&WS) versus 5.33 million trips (MRFSS). The largest discrepancy between the two surveys is in the annual average number of trips per marine angler; 7.7 trips (F&WS) versus 6.3 (MRFSS). It may be due to differences in definition, interpretation, sampling error, or other factors. The suggested compromise estimate of 1991 trips/angler, reflecting both surveys, is 7.0.

Marine Angling Expenditures in New Jersey

The Sports Fishing Institute,[14] using data from the 1991 F&WS survey, calculated the expenditures of saltwater anglers in New Jersey. As noted, the survey data indicated that 745,600 anglers (over the age of 16) participated in marine angling, making 5.76 million trips. Based on survey responses, saltwater angling yielded a total direct expenditure of $417.2 million which converts into an annual average of $560 per participant and $72 per trip.

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[14] Fedler, A. J. and D. M. Nickum. "The 1991 Economic Impact of Sport Fishing in New Jersey," Sports Fishing Institute, Washington, D.C. 1991.

The 1991 MRFSS survey data indicated that New Jersey-based angling trips accounted for 33.5% of regional trips and that the split by place of residence was 75% coastal residents, 1% inland residents, and 24% out-of-state. Data on the split by fishing mode and by mode versus residence are available for the region but not by state (Exhibit 6-13). Out-of-state residents were somewhat more likely than

Exhibit 6-13: Fishing Mode by Place of Residence, Mid-Atlantic, 1991

Fishing Mode	Coastal Residents	Inland Residents	Out-of-State Residents	Total
Shore	34%	28%	27%	32%
Party/Charter Boat`	5%	5%	10%	6%
Private/Rental Boat	61%	67%	63%	62%

others to use charter or party boats (10% versus 5% for coastal or inland residents). All tended to rely mostly on private or rental boats.

New Jersey had a higher percentage of out-of-state residents than did other states in the Mid-Atlantic region, and these anglers reported twice the percentage of party/charter boat trips than coastal or inland residents.

Applying these share differentials, it is estimated that the 1991 New Jersey distribution by mode of fishing was:

	% Trips	No. Trips (million)
Shore	28%	1.63
Party/Charter Boat	11%	0.63
Private/Rental	60%	3.50
Total:	100%	5.76

Exhibit 6-14 shows the best estimate of 1991 total expenditures (out-of-pocket expenses and the amortized costs of boat purchase, operation, maintenance and storage, fishing equipment, accessories, licenses, etc.) per trip and annually by mode of fishing. The data on number of trips are those estimated above. Expenditures by mode of fishing were derived from the Sport Fishing Institute figure of $417.2 million per year expended for marine recreational fishing.

Exhibit 6-14: Angling Trips, Average Expenditure Per Trip, Annual Expenditures, by Mode of Fishing, New Jersey, 1991

Mode	No. Trips (millions)	$ Average/ Trip	Annual $ (millions)	% Total
Shore	1.63	$30	$48.9	12%
Party/Charter Boats	0.63	$57	$35.8	9%
Private/Rental Boats	3.50	$95	$332.5	80%
			$417.2	

The preceding analysis was for 1991. Although similarly detailed data for 1993 are not yet available, it is possible to estimate the 1993 expenditures based on the regional data that are provided. The NMFS data for Mid-Atlantic marine angling show the following differences between 1991 and 1993:

- the regional total of marine recreational fishing trips dropped from 15.90 to 11.73 million (a decline of 26.2 percent);
- the number of participants also dropped by 26% (from 3.22 million to 2.38 million);
- the regional split of angler trips by place of residence did not change significantly; and
- the regional split of trips by mode showed an increase in party/charter boat trips (from 6% in 1991 to 14% in 1993), with a corresponding decline in private/rental boat trips (from 62% to 54% in 1993).

Applying these changes to the methodology used for the 1991 expenditure estimate, and using a 6% inflation rate for 1991 to 1993, trip expenses, yields an estimate of 1993 New Jersey marine angling expenditures [15] totalling about $321.3 million (Exhibit 6-15). This was a significant decline from 1991, largely due to fewer trips. However, the catch per trip had not changed.

Exhibit 6-15: New Jersey Marine Angling Expenditures Estimated for 1993

Mode	Share	Trips (millions)	Average $ Per Trip	Total $ (millions)	% of Total $
Shore	27%	1.15	$32	$36.8	12%
Party/Charter Boats	20%	0.85	$62	$52.7	16%
Private/Rental Boats	53%	2.25	$103	$231.8	72%
Total		4.25	($76)	$321.3	100%

[15] Private boat per-trip expenses have also been increased (by $9 per trip) to account for the fixed expenses of boat ownership --purchase, storage, etc.-- which increase on a per trip basis when amortized over a smaller number of trips.

CHAPTER VII: IMPORTS/EXPORTS OF FISHERY PRODUCTS

Summary

For the nation as a whole, there has been a major increase in both imports and exports over the past decade and a decline in the trade deficit for fish products. The Port of New York/New Jersey has seen an increase in the value of exports and a decline in the value of imports.

With certain assumptions, it is possible to extrapolate New Jersey imports and exports from available data on Port of New York/New Jersey activity. The assumptions are that the substantial majority of New Jersey fisheries' shipments go through the Port of New York/New Jersey, and that New Jersey accounts for some 30% of the port's fishery exports and imports. If those assumptions are valid, an estimated $69 million of fishery exports originated in New Jersey in 1993, and $211 million of imports were destined for New Jersey processors, wholesalers and retailers that year.

In the past five years (1989-1993), the Port of New York/New Jersey has experienced a significant rise in exports (164% export value) and decline in imports (8% import value). The value of exports handled in the port has been about 3% and the value of imports has been about 6.8% of the national value of exports and imports respectively.

Although shrimp remains the dominant species imported through the Port of New York/New Jersey, it has declined in total share. Shrimp imports largely account for the importance of the continents of South America and Asia as the sources of imports: together those two continents represented about three-quarters of the value of fishery imports in 1993. The largest percentage increases in imports through the Port of New York/New Jersey were for fishery products from South America and Africa; percentage declines in import values were experienced by products from Europe, Central America and the Caribbean, Asia, and the Pacific Region.

Export shipments of U.S. fishery products through the Port of New York/New Jersey over the 1989-1993 period have increased to all continents except the Australia/Pacific Island region. During this period, fishery exports to Europe and Asia have dominated port shipments consistently, together accounting for 96 to 98% of the port's fishery exports. Specific identifiable species which accounted for the bulk of this growth were sea urchins (600% increase by value), lobster

(200%), dogfish (400%), and butterfish (200%). Together, expansion of exports of these four species accounted for just over 50% of the total increase in exports.

A focus on 15 selected species and 25 selected countries provides more detailed analysis of export potential for New Jersey fisheries. Port of New York/New Jersey exports to Japan, the top market for fisheries products, have doubled over the past 5 years, and sea urchins, primarily from Maine, made up about half of the value of 1993 shipments to Japan (reflecting price increase for sea urchins). Shipments of tunas and lobster are important but have remained roughly the same; butterfish increased greatly in 1993.

Four European countries --France, Italy, United Kingdom, and Spain -- followed Japan in importance to exports. France has been particularly important (17% of all shipments), and there has been a steady major increase in export values of lobster and squids, as well as recent, but not sustained, increases in exports of dogfish and scallops. Lobsters, squid, and dogfish were also important contributors to rising exports to Italy and Spain, and dogfish, plus clams, were among the species being exported to the United Kingdom. Germany, Portugal, and the Netherlands are in the top 25 countries for Port of New York/New Jersey exports, but are relatively minor markets for the 15 selected species.

South Korea and Hong Kong are also relatively minor destinations for the 15 selected species, albeit in the top 25 markets for exports overall. Eels, herring, and lobsters were important for South Korea; increase in exports to South Korea is mostly in fish products that come from outside the North Atlantic but are shipped through the Port of New York/New Jersey. Lobster, scallops, roe, and squid were among the exports going to Hong Kong, mostly for trans-shipment to China. This market has increased steadily, and 1993 saw many new products.

National Imports and Exports of Fish and Seafood Products

For the nation as a whole, there has been a major increase in both imports and exports over the past decade and a decline in the trade deficit for fish products. In 1993, total U.S. imports of fishery products (edible and nonedible) were valued at a record $10.62 billion, an 80% increase from the 1984 level of $5.88 billion. Total exports in 1993 were $6.93 billion, only 65% of the value of the imports. However, exports too had increased, and at a higher rate than imports. Exports were at $1.0 billion in 1984, but increased by almost 600% through 1993. Between 1989 and 1993 the average annual trade deficit was $3.42 billion, considerably less than the average annual trade deficit of $6.06 billion over the 1984-1988 period.

Over the past five years, the split between edible and nonedible fish products has been relatively constant: 44-49% of exports and 55-60% of imports have been edible seafood. Edible products have grown at a slower rate than industrial products since 1989: imports 6% versus 16% for industrial and exports 31% versus 49% for industrial.

Port of New York/New Jersey Imports and Exports - Overall

The U.S. Department of Commerce does not keep import/export data for the separate states. It maintains foreign trade statistics by port, by product category, with no record of specific domestic origins or destinations of shipments or receipts. Consequently, foreign trade data on fishery product movements through the Port of New York/New Jersey were analyzed to estimate activity and assess opportunities for the New Jersey commercial fishing industry.

In this report it is assumed that the substantial majority of New Jersey's fisheries export shipments and imported receipts move through the Port of New York/New Jersey. It is also assumed that New Jersey accounts for some 30% of the port's fishery exports and imports. Obviously, this percentage will vary by product type and country of origin/destination, but the available data do not permit discrimination of such details.

The Port of New York/New Jersey recorded $702.9 million of imports and $230.6 million of exports in total fishery products in 1993. These values reflect a 164% increase in export value and 8% decline in import value since 1989. (1989 values were $87.4 million in exports and $763 million in imports.)

The Port of New York/New Jersey has recorded 5.2-5.8% of the poundage and 2.8-3.3% of the value of national fishery exports in the past three years. For imports, the comparable share has ranged from 9.1-9.9% of poundage and 6.6-6.9% of value.

The port's average values per pound, for both exports and imports, are substantially below the national average due to difference in product mix; $2./lb. for exports and $2.60/lb. for imports versus $3.49 and $3.60, respectively, for the U.S.

Applying the assumption that New Jersey's share of port activity is 30% yields a 1993 estimate of $69 million of fishery exports originating in New Jersey and $211 million of imports destined for New Jersey processors, wholesalers and retailers.

Even if this estimated share is not precise, the U.S. Department of Commerce breakdown of imports and exports by continent, country and species for the Port of New York/New Jersey provides insight into potential New Jersey opportunities for domestic product to substitute for imports and for export markets.

Port of New York/New Jersey - Imports by Continent

Most of the imports into the Port of New York/New Jersey in 1993 came from South America (39%) and Asia and the Mid-East (38%) (Exhibit 7-1). The value share by continents has not changed in recent years. Between 1989 and 1993, Asia was the origin of 36-39% of annual imports. Product share from South America grew slightly from 33% in 1989 to 38-39% annually in 1991-93. The Central American/Caribbean share dropped somewhat from 10% in 1989 to 7% in 1993. Europe's relative share also has declined from 16% in 1989 to 9% in 1993, and Africa's grew from 1% to 4%.

Exhibit 7-1: Value of Port of New York/New Jersey Imports by Continent of Origin, 1993

Continent	Value (million $)	% of Total	1993 $ ÷ 1989 $
North America (Canada, Greenland)	$ 4.74	1%	1.15
Central America (Incl. Mexico) and Caribbean	52.04	7%	0.70
South America	274.96	39%	1.10
Europe	64.58	9%	0.52
Asia and Mid-East	263.85	38%	0.92
Pacific (Australia and Pacific Islands)	17.35	2%	0.84
Africa	25.39	4%	6.35
	$702.92		0.92

In absolute value terms, total import values declined from their 1989 level of $762.9 million (with a five-year low of $655.3 million in 1991, and a slight recovery in the subsequent two years). Imports from Africa and South America increased over the five year period (from $4.0 million to $25.4 million for Africa and from $248.9 million to $275 million for South America). Europe experienced the biggest decline (48%) as a source of imports to the Port of New York/New Jersey from $123.8 million in 1989 to $64.6 million in 1993. Central America's shipments to the port declined by 30% over the period. Imports from Asia and the Pacific region declined by 10-15%.

Shrimp, mostly frozen, are the primary imported species, with a total 1993 value of almost $370 million (53% of total port imports). Almost all of the shrimp comes from South America ($201 million), Asia ($132 million) and Central America ($32.7 million).

The highest value species or products (that can be identified) from each continent in 1993 were:

North America (Canada and Greenland)
Dried and salted fillets of cod and other groundfish

Central America
Shrimp, rock lobsters, crawfish, groundfish, fish meal, tunas, swordfish and shark fins

South America
Shrimp, rock lobster, salmon, fillets of unspecified fish, tunas, crabs, crawfish, swordfish, mackerel and scallops

Europe
Fresh, frozen and smoked salmon, canned fish (salmon, herring, sardines and tuna), unspecified frozen groundfish, caviar, herring, rock lobster, flounder and tunas

Asia
Shrimp, tunas, sea urchins, frozen fish cakes and sticks, fresh and frozen fillets (unspecified species), frozen blocks (unspecified), scallops, oysters, mackerel and roe

Pacific
Frozen fish (unspecified), rock lobster, fish sticks, canned shellfish and scallops

Africa
Fish sticks, rock lobster, canned tunas and frozen (unspecified) fish

Port of New York/New Jersey - Exports by Continent, Country and Species

Export shipments of fishery products through the Port of New York/New Jersey over the 1989-1993 period have increased to all continents except the Australia/Pacific Island region. During this period, fishery exports to Europe and Asia have dominated port shipments consistently, together accounting for 96 to 98% of the port's exports. In 1993 Europe accounted for 49% and Asia and the Mid-East accounted for 48% of exports from the Port of New York/New Jersey (Exhibit 7-2).

Exhibit 7-2: Value of Port of New York/New Jersey Exports by Continent of Destination, 1989 & 1993

Continent of Destination	Value ($x1000) 1989	Value ($x1000) 1993	% of Total	1993$ ÷ 1989$
North America	63	546	*	8.6
Central America	2855	3998	2%	1.4
South America	245	775	*	3.2
Europe	29,212	113,608	49%	3.9
Asia/Mid-East	54,833	111,399	48%	2.0
Pacific/Australia	123	8	*	0.1
Africa	67	301	*	4.5
Total (Selected Countries; see text)		230,632.3		2.6

The port's fishery exports to Asia have doubled in recent years. Annual shipments to Asia increased each year in absolute value; however, total exports have increased at a higher rate. In 1989, Asia's share of the port total fisheries export value was 63%. It dropped to 46% in 1990, 36% in 1991 and 1992 and rose to 48% in 1993.

The decline in Asia's share was matched by increase in shipments to Europe. In 1989, Europe accounted for 33% of exports. This share increased to 51% in 1990, to 62% in 1991 and 61% in 1992, before dropping back to 49% in 1992. Export fishery shipments to Canada, Africa and South America, although still small, have increased substantially in recent years. The only loss has been in shipments to Australia/Pacific Islands.

Of the port's fishery exports which were identifiable by specific species, the dominant species, by value, were lobster, tuna (especially bluefin), sea urchins and squid (Exhibit 7-3). These species together accounted for over 50% of total value of shipments in 1993. They also accounted for 50% of the value increase from 1989 to 1993. Their composite share has remained at about 50% of the total value of fisheries exports through the port since 1989. This reflects an increasing species diversity of exports counterbalanced by a fourfold increase in sea urchin roe prices (from $1.85/lb. to $8.64/lb).

Exhibit 7-3: Value of Exports by Species, Selected Species, Port of New York/New Jersey, 1989-1993 ($x000)

Product	1989	1990	1991	1992	1993	93/89
Sea Urchins	7,000	10,800	16,200	24,200	50,700	7.2
Lobster	12,004	22,213	29,349	33,930	35,550	3.0
Squid	8,199	5,219	5,696	9,394	7,122	0.9
Tuna-Blue	11,375	15,063	10,084	10,127	11,424	1.0
Tuna-NSP	5,588	5,058	7,397	4,384	4,452	0.8
Tuna-Yellow	918	527	1,897	392	364	0.4
Roe	3,300	4,256	5,555	4,031	4,526	1.4
Dogfish	--	1,078	2,347	5,982	3,926	n.a.
Butterfish	2,261	1,842	1,863	3,115	6,388	2.8
Mackerel	56	181	3,669	69	207	3.7
Other Spp*	30,927	49,667	78,819	87,924	126,691	4.1

* Other Identified Species

The Port of New York's major export species by destination continent and by value, in 1993 are summarized below:

North America

Frozen cod

Central America

Rock lobster, unclassified frozen fillets, frozen crab, frozen fish meats, lobster, scallops, mackerel and squid

South America

Rock lobster, unclassified frozen fillets, frozen shrimp and squid

Europe

Lobster, fresh and frozen salmon, unclassified fresh groundfish and fillets, squid, frozen groundfish fillets and minced surimi, canned salmon and processed fishsticks and prepared seafood dinners

Asia

Sea urchins (live and roe), tunas (primarily bluefin), fresh and frozen flatfish, lobsters, frozen crab, shrimp and clams

Australia/Pacific

Canned sardines

Africa

Frozen squid

In order to assess export potential for New Jersey fisheries, 17 species and 25 countries were examined in further detail. The basis of selection included known importance of the species to current or potential New Jersey exports, and whether the countries apparently have current or potential export opportunities, as indicated by the New Jersey Department of Agriculture.

The species or products examined included the following, identified by the N.J. Department of Agriculture as of interest: bass, butterfish, clams and clam juice, conch, eels, flounder, hake, herring, lobster, mackerel, oyster, scallop, shark, squid, swordfish, tunas, and unspecified fish liver and roe. Sea urchins were also added because of their rising importance. The countries examined (of which 18 actually received port exports in 1993) accounted for 87% of the total 1993 value of port fishery shipments.

- Japan

Japan is by far the largest recipient of port fishery exports. It accounts for 83% of Asia's receipts from the Port of New York/New Jersey and 40% of the total shipments. The port's fishery exports to Japan have almost doubled over the past 5 years from $50.2 million in 1989 to $93.0 million in 1993.

The species with the highest total value in port exports to Japan is sea urchins (which come primarily from Maine). Fresh sea urchin roe and fresh live sea urchins together accounted for about 50% of 1993 port shipments to Japan. Sea urchin roe volumes fluctuated somewhat between 1989 and 1993, from a high of about 1.0 million pounds (1990) to a low of .6 million pounds in 1992. Prices have risen dramatically in recent years from $1.85/lb. in 1989-90 to $3.20/lb. in 1991, $5.78/lb. in 1992 and $8.64/lb. in 1993. This price increase has contributed to the recent growth in the sea urchin share of port shipments to Japan from about 20% in 1989 to 50% in 1993.

Other major shipments from the port to Japan in 1993 included: bluefin tuna (12.2%), unspecified tuna (4.4%), butterfish (6.9%) and lobster (6.8%). The 1993 values for each of these species have been essentially stable since 1989 thus producing a loss in share. The exception has been butterfish, 1993 value was double that of the prior year and almost three times the 1989-92 average.

- France

France is the second highest value destination for shipments from the port. Fishery exports to France accounted for $39.8 million: 17% of the total of such shipments and 35% of the total to Europe in 1993. Of the key species, the highest value were lobster, $10.5 million (26% of the country total) and dogfish, $1.8 million (4.4%). Roes, squid and tunas each accounted for $250,000 - $300,000.

The port's exports to France have grown steadily and substantially since 1989 from $9.6 million to $39.8 million. Of the key species, lobster has shown the greatest increase (from $2.2 to $10.5 million). Dogfish shipments to France in 1990 were $538,000. They peaked at $2.6 million in 1992 and then dropped off in 1993. Squid shipments were relatively stable until 1992 (1989-92 average of $102,000) then increased to $365,000 in 1993.

Tuna shipments to France have remained fairly constant since 1990. Scallop shipments hit a peak of $2.5 million in 1991 but virtually disappeared in 1993 ($3,000).

- Italy

Fishery exports to Italy in 1993 ($20.8 million) reflected 18% of exports to Europe and 9% of total port exports. The key species were lobsters with $13.8 million (67%) and squid with $4.1 million (20%). Shipments also included $362,500 in dogfish.

Fishery shipments to Italy have risen sharply from $7.7 million in 1989, reaching a peak of $28.6 million in 1992 before declining last year. Over the 5 year period, the biggest gain was in lobster, which accounted for only $2.3 million in 1989 but rose to $16.1 million in 1992.

- United Kingdom

The United Kingdom with $16.3 million in 1993 fishery shipments from New York accounted for 14% product to Europe and 7% of all fishery exports. The key species were a minor share of this total; $1.0 million (6%) of clams and $532,000 (3%) dogfish. Shipments of scallops and tunas each accounted for almost $100,000.

United Kingdom fishery shipments from the port increased from $0.7 million in 1989 to $16.3 in 1993. Little of this increase was in the selected species. Clams grew from $.25 million to $1.0 million and dogfish grew from nothing to $532,000 over than time.

- Spain

Spain received $11.4 million in fishery products from the port in 1993. This represented 10% of port exports to Europe and 5% of total fishery shipments. The value of "key" species were: lobster $3.2 million (28%), squid $2.0 million (18%) and dogfish $0.6 million (5%).

Port exports to Spain grew from $3.5 million in 1989 to the 1993 level of $11.4 million. The five year peak in value was 1991, with $11.6 million. Lobster shipments to Spain have been cyclical ($18,000 in 1989, $1.5 million in 1990, #3.9 million in 1991, $1.6 million in 1992 and $3.2 million in 1993). Squid shipments have declined from $3.1 million in 1989. Dogfish receipts started at $578,000 in 1991 and rose to $1.4 million in 1992 before declining last year.

- South Korea

Shipments of $7.0 million to South Korea in 1993 reflect 6% of product to Asia and 3% of the port's total fishery exports. Eels and herring with $0.5 million (7%) each and lobsters with $177,000 were the major "key" species. The total value shipped to South Korea in 1993 represent a very significant increase; the 1989-90 average was $132,000 and for 1991-92, the average was only $450,000 per year. This increase was almost exclusively in species not involved in North Atlantic fisheries. The eel and herring receipts were new in 1993, but there has been little substantive change with respect to other species.

- Hong Kong

The Crown Colony received $4.4 million in fishery products from the Port of New York/New Jersey in 1993, some for trans-shipment to China. Selected species in this total were: lobster, $386,000; scallops, $125,000; roe, $110,000; and squid, $100,000. Shipments have increased steadily since 1989 when the total was $1.3 million. The 1993 values for selected species all reflected new products which had not been shipped from New York in the prior four years.

- Germany

Shipments to Germany in 1993 had a value of $3.6 million, less than 2% of the port's total exports. Selected species were: dogfish, $615,000; lobster, $204,000; eels, $115,000; tunas, $37,000; and mackerel, $4,000. These values have not changed significantly since 1990. Total fishery shipments from New York to Germany have fluctuated widely in recent years; $389,000 in 1989, $4.6 million in 1990, $13.3 million in 1991 and $3.0 million in 1992.

- Netherlands

The Netherlands received $2.7 million of fishery products from the port in 1993, an increase from the $1.2 million shipped in 1989. In recent years, the only one of the selected species with significant shipments is lobster ($811,000 in 1993; $669,000 in 1992). Minor shipments in prior years included tunas (in 1991 and 1992), scallops (1989-91), and dogfish (1992).

- Portugal

Shipments to Portugal in 1993 totalled $2.2 million. This represents a significant increase over the 1989 total of $484,000 but far below the one-year peak of $12.9 million in 1992. That year saw sizeable landings of hake and dogfish which were not in any other of the past five years. The only one of the selected species with any meaningful 1993 shipments was squid.

- Other Selected Countries

Ten other selected countries received shipments from New York in 1993. The rate of export growth and main species involved are shown in Exhibit 7-4.

Exhibit 7-4: Fish Exports from Port of New York/New Jersey to Other Selected Countries, 1993

Country	Total $ (x1000)		Select Species	Comments
	1993	1989		
Taiwan	961	883	Scallops, tunas	Peak $1.9M in 1992
China	796	--	Squid, lobster	Started 1990
Saudi Arabia	671	29	Lobster	$1.0M in 1992
Canada	546	63	Tunas	--
South Africa	298	--	Squid	Started 1991
Mexico	40	--	Lobster, dogfish	Started 1991
Poland	3	--	Lobster	Peak $114K 1991
Nigeria	3	11	Tunas, roe	No shipments 1990-92
All Other Countries	2,100	142	Mackerel	Almost all mackerel

CHAPTER VIII: EMPLOYMENT AND ECONOMIC CONTRIBUTIONS OF NEW JERSEY FISHERIES, 1993

Summary

Estimates are provided for employment in the commercial fisheries of New Jersey. Direct employment in harvesting consists primarily of the crews who work aboard fishing vessels. An estimated 2706 FTEs were directly involved in commercial fish harvesting in 1993. This estimate is based on 1992 NMFS data combined with a number of assumptions about crew size, vessel activity, and percent part-time employment. Another 200 or so are estimated to be engaged in dockside support for the harvesting sector of the industry.

About 1,950 FTEs were in fish and seafood processing, 100 in aquaculture, 860 in wholesaling, and 3,278 in retailing. The estimated 1993 New Jersey combined annual direct employment in all sectors of the commercial fishing industry is 9,100. This figure is multiplied by 2.4, for an estimated 21,840 jobs in New Jersey both directly and indirectly attributable to the state's commercial fish and seafood industry. The multiplier includes estimates of support workers such as truckers and suppliers, and their own expenditures.

Another 9,700 FTEs are associated with the state's marine recreational fisheries. This yields a combined total statewide employment of over 31,500 jobs attributable to the state's marine fisheries for 1993.

The estimated direct total payroll for New Jersey commercial fisheries in 1993 was $138.4 million, over half from the harvesting and processing sectors.

An estimate of the economic value added was made based on a multiplier of 6.0. The result is a figure of about $600 million valued added in the commercial fisheries industry in 1993. The economic value added for the marine recreational fishery of New Jersey is estimated to be $762.2 million for 1993.

The total contribution of commercial and marine recreational fishing to New Jersey's economy in 1993 is estimated at $1,362 million. This total does not include all federal (income), state (income and sales) or local (property) taxes generated. The combined value of such additional taxes is estimated to exceed $100 million.

Employment: Commercial and Marine Recreational Fisheries

Direct employment in the 1993 New Jersey commercial fisheries is the sum of fishery employment in the harvesting, processing, aquaculture, wholesale and retail sectors. No data exist on actual employment in fisheries for all of these sectors. Estimates are required. Estimates are based on data presented in earlier chapters, assumptions and observations derived from interviews and previous research experience, and census and NMFS data. The unit used is the Full-Time Equivalent, or FTE.

Harvesting

The crews who work aboard fishing vessels make up most of the direct employment in harvesting. Vessel crew size, including the captain, varies according to a number of factors including vessel size, gear type, trip length, expected catch and economic factors. Past studies have shown that for New Jersey typical crew sizes range from 8-10 for scallop dredges; 4-6 for large ocean clam dredges and migratory longline vessels (swordfish and tuna fisheries); 3-5 for trawlers; 2-4 for gill netters and fixed gear fisheries; to 1-2 for small, nearshore boats (hard clams, inshore

Exhibit 8-1: Employment in New Jersey Marine Fishing,
FTE Estimates for 1993

	Attributable to Marine Fisheries	
Commercial --Direct: Harvesting	2,906	
Processing	1,950	
Aquaculture	100	
Wholesale	860	
Retail	3,278	
Total Direct	**9,094**	**9,100**
Indirect/Induced Multiplier*		x 2.4
Total Commercial =		**21,840**
Recreational Total (including multiplier)** =		**9,700**
New Jersey Total =		**31,540**

*Type III multiplier, weighted average based on estimates by E. Tavernier, Rutgers University, Impact for Planning Program, based on U.S. BUREAU OF CENSUS, 1991.

**Fedler, A.J. and D.M. Nickum. "The 1991 Economic Impact of Sport Fishing in New Jersey," Sports Fishing Institute, Washington, D.C. 1991.

lobster, crabs).[16]

An estimated 2,706 FTEs were directly involved in commercial fish harvesting in 1993. The 1992 NMFS records show 487 documented (over 5 net registered tons) fishing vessels in New Jersey. If it is assumed that this number is close to the number for 1993 (there was only a slight increase from 1991 to 1992); that about 75 percent of these large vessels were actively fishing; that the average crew size on these vessels is 4.0; and that 10 percent of the crew time is devoted to outside employment, the 1993 permitted vessel employment would be 1,314 FTE (365 active vessels x 4 (.9) crew = 1,314 FTE).

The 1992 NMFS records also indicate 1,392 smaller boats (5 net registered tons and under) in the commercial fishery. With the assumptions that this same number of boats obtains for 1993 (there was no change between 1991 and 1992); that each boat is active for 50 percent of the year; and that the average crew size is 2.0, the 1993 FTE for smaller boat harvesting is 1,392 (1,392 x 2 x .5 = 1,392 FTE).

The New Jersey harvesting fleet is supported by an estimated 200 dock workers-handlers, off-loaders and direct support personnel. Thus, the estimated total annual FTE for the harvesting sector is 2,906.

Processing

It is estimated that another 1450 FTEs were engaged in seafood processing in New Jersey in 1993. 1993 NMFS processed product files reported 808 average annual employees. As noted in Chapter V, this is an incomplete record. The 1991 New Jersey County Business Patterns (CBP) (U.S. Bureau of the Census) reports a total state employment of 1,306 for two classes fish and seafood processors.

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[16] Grant, G., J. Wilson, G. B. Charles, "Mid-Atlantic Fishery Conservation Zone: fisheries Socio-Economic Inventory, Volume II, Economic Analysis", Decision Sciences, Inc., December 1980.

Edward V. Cattell, Jr., George Grant, Bonnie J. McCay, Gayle Charles, William R. Belvin. "A State Supported Fishermen's Mutual Insurance Company." Prepared for the National Marine Fisheries Service, National Oceanic and Atmospheric Administration, and the New Jersey Fisheries Development Commission. 197 pp; plus appendices. July 1986.

Bonnie J. McCay, Edward V. Cattell, Jr., George Grant, and Gayle B. Charles, "New Jersey Fisheries and Fishermen: 1985 to 1986 Survey Report." Department of Human Ecology, Cook College, Rutgers the State University, New Brunswick, New Jersey. 35 pp. plus tables. October, 1988.

Assuming a slight decline in this level from 1991 to 1993 and an additional 700 employees in operations not included in either data base, the processing employment is estimated at:

NMFS processing file= 808
Additional CBP = 442
Peripheral= 700
Total Processing FTE=1,950

Aquaculture

Total 1993 employment in culture operations (FTE) was about 100.

Wholesale Sector

The CBP (1991) annual employment in the fish and seafood wholesale sector was 817; an adjusted estimate for 1993 is 760. Adding an additional estimate of employment in export/import, the FTE for the wholesale sector would be 860.

Retail

The CBP 1991 data for employment in meat and fish markets show 2,354 FTE employees. If it is assumed that one-half are involved in handling fish, then FTEs are 1,177. It may be assumed that the 1993 data are little different from the 1991 data. Data on grocery stores and restaurants can be similarly used, but with a much smaller percentage, 1%, estimated as devoted to fish and seafood:[17]

Meat and Fish Markets = 2,354 employees @ 50% fish, FTE	=1,177
Grocery Stores = 85,581 employees @ 1% fish (cutters, etc.), FTE	= 860
Restaurants = 124,115 employees @ 1% fish/seafood specialty	= 1,241
Total Retail, FTE	= 3,278

As summarized in Exhibit 8-1, the estimated 1993 New Jersey combined annual direct employment in all sectors of the commercial fishing industry is 8,500. This direct total does not include indirect (support) employment such as truckers, workers supplying packing materials, producers of nonseafood ingredients, vessel and equipment maintenance, fuel, etc. The employment attributable to such indirect goods and services and the induced employment due

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[17] No employment was allocated to institutional food service; same food service and staff without seafood.

to the expenditures of these direct and indirect employees is conservatively estimated at 2.4 times the direct commercial fisheries employment. The resulting estimate is that 20,400 jobs in New Jersey are attributable to the state's commercial fish and seafood industry.

Marine Recreational Fishery

The Sports Fishery Institute (SFI) 1991 analysis of the economics of New Jersey's recreational fishing industry (see Chapter VI) reported total in-state marine angling expenditures of $417.2 million. It reported 11,400 direct, indirect and induced jobs attributable to these activities.

Because of the nature of sports angling-related employment, it is not reported by sector but only as a total. Adjusting this 1991 employment total to 1993 to reflect the documented 15% reduction in marine angling expenditures, yields a total 1993 employment of 9,700 (FTE). As shown in Exhibit 8-1, this yields a combined total statewide employment of 31,540 jobs attributable to the state's marine fisheries.

Direct Payroll -- Commercial Fisheries

The logic and assumptions used to calculate direct employment and the payroll totals from New Jersey CBP (U.S. Bureau of the Census) were applied to calculate the direct total payroll for New Jersey commercial fisheries. The results are $138.4 million, over half from the harvesting and processing sectors (Exhibit 8-2).

Exhibit 8-2: New Jersey Commercial Fisheries Payroll Estimates, by Sector, 1993

Harvesting: $97.5M x .40 (crew share) + $1.6M support	$40.6M
Aquaculture: 100 x $10,000 each (E) =	1.0M
Processing: $23.4M X 1.56 =	36.5M
Wholesale (including export/import) =	18.0M
Retail: Food Stores $1,300M x .01 =	13.0M
Fish Markets $34,5M x .50 =	17.3M
Restaurant $1,206M x .01 =	12.0M
Total New Jersey Commercial Fisheries Payroll =	**$138.4M**

Economic Value Added

Value added is a measure of the total worth of a product at each stage of the production/marketing process. It consists of the gross receipts of firms minus the cost of purchased goods and services needed to fabricate/distribute the product.

It is difficult to establish a value added multiplier at the state level in the absence of reasonably precise data on the proportion of the relevant suppliers, processors, service providers, consumers, etc. are located within the state. A rough estimate may be obtained by looking at national figures.

The NMFS calculates value added, margins (mark-up) and expenditures by sector for the nation as a whole. For 1993, the total value added for commercial fisheries in the U.S. was $19,768 million. The percentage contribution to value added by sector was 11% for domestic havest, 23% for primary/secondary processing and wholesale, 56% for retail- food service; and 9% for retail-stores.

The 1993 national value added amount was 5.71 times the total domestic commercial harvest value in that year ($3,465 million). New Jersey is somewhat lower than the national average in the ratio of state landings to in-state processing but substantially higher in per capita seafood consumption. Given that the share of value added contributed by the retail sector is almost three times that of the processing sector, a value added multiplier of 6.0 times harvest value is deemed to be a conservative estimate for New Jersey.

Using this value added multiplier of 6 times harvest value yields the following estimate of value added for New Jersey's commercial fisheries in 1993:

Domestic Landings Value =	$97.5 million
Aquaculture At Gate Value =	$2.4 million
Total Production =	**$99.9 million**
x Value Added Multiplier =	x 6.0
Commercial Fish. Total Value Added =	$599.4 million
	est. **$600 million**

The state's marine recreational fisheries generated a higher 1993 direct expenditure total ($353.0 million) but a far smaller multiplier because of the absence of any processing, marketing or retail trade with respect to landed product. The 1991 SFI analysis indicates a multiplier of 2.16 for marine angling, yielding an economic output total of $762.2 million (1993).

The total contribution of commercial and marine recreational fishing to New Jersey's economy in 1993 is estimated at $1,362 million. This total does not include all federal (income), state (income and sales) or local (property) taxes generated. The combined value of such additional taxes is estimated to exceed $100 million.

CHAPTER IX: STOCK CONDITIONS AND RESOURCE MANAGEMENT CONSTRAINTS ON HARVESTING

Summary

Fisheries management by the State of New Jersey pertains to waters within 3 nautical miles of the coast. The strong trend is for state regulations to be coordinated with inter-state regulations, through the Atlantic States Marine Fisheries Commission; and with federal regulations, through the Regional Fishery Management Councils created by the Magnuson Act.

It is likely that stricter state regulations for many species will emerge over the next few years. The process has already begun. In late 1994 the state proposed amendments to its fisheries regulations to bring New Jersey into compliance with the ASMFC management plans for: winter flounder, bluefish, weakfish, Atlantic sturgeon, and American lobster. Both commercial and recreational fisheries are likely to be impacted.

Stricter regulations for federal fisheries (3-200 miles) are also in place and underway, and the trend is for some kind of limited entry as well as catch quotas and gear restrictions. Important New Jersey fisheries currently regulated under the federal Magnuson Act system include summer flounder (fluke), bluefish, squid, mackerel, lobster, sea scallops and butterfish. Management plans are being developed for black sea bass, scup, weakfish, and tilefish. Some species, like whiting and red hake, are indirectly managed through provisions of the multispecies groundfish management plans developed by the New England fishery management council. Regulation of pelagic shark fishing (i.e. mako shark) has begun, and swordfish and tuna regulations are in place, involving international as well as domestic policy.

Fish and shellfish population declines and harvest restrictions affect the entire Atlantic coast. The surf clam and ocean quahog fisheries, major contributors to New Jersey's fishery-based economy, are problematic. The lack of signs of new recruitment to the clam stocks as well as depletion of regional clam beds have already led to some shifts of harvesting and processing activity, mostly northward, as well as reductions in allowable catches.

New Jersey harvesters are impacted not only directly by declines or restrictions in their traditional target species but also indirectly by problems with other species and other areas. Next to the surf clam and ocean quahog fishery, the "mixed-trawl" fishery for a large variety of species, using mostly otter-trawls, is the second most important fishery in New Jersey, as it is more generally in the

Mid-Atlantic and southern New England regions. This fishery is threatened by sharp restrictions and limited entry provisions in many fisheries, ranging from fluke and scallops to the large complex of fishes included in the "multispecies" groundfish management plan for northeast federal waters. New England fishermen no longer able to rely on groundfish (cod, haddock, etc.) because of declining stocks and regulatory closures are forced to switch to alternatives such as squid, increasing competition for both stocks and market share. More directly, many mixed-trawl fishing operations have been closed out of the scallop fishery, which was an important seasonal or irregular adjunct to a flexible strategy, and are being squeezed out of a profitable small-mesh fishery through the recent (December 1994) emergency provisions to protect cod, haddock, and yellowtail flounder in New England waters (Federal Register v.49, no.237, Dec. 12, 1994, pp.63926-34).

Among important New Jersey species deemed "overexploited" by the N.M.F.S. in 1993 were fluke, winter flounder, Atlantic sturgeon, monkfish, scup, black sea bass, tilefish, lobster, and sea scallop. The list of "fully exploited" species also contains many species important to New Jersey's fisheries: the ocean clams, whiting, and bluefish. The challenge is to cooperate in ways to protect and restore these species as well as to enhance the market value of other available resources.

The only species seen as "underexploited" in the northeast region are species that bring relatively low prices because of low market demand. These include red hake, Atlantic herring, Atlantic mackerel, butterfish, skate, dogfish, and Loligo and Illex squid. New Jersey harvesters and processors have been trying to improve catches and markets for these species. The emergency provisions noted above would make it very difficult for New Jersey harvesters to target or even have by-catches of skate--or bluefish as well as more valuable species such as tilefish, monkfish and other species that are typical by-catches in the small-mesh whiting, squid, and scup fisheries that have been the mainstay of this region.

Decline in the catches of many high valued fish species, as shown in Chapter II, is not a matter of choice for New Jersey fishermen. It is a result of declining stocks in the traditional species and state and federally mandated harvest restrictions designed to prevent further declines and to encourage the rebuilding of stocks.

Fish and shellfish population declines and harvest restrictions affect the entire Atlantic coast. New Jersey harvesters are not only impacted directly by

decline or restrictions in their traditional target species but also indirectly by problems with other species and other areas. For example, New England fishermen no longer able to rely on groundfish (cod, haddock, etc.) because of declining stocks and regulatory closures are forced to switch to alternatives such as squid, increasing competition for both stocks and market share.

Each year, the NMFS evaluates the status of fishery stocks in the Northwest Atlantic. These assessments are based on a combination of biological, trawl sample and catch data (current and historical) of each species to determine its current status, projected abundance and mortality rate. Each species is categorized with respect to the extent of exploitation, either regionally or by major water body. The 1993 status of significant Northeast and Mid-Atlantic species is shown below:[18]

Over exploited

- Atlantic Cod
- Haddock
- Ocean Perch
- Yellowtail Flounder
- Fluke (Summer Founder)
- Winter Flounder
- Other Flounders
- Atlantic Sturgeon
- Angler Fish (Monkfish or Goosefish)
- Scup
- Black Sea Bass
- Cusk
- Tilefish
- Lobster
- Sea Scallop

Fully exploited

- Whiting
- Pollock
- Ocean Pout
- White Hake
- Bluefish
- Surf Clam
- Ocean Quahog (some areas)
- Atlantic Salmon
- Northern Shrimp

Under exploited

- Red Hake
- Atlantic Herring
- Atlantic Mackerel
- Butterfish
- Skate
- Dogfish
- Loligo Squid
- Illex Squid

By this account, there are few species that can be targeted for fisheries development or even for the redirection of fishing effort. Moreover, the "under exploited" species are presently low value and with limited markets. Nevertheless,

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[18] Note that the status of some of these stocks may be different in 1994; for example, Atlantic salmon would surely be considered over-exploited as petitions were filed in 1994 to declare Atlantic salmon an endangered species.

it is likely that they will serve as the only available avenue for the growth/stability of state and regional fisheries for the rest of this century. To broaden the options, effort also needs to be directed to investigate deep water resources on the slopes of the continental shelf; for species such as grenadiers, roughies, cutbassfish, etc.

Fisheries Regulations and Management

State and Inter-State

New Jersey fisheries are regulated by state and federal governments, as well as the workings of nature, markets, and informal agreements among fishermen. The State of New Jersey is responsible for the fisheries within 3 nautical miles of a coastal baseline and for the species that are primarily found there. Examples of species that come exclusively within state jurisdiction are bay clams, oysters, horseshoe crabs, diamondback terrapin, and blue-claw crabs. The Division of Fish, Game, and Wildlife of the Department of Environmental Protection has responsibility, with advice from an appointed Marine Fisheries Council plus two shellfisheries councils, a council for endangered and non-game species, and an overall fish and game council.

Current New Jersey state regulations[19] affect the following finfish: weakfish (minimum size, including fillets), winter flounder and summer flounder (size, possession, season, no filleting at sea for commercial boats), striped bass and hybrid striped bass (complex regulations, the result of inter-state deliberation, including longstanding prohibition of most commercial gear), and short-nosed sturgeon (an endangered species). Crustaceans regulated by the state include American lobster (within state waters, but strongly affected by federal rules), blue crabs (gear, size, other), horseshoe crabs (permit; areal closure), sea turtles and marine mammals (allowing fishing only for diamondback terrapin). Mollusks regulated by the state include hard clams (licensing, gear, size), surf clams (licensing, weekly limits, other) and oysters (licensing, gear, culling, seasons). Certain of these and other fisheries (e.g., for soft clams) are also controlled by closure of polluted waters, and the state shellfisheries have come to rely heavily on state-controlled programs of clam depuration or relay.

There are size limits for a large number of species if offered for sale, including, besides the above, tautog, porgy, sea bass, goosefish, Atlantic sturgeon,

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[19] A useful source is the "New Jersey Fish & Wildlife Digest," NJ Department of Environmental Protection & Energy, Division of Fish, Game, & Wildlife, published periodically. The information used here comes from vol. 7, no.4, May 1994.

bluefish, and cod. The state also regulates various commercial gears, such as pound nets and the use of otter trawls and purse seines (restricted to the area beyond 2 nautical miles, except for menhaden). The uses of gill nets of various kinds, fyke nets, dredges, and haul seines are also restricted by season, dimensions, licensing, etc. The complexity of regulations for the commercial fisheries reflects two centuries of competition between sports and commercial interests, as well as attempts to reduce gear conflict, congestion, and overfishing.

State regulations are closely connected with what is happening elsewhere, and they are likely to become much more restrictive in the near future. The state cooperates with other states for the management of migratory, mostly inshore species, such as striped bass, tautog, Spanish and king mackerel, red drum, and weakfish, through the Atlantic States Marine Fisheries Commission (ASMFC), established in 1942.[20] Although management plans are made cooperatively, it is up to individual states to implement the regulations, and it has proved difficult in several cases, recently weakfish, to get all states to go along. Congress passed a law in 1993 ("Atlantic Coastal Fisheries Cooperative Management Act") which is intended to strengthen the regulatory authority of this commission, particularly its ability to improve compliance of all of the 15 states involved with agreed upon regulations by threatening a total moratorium on a fishery if the state is found not to be in compliance.

It is likely that stricter state regulations for many species will emerge over the next few years. The process has already begun. In late 1994 the State proposed amendments to its fisheries regulations to bring New Jersey into compliance with the ASMFC management plans for winter flounder, bluefish, weakfish, Atlantic sturgeon, and American lobster.[21] Many of the amendments will have very real effects on New Jersey fisheries, such as the proposed reduction of commercial landings of bluefish, leading to closed seasons; closing the directed gill net sturgeon fishery to historical participants; and prohibiting the filleting at sea of fish with minimum size limits, even on recreational boats, where the practice has been to fillet the fish or have it filleted by mates before returning to dock.

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[20] Many of the species dealt with by the ASMFC are also subject to federal regulation through the Magnuson Act system.

[21] New Jersey Register, November 7, 1994 (26 N.J.R. 4277), courtesy of Bruce Halgren.

Federal

Beyond 3 miles, the federal government has jurisdiction. Anticipating changes in the international law of the sea, the Magnuson Fishery Conservation and Management Act of 1976 established United States control of fishing activity within 200 miles of the shores and provided mechanisms for the management of both foreign and domestic fisheries. A system of eight Regional Fishery Management Councils was established and made responsible for fisheries management between 3 and 200 miles.

The Mid-Atlantic Fishery Management Council includes states from Virginia to New York and is made up of representatives of the fisheries agencies from those states and of the NMFS and other agencies of the federal government, plus appointed citizens whose experiences and knowledge are supposed to reflect regional balances of sports, commercial, environmentalist, and other interests.

Fishery management plans are created by these councils and reviewed and approved by the Secretary of Commerce, the federal agency that includes the National Marine Fisheries Service, which provides most of the data and scientific expertise used in the management process and has responsibility for implementing and enforcing the fishery management plans.

A report by the Office of Conservation and Management of the NMFS examined the question of whether competing interests ("commercial," "recreational," and "other") were equally represented on the regional councils. Examining data on membership for 1990-1992, the report found generally fair ratios, given the issues each council had to resolve in the near future, but recommended adding commercial seats to the Mid-Atlantic, South Atlantic, and Pacific councils, because of apparent under-representation. Despite this imbalance for the Mid-Atlantic council, the report found that all viewpoints were represented in bluefish management, and there was "balanced input" for weakfish, tilefish, scup and black sea bass.[22]

The 1994 composition of the 18-member Mid-Atlantic Council is as follows: 6 state fisheries officials; 4 academicians; 4 representatives of recreational fishing interests; 2 representatives of the commercial industry; and 2 former public sector employees.

New Jersey has some voice in developing the options and selected alternative regimes via its members on the Mid-Atlantic Fishery Management

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[22] See article by Linda Buckmaster, National Fisherman, January 1993, p.17.

Council, but it is only one of six states on that council. In addition, some of the species of interest to New Jersey fishermen, processors, and distributors are within the purvieu of other councils, particularly the New England council (American lobster, multi-species groundfish, etc.) and the South Atlantic and Gulf/Caribbean councils. Various liaison and cooperative arrangements exist, but the state can find itself having very little control over FMP recommendations. Moreover, implementation and enforcement is the job of the federal government, not the state governments (although there, too, there is often collaboration).

The major technical factors considered in Council deliberations (which include public hearing and industry input) are:

> "Scientific trawl sampling data which estimate the current stock biomass and size, geographic and age distributions of a given species and any recent changes in these variables;
>
> "Current and recent historical catch history: volume of harvest; fish size; catch per unit effort (pounds per trip or set) and split between commercial and recreational harvests; and
>
> "Species-specific characteristics such as life span, age of reproductive maturity, geographic range, susceptibility to predators and/or natural fluctuations in food supply, water temperatures, etc."

These considerations are integrated to estimate (1) mortality and fecundity (spawn survival) rates for that species, and (2) the level of harvest reduction needed to protect/restore the species. A variety of measures or combinations of measures are typically considered to achieve such reductions, including: quotas (fishery wide, per trip or per vessel); seasonal and/or geographic closures; size and/or gear restrictions; and/or limited entry.

The options are evaluated on the basis of their anticipated effectiveness; the period of time required to attain the desired recovery; ease of enforcement; the impact on various sectors of the fishery (harvesters, anglers, support systems, etc.) and any other pertinent considerations.

Federal Management Plans for Major Mid-Atlantic Fisheries

To date, 11 fishery management plans (FMP's) have been implemented for individual species or clusters of species in the northeastern fisheries. The first Mid-Atlantic plan was for surf clams and ocean quahogs, a major New Jersey fishery in both state (surf clams) and federal (both) waters. All of the 11 plans have been instituted or updated since 1989, including the surf clam and ocean quahog plan, which was amended in 1990 to create individual transferable quotas in that fishery, the first in the U.S. to do so.

As of mid-1994, 5 additional FMP's were being prepared, and several other species are being evaluated for possible restrictions. The current and planned management regimes cover virtually all of the species of current and historical significance in New Jersey.

The harvesting restrictions are generally imposed on a coast-wide basis; only a few species (e.g., summer flounder, or fluke) have specific state-by-state allocations. The regimes for migratory species (tunas, sharks, swordfish) are driven by international criteria and issues and multi-national agreements.

The depleted status of the biomass for almost all significant species, and the nearly simultaneous imposition of harvest restrictions on these species, have three highly important impacts: (1) they prevent harvesters from achieving economic growth or even stability by expanding harvests of their traditionally targeted species; (2) they preclude any shift to alternative established species and (3) they cause other economic hardships due to increased competition, lower catch per unit effort, reduced bycatch and lower operating efficiencies. The status of stocks and management regimes for major species, for federal waters, are summarized below.[23] The data and trends are relevant to state water fisheries as well.

Surf Clams

About two-thirds of annual surf clam landings are taken from federal federal waters (3-200 miles from shore, also known as the EEZ, or Extended Economic Zone). The rest are taken from state waters. Nearly 75% of the current biomass is located in Mid-Atlantic waters. Another 20% is in the Georges Bank area, but this area has been closed due to contamination (PSP, or Paralytic Shellfish Poisoning).

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[23] Information taken from publications of and discussions with the National Marine Fisheries Service, Northeast Fisheries Center and the Mid-Atlantic Fishery Management Council (MAFMC).

New Jersey's 1993 surf clam landings constituted 65% of the total U.S. harvest of this species (from both federal and state waters), a slight decrease in share from 71% in 1992. Some 90% of the EEZ harvest comes from waters off New Jersey, but some of these are landed at ports in New York, Maryland, Virginia and New England (along with landings from state waters in these locations).

Surf clams reach commercial size (4.75") in six years and typically start to spawn at the end of their second year. Their life span is about 35 years. There has been no significant recruitment of stock off New Jersey since 1976, making conservation a paramount concern from both a biological and an economic perspective.

Management of EEZ surf clam harvests began in 1978 with the imposition of limited entry, annual harvest quotas and minimum size limits (the last control began in 1985 but has been suspended since 1991). From 1986 to 1989, the annual quota ranged between 3.1 and 3.4 million bushels (53.0 to 57.5 million pounds of meat), with annual catch reflecting 88-99% of the yearly quota.

By the late 1980's, effort limitations and increased vessel harvesting efficiency had created serious excess capacity. Each permitted surf clam vessel was restricted to only 6 six hour trips per quarter. In 1990, a system of Individuals Transferable Quotas (ITQ's) was established. This assigned a percentage of the annual quota to each vessel and allowed each owner to consolidate quotas for his fleet and to buy, sell or lease quota allocations, thereby adjusting capacity and reducing management/enforcement costs.

At the same time (1990), the annual EEZ quota was reduced to 2.85 million bushels (48.45 million pounds), a level which has remained constant through 1994. Between 1991 and 1993, the annual coastwide landings reflected from 99% - 101% of this quota.

The MAFMC reviews all FMP's and quotas each year. The Council's policy is to ensure that the surf clam biomass is sufficient to ensure 10 years of harvesting. It is estimated that, at the current harvest rate, the Mid-Atlantic stock will only last 9-12 years (2003-2006), and the stocks off New Jersey (which now account for 90% of the EEZ harvest) will be depleted by the end of this century. This is based on continuing decline of the biomass (50% over the past decade); an absence of significant recruitment; continued harvesting pressure concentrated in a few small geographic areas; and a sharp (47%)continuing decline in catch-per-unit-effort between 1987 and mid-1994 (from 199 bu./hr. to 106 bushels per hour).

Although the 1994 biomass survey, (completed in January 1995,) indicated

a much larger biomass than expected a quota reduction (of about 10%)is almost certain to be implemented for 1995.

Ocean Quahogs

Ocean quahogs are managed as part of the same FMP as surf clams but with separate quotas. There are major biological and geographical differences between ocean quahogs and surf clams. Ocean quahogs have a life span in excess of 200 years and require 30 years to reach marketable size (2.75"); 50% of individuals reach sexual maturity at about the age of 10. No significant recruitment to the population has occurred over the past several decades, and the stock from Georges Bank to the south is comprised almost entirely of large adults.

Geographically, the biomass density is concentrated in EEZ waters. In 1992, over 99% of the harvest came from federal water, but new 1993 harvest from inshore waters in Massachusetts and Rhode Island lowered the EEZ share 95%. The largest ocean quahog stocks are off southern New England, followed by Long Island, Georges Bank (closed due to PSP infestation), New Jersey and Delmarva.

Less than 20% of the biomass is now located off New Jersey and Delmarva, the historical focal point of the fishery. The distribution of recent ocean quahog landings has moved to the north, as shown in Exhibit 9-1.

Exhibit 9-1: Ocean Quahog Landings by Area, 1992 and 1993

	1993		1992	
	Bu. (x000)	**%**	**Bu. (x000)**	**%**
New England	575	11	298	6
New York	150	3	174	3
New Jersey	4,146	80	3,976	79
Maryland	295	6	596	12
Total	**5,166**	**100%**	**5,044**	**100%**

These data, reflected also in longer time series, indicate the continued dominance of New Jersey landings but also show shift of activity from the southern area (Maryland) to New England in response to declining ocean quahog density in the south. (This is the same pattern which is reflected by the shift of New Jersey landings from Cape May to Ocean and Monmouth Counties, discussed in Chapters II and III.)

If current recruitment and harvest patterns continue, the Mid-Atlantic (Long

Island to Virginia) ocean quahog stock will last until 2001 or 2002. The entire stock in the northwestern Atlantic could last for between 20 and 30 years, but most of this is in the northern range where bottom topography an distance from markets make harvesting relatively less efficient.

As noted, ocean quahogs are managed as part of a combined FMP with surf clams and were also incorporated in an ITQ allocation system in 1990. The EEZ quahog quotas were originally set at 6.0 million bushels and continued at that level through 1988 with annual harvests reflecting 69-79% of the quota. The subsequent annual quotas were 5.2 million bushels (1989), 5.3 million (1990-1992) and 5.4 million (1993-1994). In each of the years from 1989 and 1993, harvests equaled between 87% and 95% of the quota for that year.

The MAFMC ocean quahog policy is to set allowable harvest at a level that will allow continuing activity at that level for at least 30 years and, if possible, meet existing demand. Given that criterion and circumstances similar to those existing for surf clams -- dwindling biomass; poor recruitment; and declining CPUE --, some reduction in quota is almost certain for 1995.

Because in recent years harvests were slightly below quota, the quota reduction is likely to be somewhat smaller than the 10% for surf clams, probably on the order of 8 - 9%. This would yield an ocean quahog quota equivalent to the average annual harvests recorded between 1984 and 1993. Again, decisions on a quota will await final analysis of the latest (1994) stock assessment.

From the standpoint of New Jersey quahog ocean harvesters, the concern is not so much the possible coastwide quota reduction as the poor status and imminent depletion of New Jersey coastal stocks. Elimination of the nearby resource will mean a decline in New Jersey's share of this species and a greater comparative disadvantage in effort and cost for New Jersey harvesters seeking catch in more northern waters. There was some promise in recently discovered beds off Long Island, based on the 1992 harvest from these beds, but by 1993 harvests from these beds had already declined by 60% (from 1.5 million bushels in 1992 to 0.6 million bushels in 1993). Like surf clams, ocean quahogs are likely to experience a major quota reduction in 1995.

Major Groundfish

Stocks of the major groundfish species in the Gulf of Maine, Georges Bank and southern New England -- cod, haddock, pollock and yellowtail flounder -- have been declining and overexploited for at least the past 15 years. Quotas were imposed on these species in 1977 but discontinued in 1982. The northeast multi-species FMP was instituted in 1986 (and updated in 1991) by the New England

Fishery Management Council. There were no quotas, just regulations on mesh sizes and provisions for closing areas.

In 1994, in an effort to curtail harvest of these species by at least 50 percent, restrictions including limited entry, selected geographic closures, gear limitations and a 10% per year decrease in the number of fishing days were imposed. By the summer of 1994 these measures were seen as insufficient. In October, 1994, the New England Council voted unanimously to virtually close the American sector of the Georges Bank to commercial fishing. In December 1994 the U.S. Department of Commerce announced emergency closures, which are likely to be followed by extremely restrictive management measures.

Existing and proposed restrictions on the above-mentioned groundfish species and fishing grounds have little direct impact on New Jersey harvesters -- they are typically not active in the affected waters and do not catch significant amounts of these species. However, the management measures that went into place in the 1990s have included restrictions on gear making it more difficult for fishermen to switch between small-mesh fisheries for species such as whiting and squid and large-mesh fisheries for species such as the flounders and cod, haddock, and pollock. They have also created a limited entry system that has the potential of further reducing the flexibility of Mid-Atlantic fishing operations.[24]

Moreover, the indirect impact on New Jersey harvesters is significant and will likely continue to worsen. The New England groundfish vessels tend to be larger (80-100+ feet), newer and more technologically advanced than most New Jersey vessels. As their traditional fisheries are closed, many of these vessels will redirect their efforts to waters as the Mid-Atlantic, where fishing is less restricted and target New Jersey traditional species such as fluke, squids and scup and the underexploited species which are New Jersey's only growth option.

Such competition from newer, larger, more efficient vessels (some of which is already in evidence) may be of some benefit to New Jersey ports capable of handling and off-loading transient vessels, but it does not bode well for the state's harvesters.

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[24] Mid-Atlantic finfish fisheries have traditionally depended on opportunistic and flexible fishing patterns, facilitated by carrying different gear on a fishing trip. This has been disallowed or sharply restricted in both the new groundfish management system and the summer flounder management plan. Limited entry has also diminished flexibility by factoring out of the permitted fisheries people who had left certain fisheries for a number of years, intending to return some day, but therefore do not qualify to return. The scallop management plan underway in 1994 also works against this strategy, affecting some of the New Jersey boats that have traditionally switched back and forth between finfish and scallops.

Fluke (Summer Flounder)

In 1992 a fluke FMP went into place in response to signs of decline in this high-valued commercial and sports fishery of the Mid-Atlantic region. The fluke FMP is unusual in involving state by state allocations. The coastwide 1993 fluke quota was 20.73 million pounds. This was divided into a commercial landing limit of 12.35 million pounds (60% of the total quota) and an 8.38 million pound recreational allocation (4.36 million fish). The 1994 landing limit was raised to 26.676 million pounds, 16,006 million pounds commercial (60%) and 10.670 million pounds recreational.

The commercial quotas are allocated by state, based on a formula derived from historical (1980-1989) landing records. New Jersey's share of a coastwise commercial allowance is 16.725%. This percentage of the 1993 total commercial quota yields a New Jersey commercial limit of 2.066 million pounds for that year. However, New Jersey commercial fluke landings in 1993 were 2.50 million pounds. The FMP stipulates that any excess state landings in a given year are to be subtracted from its commercial quota allocation in the following year.

Thus, the 1994 New Jersey commercial allocation is 2.242 million pounds. (16.006 million [coastwise] x .16725 [New Jersey share] = 2.677 million [New Jersey allocation] - .435 million [deduction for excess 1993 landings = 2.242 million pounds]). This 1994 allocation is some 10% below the 1993 landings. If New Jersey landings should again exceed the allocation in 1994, the average would then be deducted from the state's 1995 quota (not yet established). A lawsuit successfully brought against the NMFS by commercial fisheries groups in late 1994 to increase the 1994 quota may lead to an increase in the 1995 quota.

In addition to quotas, the commercial fluke fishery is subject to other restrictions, including: a moratorium on new entrants; minimum mesh size regulations; and a minimum size (14") for landed catch.

The annual quota for the recreational fluke fishery is coastwide and not allocated by state. (In 1991, New Jersey anglers accounted for 47% of the coastwide fluke landings.) The restrictions on recreational landings are a recreational season from May 15 to September 30 and a per trip possession limit of 6 fish per angler.

Loligo and Illex Squid

Loligo (long-finned) and Illex (short-finned) squid are covered in the 1978 Squid, Mackerel and Butterfish Plan, as amended in 1990. In 1993, U.S. landings of Atlantic squid were 41,200 metric tons (MT) (90.8 million pounds). This total is a composite of both Loligo and Illex. The 1993 breakdown is not available, but

in 1992, the U.S. split was essentially equal. Neither species has yet approached the specified limits of allowable catch. Given their short life span (2-3 years), the squid seem capable of sustaining intensive harvests.

The Loligo allowance was 37,000 MT from 1986-92. It was 44,000 MT for 1993 and 1994, and the FMP Amendment recommendation is for a 37,000 MT limit in 1995. The Illex limit has been 30,000 MT for a number of years and is slated to continue at that level in 1995.

Both fisheries, as well as butterfish, are being considered for restrictions on participation (a moratorium permit).

Swordfish

Swordfish is a highly migratory species which must be managed on an international basis. The current U.S. quota for swordfish covering catch by U.S. harvesters in the western Atlantic, Caribbean and Gulf of Mexico is 7.56 million pounds dressed weight (11.28 million pounds round (live) weight). This quota is slightly above the approximately 6.3 million dressed pounds caught by U.S. fishermen in these waters in 1993.

In addition to this quota, harvest restrictions include a size/weight minimum. At least 85% of the dressed carcasses must be over 31" in length or over 41 pounds in weight.

There is thus some room for expansion of swordfish landings under current limits. However, there have been extensive domestic and international discussions regarding greater reductions in harvest allowances, and the long term picture is problematic. CPUE is declining, together with a decrease in landings and in the average size of fish caught, all factors which, point to the probable need for further catch restriction.

Sea Scallops

The total U.S. Atlantic catch of sea scallops in 1993 was some 8,000 MT, significantly lower than the 1992 total of 14,200 MT and the 1990 and 1991 levels of over 17,000 MT. The Mid-Atlantic stock accounts for about one-third of the coastal harvest. Over 50% of the regional total come from the New York Bight, but this area has exhibited the sharpest declines in recent years (from 4,700 MT in 1991 to 2,800 MT in 1992). CPUE in the Mid-Atlantic has been declining steadily since 1989, with a decrease of about 20% from 1991-92. Recent (1992) survey data indicate that abundance and recruitment are also declining.

A coastwide moratorium on entry into this fishery has been in place since

1990. Because of declining stocks and overexploitation, restrictions on fishing effort were imposed in March, 1994. These call for a 10% per year reduction in annual days at sea for each of the next seven years (the current per boat average is 210 days annually).

Other Groundfish Species

Most of the other groundfish currently of importance to New Jersey's commercial and/or recreational fisheries are classified as "overexploited", declines exhibiting in biomass, harvest volume and CPUE. FMP's are in process or under consideration for the following species:

Scup (Porgy)

-Consideration of various types of quotas and other measures to achieve a 50% reduction in landings.

Black Sea Bass

-Also expressed need to reduce landings by 50 percent, probably via imposition of quotas or other limits.

Tilefish

-A tilefish FMP is under development. The scientific data indicate a sustainable annual catch of 1,200 MT. Given 1993 tilefish landings of 2,674 MT, major restrictions will probably be needed.

Weakfish

-Status indicates need to reduce landings by estimated 25%. (The State is also heavily involved in management of weakfish).

Pelagic Species

Atlantic Mackerel are covered under the 1978 Squid, Mackerel and Butterfish FMP. This species is still considered underexploited. The allowable catch for 1995 has been established at 134,000 MT. This compares to total 1993 landings of only 4,700 MT, leaving a substantial stock for harvest.

Butterfish are covered by the same FMP as mackerel and squid. The designated annual domestic harvest limit through at least 1995 is 10,000 MT. With 1993 landings of 4,750 MT, this species also reflects expansion opportunities.

Bluefish have been covered by an FMP since 1989. This plan currently imposes a 12 fish per trip possession limit on anglers. If commercial landings

exceed 20% of the total (commercial and recreational) landings, a state allocation system is to be implemented to determine each state's percentage of any quota imposed. Based on 10 year history, the New Jersey share would be 15.647%. Given the lack of pressure on both commercial and recreational fisheries (i.e., landing declines in both sectors) and the fact that in recent years the commercial proportion has hovered in the low 20% range. Any commercial restrictions are likely to have minimal impact.

Other Migratory Species (all subject to international agreements)

Sharks - The only species group for which an FMP is under development is pelagic sharks. The major commercial species in this group is mako shark. As of January, 1994, harvest of this species is subject to a limit of 4,000 pounds per trip.

Tuna - September 1, 1994, has been designated as the control date for all commercial tuna fishing. Any future imposition of entry limits or moratoria on tuna species would include harvesters active prior to that date. Yellowfin tuna (of which the U.S. has 4% of landings) is likely to be capped at the 1992 harvest level with restrictions on effort (vessel-days) the preferred control mechanism. Total bluefin tuna tonnage in the Atlantic has been fairly steady since 1988. Discussions of restrictions on this species have focused on restrictions yielding up to 40% reduction of catch.

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Appendix A-1.
New Jersey Landings - 1993, Pounds by County (x000)

Species	County						State Total	% of State	State $/Lb.
	Atlantic	Cape May	Cumberland	Monmouth	Ocean	Other*			
Finfish									
Anglerfish (Monk)	1.1	1,915.7	--	29.2	1,126.7	--	8,072.7	1.6	.56
Bluefish	24.1	536.7	5.9	441.2	1,182.4	0.8	2,191.1	1.1	.29
Butterfish	0.6	1,191.2	0.8	62.7	64.3	15.9	1,335.6	0.7	.33
Summer Flounder (Fluke)	0.1	1,756.5	--	480.4	263.5	--	2,500.5	1.3	1.32
Herring	--	2,923.6	--	0.3	0.8	--	2,924.6	1.5	.05
Atlantic Mackerel	--	2,216.6	--	206.4	340.8	--	2,763.7	1.4	.09
Menhaden	--	21,671.2	318.3	6,181.4	25.8	100.0	28,296.7	14.4	.05
Scup	2.3	3,622.5	--	141.2	249.6	0.1	4,015.7	2.0	.56
Black Sea Bass	64.6	1,218.4	--	46.2	51.3	--	1,380.5	0.7	.79
Weakfish	12.2	528.1	22.3	28.3	240.9	2.8	834.5	0.4	.83
Dogfish	1.8	670.8	--	20.4	436.0	--	1.129.0	0.6	.20
Mako Shark	--	36.2	--	0.5	427.2	--	463.9	0.2	.70
Skate	0.2	658.2	--	19.5	151.3	0.1	829.3	0.4	.10
Swordfish	--	106.5	--	--	572.9	--	679.4	0.3	3.03
Tile Fish	--	280.5	--	0.1	788.8	--	1,069.3	0.5	1.46
Tunas	7.2	462.9	--	16.2	887.4	12.9	1,386.5	0.7	2.48
Whiting (Silver Hake)	--	275.5	--	846.5	1,268.3	31.3	2,421.6	1.2	.37
Total Listed	**114.1**	**40,070.9**	**347.3**	**8,520.4**	**8,078.0**	**164.0**	**57,294.7**	**29.2**	**.36**
Total - Other Species	**126.7**	**456.9**	**196.8**	**931.4**	**931.5**	**65.7**	**2,708.9**	**1.4**	**.79**
Total Finfish	**240.8**	**40,427.8**	**544.1**	**9,451.8**	**9,009.5**	**229.6**	**60,003.7**	**30.6**	**.37**

Appendix A-1 (Continued).
New Jersey Landings - 1993, Pounds by County (x000)

Species	County						State Total	% of State	State $/Lb.
	Atlantic	Cape May	Cumberland	Monmouth	Ocean	Other*			
Shellfish and Invertabrates									
Blue Crab	784.0	897.1	3,187.0	599.6	1,394.2	878.7**	7,740.4	3.9	.54
Lobster	10.1	190.4	--	702.1	3.9	--	906.5	0.5	3.52
Hard Clam	385.0	385.0	--	446.0	210.2	--	1,496.4	0.8	3.28
Ocean Quahog	2,645.4	16,539.1	--	10,460.7	11,681.8	131.8	41,458.8	21.1	.37
Surf Clam	38,806.6	5,948.4	--	--	3,223.0	--	47,978.1	24.5	.45
Sea Scallop	1.0	1,402.4	--	--	876.9	--	2,280.3	1.2	6.03
Illex Squid	--	19,747.0	--	--	0.4	37.4	19,784.8	10.0	.16
Loligo Squid	--	10,446.9	--	309.3	2,055.3	538.2***	13,349.8	6.8	.50
Total Listed	**42,702.5**	**55,556.2**	**3,187.0**	**12,517.6**	**19,445.7**	**1,586.1**	**134,995.1**	**68.8**	**.54**
Total - Other Species	**37.8**	**936.2**	**56.4**	**68.5**	**6.4**	**8.3**	**1,113.5**	**0.6**	**.48**
Total Shellfish/Invertabrates	**42,740.3**	**56,492.4**	**3,243.4**	**12,586.1**	**19,452.1**	**1,594.4**	**136,108.7**	**69.4**	**.54**
% Shellfish By County	**(99.4)**	**(58.2)**	**(85.6)**	**(57.1)**	**(68.3)**	**(87.4)**	**(69.4)**		
Grand Total	**42,981.1**	**97,020.2**	**3,787.4**	**22,037.9**	**28,461.7**	**1,824.0**	**196,112.3**		**.49**
Total as % of State	**(21.9)**	**(49.5)**	**(1.9)**	**(11.2)**	**(14.5)**	**(0.9)**			

*Salem, Union, Bergen, Hudson, Hunterdon and Unknown
**Salem
***Union

Appendix A-2.
New Jersey Landings - 1993, Value by County (x000)

Species	County						State Total	% of State $
	Atlantic	Cape May	Cumberland	Monmouth	Ocean	Other*		
Finfish								
Anglerfish (Monk)	$ 6.1	$ 878.5	$ --	$ 19.9	$ 827.8	$ --	$ 1,732.4	1.8
Bluefish	7.3	85.4	1.7	128.7	412.6	0.2	635.8	0.7
Butterfish	0.4	345.4	0.5	55.3	2.7	12.0	440.6	0.5
Summer Flounder (Fluke)	0.1	2,298.3	--	697.3	293.7	--	3,289.4	3.4
Herring	--	148.5	--	0.1	0.2	--	148.7	0.2
Atlantic Mackerel	--	154.2	--	45.5	35.1	--	234.9	0.2
Menhaden	--	987.5	28.6	363.7	2.3	9.0	1,391.1	1.4
Scup	1.1	2,010.7	--	82.7	138.1	--	2,232.6	2.3
Black Sea Bass	101.9	872.4	--	84.7	37.1	--	1,096.7	1.1
Weakfish	15.6	311.7	25.6	40.1	295.9	2.8	691.7	0.7
Dogfish	0.6	172.1	--	3.1	51.4	--	227.2	0.2
Mako Shark	--	28.8	--	0.3	297.2	--	326.2	0.3
Skate	--	57.1	--	3.3	22.1	0.1	83.2	0.1
Swordfish	--	351.8	--	--	1,704.4	--	2,056.1	2.1
Tilefish	--	459.3	--	0.2	1,102.6	--	1,562.0	1.6
Tunas	17.4	951.0	--	94.0	2,304.6	39.4	3,442.5	3.6
Whiting (Silver Hake)	--	62.3	--	382.6	447.7	6.9	899.6	0.9
Total Listed	**150.6**	**10,175.6**	**56.5**	**2,001.5**	**8,036.4**	**70.3**	**20,490.8**	**21.3**
Total - Other Species	**129.6**	**220.2**	**169.4**	**675.8**	**879.4**	**68.7**	**2,143.2**	**2.2**
Total Finfish	**$280.1**	**$10,395.8**	**$225.9**	**$2,677.3**	**$8,915.8**	**$139.1**	**$22,633.0**	**23.5**

Appendix A-2 (Continued).
New Jersey Landings - 1993, Value by County (x000)

Species	County						State Total	% of State $
	Atlantic	Cape May	Cumberland	Monmouth	Ocean	Other*		
Shellfish and Invertabrates								
Blue Crab	$ 433.2	$ 503.1	$1,712.8	$ 482.6	$ 634.7	$ 415.2**	$ 4,181.5	4.3
Lobster	37.9	685.5	--	2,448.3	16.0	--	3,287.7	3.3
Hard Clam	1,946.9	643.2	--	1,427.3	884.7	--	4,902.1	5.1
Ocean Quahog	1,030.6	5,996.8	--	3,898.6	4,415.1	46.1	15,387.2	16.0
Surf Clam	16,651.6	3,234.8	--	--	1,916.4	--	21,802.7	22.6
Sea Scallop	5.2	8,394.8	--	0.1	5,340.9	--	13,741.0	14.3
Illex Squid	--	3,238.3	--	--	0.2	12.1	3,250.6	3.4
Loligo Squid	--	5,123.1	--	181.6	943.8	432.9***	6,681.3	6.9
Total Listed	**20,105.3**	**27,819.7**	**1,712.8**	**8,438.4**	**14,151.7**	**906.3**	**73,134.1**	**75.9**
Total - Other Species	**15.7**	**422.0**	**17.9**	**68.7**	**4.4**	**4.1**	**532.9**	**0.6**
Total Shellfish	**$20,121.0**	**$28,241.7**	**$1,730.7**	**$8,507.1**	**$14,156.1**	**$910.4**	**$73,667.0**	**76.5**
% Shellfish By County	**(98.6)**	**(73.1)**	**(88.5)**	**(76.1)**	**(61.4)**	**(86.7)**	**(76.5)**	
Grand Total	**$20,401.1**	**$38,637.5**	**$1,956.6**	**$11,184.4**	**$23.071.9**	**$1,049.5**	**$96,301.0**	
Total as % of State	**(21.2)**	**(40.1)**	**(2.0)**	**(11.6)**	**(24.0)**	**(1.1)**		

*Salem, Union, Bergen, Hudson, Hunterdon and Unknown
**Salem
***Union

Appendix B.
New Jersey Landings By Species, 1982-93

Species	Pounds (x000)											
	1982	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**
Finfish												
Anglerfish (Monk)	353.9	446.4	478.6	431.2	244.0	567.3	537.3	750.8	1,063.9	2,045.3	3,117.8*	3,072.7
Bluefish	1,980.6	1,924.4	1,676.1	2,017.2	3,019.6	2,531.7	2,483.6	1,579.1	2,171.0	2,447.8	2,198.2	2,191.1
Butterfish	389.0	398.3	764.9	1,450.3	1,184.3	895.7	688.7	751.5	581.7	567.0	924.6	1,335.6
Eels	250.6	309.3	545.5	344.5	300.3	210.3	203.8	198.5	151.8	252.9	212.0	225.1
Winter Flounder	265.6	312.2	191.4	472.5	370.6	227.6	252.0	346.8	221.6	257.5	284.0	241.8
Summer Flounder	4,317.9	4,826.0	6,224.5	5,633.8	4,017.1	4,450.4	6,006.4	2,862.1	1,458.3	2,340.7	2,870.9	2,500.5
Red Hake	953.6	967.1	887.9	609.3	495.2	376.8	513.7	702.4	731.9	603.9	429.4	515.0
Herring	23.7	45.0	22.0	24.1	45.1	49.9	51.4	68.4	105.3	809.0	8,264.5	2,924.6
Atlantic Mackerel	3,628.0	2,154.6	2,165.0	1,858.3	4,740.6	6,294.2	8,151.0	6,667.2	5,628.6	18,548.6	8,885.1	2,763.7
Menhaden	1,637.4	1,581.5	2,242.1	2,879.8	2,453.6	2,563.2	1,984.0	2,854.4	9,041.5	16,597.4	27,470.9	28,296.7
Scup	3,848.3	5,592.0	4,884.9	3,283.0	4,177.0	4,005.2	2,940.2	2,682.2	2,215.0	4,320.4	3,251.5	4,015.7
Black Sea Bass	679.2	855.5	826.3	645.6	798.2	1,109.5	1,180.2	840.7	990.2	1,034.1	1,244.9	1,380.5
Weakfish	2,0073.1	2,172.4	2,747.5	3,048.0	3,208.1	2,093.8	2,332.3	1,457.1	968.3	1,174.2	940.7	834.5
Shad/Roe	349.9	228.4	291.7	335.2	335.2	267.8	434.5	524.9	611.6	454.0	366.8	319.6
Sharks, Other	22.9	8.4	19.1	27.4	15.8	18.5	45.2	147.9	120.5	459.4	779.5	15.4
Dogfish	5.5	0.6	9.1	8.3	52.9	4.1	11.1	22.6	4,544.0	3,246.2	3,344.2	1,129.0
Skate	0.2	1.3	1.6	5.3	23.9	19.5	23.2	40.2	19.3	276.5	589.1	829.3
Swordfish	463.5	610.6	864.7	524.2	787.0	603.5	819.1	845.6	1,312.5	1,103.3	805.2	679.4
Tilefish	2,840.3	2,207.9	1,980.0	1,712.8	1,514.6	2,037.3	778.1	383.8	511.7	978.1	1,167.6	1,069.3
Tunas	668.9	352.1	489.4	442.6	801.9	655.2	885.6	1,114.4	1,312.1	2,136.7	1,965.8	1,386.5
Whiting	7,102.2	6,613.7	8,201.3	9,009.3	5,899.7	4,183.1	6,095.6	8,199.1	8,626.6	4,354.9	2,078.9	2,421.6
Mako	23.9	33.9	39.9	51.1	86.4	78.0	104.7	93.1	103.9	125.6	110.5	463.9
Sturgeon	7.5	17.3	30.5	19.5	20.2	20.1	13.0	85.1	128.4	117.3	84.1	33.9
Total Listed	**31,885.7**	**31,658.9**	**35,782.0**	**34,789.7**	**34,591.3**	**33,262.7**	**36,354.7**	**33,217.9**	**42,619.7**	**64,250.8**	**71,386.2**	**58,645.4**
Other Finfish	**926.2**	**751.7**	**433.7**	**645.8**	**574.4**	**866.2**	**603.1**	**787.8**	**755.0**	**989.4**	**1,057.4**	**1,358.3**
Total Finfish	**32,811.9**	**32,410.6**	**36,215.7**	**35,435.5**	**35,165.7**	**34,128.9**	**37,137.8**	**34,005.7**	**43,374.7**	**65,240.2**	**72,443.6**	**60,003.7**

Appendix B (Continued).
New Jersey Landings By Species, 1982-93

Species	Pounds (x000)											
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Shellfish Oysters	641.4	705.5	788.8	293.2	104.8	14.7	--	--	500.6	209.6	33.8	0.5
Blue Crab	802.1	1,197.7	1,714.4	2,407.3	2,700.0	2,923.8	5,110.3	5,680.3	4,839.6	4,971.6	6,529.6	7,740.4
Lobster	846.2	769.9	927.5	1,079.7	1,123.0	1,397.1	1,557.2	2,059.8	2,198.8	1,673.0	1,213.3	906.5
Inshore Hard Clams	950.8	1,333.7	1,601.1	1,034.8	1,235.3	1,525.0	1,384.1	1,172.7	1,237.4	1,340.6	1,201.9	1,496.4
Ocean Quahog	22,856.1	21,272.3	21,457.6	28,564.3	24,218.0	24,394.9	17,537.4	27,040.3	32,732.8	34,732.8	39,760.4	41,458.8
Surf Clam	24,410.1	24,373.9	39,191.3	32,695.8	36,473.2	35,821.2	37,150.6	42,882.9	44,774.2	45,954.5	52,848.8	47,978.1
Sea Scallop	1,334.7	2,424.4	2,390.1	1,749.1	2,142.8	3,451.5	3,163.7	3,986.2	4,615.3	4,824.8	3,313.0	2,280.3
Illex Squid	4,789.3	812.9	4,390.3	1,164.5	6,239.2	8,991.4	3,123.0	4,854.4	8,342.5	7,617.9	17,479.7	19,784.8
Loligo Squid	860.8	1,070.7	2,268.9	2,139.5	2,141.6	2,868.4	6,136.1	6,457.8	6,344.8	8,666.7	8,893.7	13,349.8
Total Listed	**57,491.5**	**53,961.0**	**74,730.0**	**70,128.2**	**76,377.9**	**81,373.3**	**75,162.4**	**94,134.4**	**105,266.5**	**109,991.8**	**131,274.2**	**134,995.6**
Other Shell	**382.7**	**354.7**	**260.3**	**1,490.3**	**331.3**	**444.4**	**372.3**	**326.9**	**748.2**	**623.6**	**608.6**	**1,113.1**
Total Shell	**57,874.2**	**54,315.7**	**74,990.3**	**71,618.5**	**76,709.2**	**81,817.7**	**75,534.7**	**94,461.3**	**106,014.7**	**110,615.4**	**131,882.8**	**136,108.7**
Total New Jersey	**90,686.1**	**86,726.3**	**111,206.0**	**107,054.0**	**111,874.9**	**115,946.6**	**112,672.5**	**128,467.0**	**149,389.4**	**175,855.6**	**204,326.4**	**196,112.3**

Tuna Landings By Species, 1982-93

Species	Pounds (x000)											
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Bluefin	1.1	56.5	104.2	8.8	35.2	24.5	67.0	143.9	75.6	52.1	37.7	26.5
Little Eye	--	0.4	1.8	6.2	15.2	5.0	4.9	11.5	21.9	74.1	40.7	19.3
Big Eye	31.8	109.0	215.8	218.5	324.4	343.0	317.8	326.6	405.1	634.7	354.0	548.3
Albacore	27.7	8.6	20.3	12.5	36.2	15.4	42.4	46.8	142.5	186.5	93.0	126.0
Yellowfin	100.6	82.6	60.2	135.3	324.7	239.4	447.5	619.6	663.3	976.9	994.2	502.3
Other	507.7	95.4	87.1	61.3	66.2	27.9	6.0	66.0	3.7	212.4	212.4	164.2
Total	**668.9**	**352.1**	**489.4**	**442.6**	**801.9**	**655.2**	**885.6**	**1,114.4**	**1,312.1**	**2,136.7**	**1,965.8**	**1,386.5**

Appendix C.
New Jersey Landings, Pounds and Value (x000) by County, 1982-93

County	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Atlantic												
Pounds	19,697.4	18,873.5	29,994.5	22,551.6	22,843.6	25,967.6	29,023.0	35,073.6	40,302.7	40,395.5	44,857.5	42,981.1
Value	9,728.4	9,047.1	16,682.9	13,350.9	14,575.7	14,360.4	15,861.7	18,347.7	20,707.8	20,528.9	22,878.4	20,401.1
Bergen												
Pounds	91.1	27.2	83.6	56.0	119.0	31.8	111.7	63.7	59.9	30.4	28.9	17.6
Value	115.8	10.5	22.5	15.6	18.5	7.2	36.8	16.3	20.0	18.7	18.3	13.0
Cape May												
Pounds	45,934.5	42,925.3	53,372.6	48,708.0	56,820.7	57,097.3	48,708.1	54,680.4	70,204.7	94,851.8	96,001.6	97,020.2
Value	18,781.3	25,267.3	29,624.2	25,617.3	28,787.2	30,924.7	29,140.7	31,599.9	35,863.0	42,361.1	37,256.8	38,637.5
Cumberland												
Pounds	1,564.4	2,140.2	2,243.3	2,517.0	2,025.8	2,273.1	2,861.2	2,953.8	3,338.1	2,534.3	3,110.8	3,787.4
Value	1,330.1	2,112.9	2,617.1	2,059.3	2,059.3	1,194.5	1,435.1	1,557.1	3,594.3	1,703.4	1,716.1	1,956.6
Monmouth												
Pounds	5,207.6	4,816.4	7,129.2	9,551.9	8,445.1	8,007.1	7,797.7	10,479.7	11,176.8	9,692.4	22,755.6	22,037.9
Value	3,012.3	3,007.8	4,576.4	5,192.1	5,749.4	7,081.8	7,321.5	8,814.1	9,444.8	7,776.5	9,748.3	11,184.4
Ocean												
Pounds	18,032.6	17,852.6	18,227.5	23,164.5	20,885.2	21,970.4	23,402.0	24,712.7	23,637.5	27,422.5	36,498.2	28,461.7
Value	12,177.2	14,506.7	13,800.1	14,121.7	16,293.4	18,818.0	17,874.9	18,222.2	19,475.9	24,079.4	25,352.3	23,071.9
Salem												
Pounds	157.5	89.1	148.4	481.9	730.0	591.1	759.5	496.3	659.4	920.3	1,057.0	1,037.0
Value	50.9	39.8	67.1	200.4	342.1	278.4	328.7	246.3	247.3	399.1	538.8	485.2
Total Counties												
Pounds	90,685.1	86,724.3	111,199.1	107,030.9	111,869.4	115,938.4	112,663.2	128,460.2	149,379.1	175,847.6	204,309.6	195,342.9
Value	45,196.0	53,992.1	67,390.3	60,557.3	67,192.7	72,665.0	71,999.4	78,803.5	89,365.3	96,867.1	97,509.0	95,749.7
Average $/Lb.	.498	.623	.606	.566	.601	.627	.639	.613	.598	.551	.477	.490
Total All New Jersey												
Pounds	90,686.2	86,726.2	111,206.0	107,053.9	111,875.0	115,946.6	112,672.5	128,467.0	149,389.5	175,855.6	204,326.4	196,112.3
Value	45,197.1	53,994.4	67,398.7	60,570.0	67,198.8	72,672.4	72,009.7	78.811.7	89,365.3	96,880.0	97,531.1	96,301.0
New Jersey as % U.S.												
Pounds	1.42%	1.35%	1.72%	1.72%	1.80%	1.68%	1.57%	1.52%	1.59%	1.85%	2.12%	1.87%
Value	1.88%	2.29%	2.86%	2.62%	2.41%	2.33%	2.04%	2.43%	2.49%	2.55%	2.65%	2.77%