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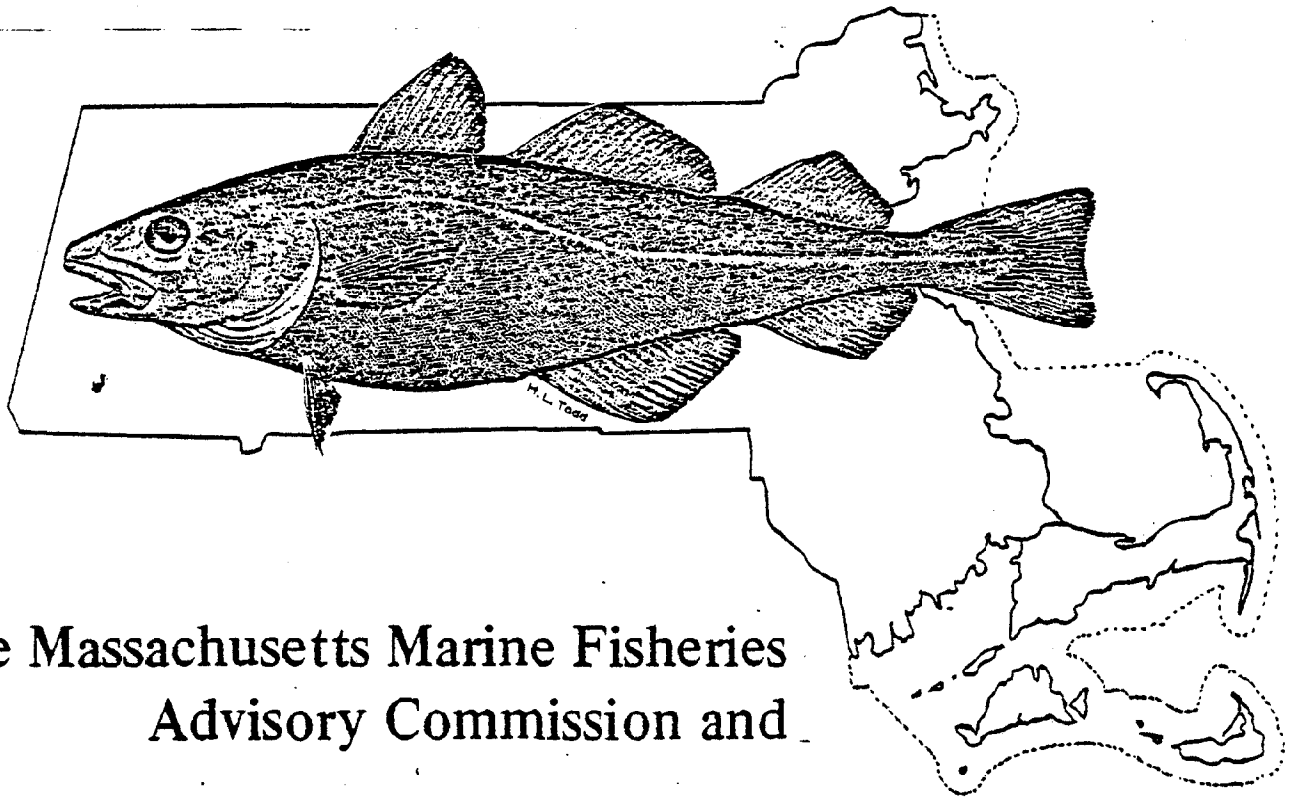
Massachusetts Marine Fisheries Management Policy Report



The Massachusetts Marine Fisheries Advisory Commission and

The Massachusetts Division of Marine Fisheries

:d by: Massachusetts Coastal Zone Management Program

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May, 1981

Commonwealth of Massachusetts
Edward J. King, Governor

Executive Office of Environmental Af
John A. Bewick, Secretary

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DIRECTOR

The Commonwealth of Massachusetts
Division of Marine Fisheries
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May 11, 1981

The Division of Marine Fisheries, supported by a Coastal Zone Management Grant, has developed a Marine Fisheries Management Policy to guide Massachusetts in the management, promotion, and development of its living marine resources. The need for a fisheries policy is based on the economic and social value of Massachusetts' living marine resources and the problems confronting the fisheries as evidenced by the following:

- Massachusetts commercial fishermen landed over $175 million worth of fish and shellfish in 1979.

- Massachusetts ranked fourth in the nation, after Alaska, California, and Louisiana, in value of fish landings.

- The 1979 value of fish landings exceeded the value of crops or livestock in Massachusetts.

- Massachusetts fish landing values have been increasing at an annual rate of 21% since 1975.

- Over 16,000 people in Massachusetts are employed in fishery related jobs.

- The fisheries are worth almost $900 million to Massachusetts in economic activity generated from commercial landings, recreational shellfish landings, and saltwater angling expenditures.

- Many fishing boats are facing bankruptcy because of increasing fuel, insurance and other costs while ex-vessel fish prices remain low.

- Sixty percent of the fish consumed in the U.S. is imported.

- Forty-two percent of the fish processing plants, and fifty-six percent of the fish processing employees in New England were located in Massachusetts in 1979.

- Massachusetts firms processed 68% of the total value of New England processed fish in 1976.

- Ninety percent of the frozen fish processed in Massachusetts is imported.

- Massachusetts has 2,081 commercial fish and lobster boats at 51 fishing ports along the coast.

- Five ports, Gloucester, New Bedford, Boston, Provincetown, and Sandwich, landed in excess of $1 million worth of fish in 1979.

- Most ports need redevelopment. Piers are old and overcrowded, many ports lack ice, cold storage, and offloading facilities, many harbors need dredging.

- In 1979, 824,000 people participated in marine recreational saltwater angling, shellfishing, and lobstering.

- Seven hundred and seventy-six thousand saltwater anglers, 35% from out-of-state, made 2.7 million trips and spent $30 million.

- Salt water anglers caught over 20 million fish in 1979, 56% of the total New England recreational catch.

- Boat ramps, fishing piers, and beach fishing sites are overcrowded, inadequate, and increasingly restricted from public usage. Some important sportfish stocks, such as striped bass are declining.

- Of the ten states with the highest fish landing value, Massachusetts spends the least for fisheries management and protection.

- Since the value of living marine resources to Massachusetts is so great, the problems faced by the fisheries so complex, and the funds to manage and develop the fisheries, so limited, Massachusetts needs a fisheries policy to set a course for preserving and protecting these important resources and industries. In general, the policies recommend:

    - modernization of port facilities
    - imporvement of fish quality
    - reduction of fishing costs

- increasing public access to recreational fisheries
- improving management of commercial and recreational fisheries
- informing and educating the public on fishery issues, fish products, and recreational opportunities
- improving law enforcement capabilities

The fishery policies will affect all recreational fishermen, commercial fishermen, fish processors, retailers and wholesalers. They will influence all marine related State programs and many intergovermental programs, but will primarily impact upon the Division of Marine Fisheries' management, promotion, and development of the fisheries. Policies on limited entry, enforcement, regulations, mariculture, research, fisheries enhancement, marketing, fisheries assistance, statistics, and licensing have been prepared. The public is encouraged to comment both in writing and at the following meetings:

June 15, 1981 - Gardner Auditorium, State House, Boston at 2:00 P.M.

June 15, 1981 - Memorial Hall, Court St. (Rte. 3A), Plymouth at 7:00 P.M.

June 17, 1981 - Lecture Hall C, Science Building, Cape Cod Community College at 7:00 P.M. Use parking lots 7 and 8.

June 22, 1981 - City Hall, Gloucester at 7:00 P.M.

June 25, 1981 - Main Library, 613 Pleasant St., New Bedford at 7:00 P.M.

For further information contact either Don MacIsaac or Tom Hotz at (617) 888-1155 or write to Division of Marine Fisheries, 449 Rte. 6A, East Sandwich, MA 02537.

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MASSACHUSETTS MARINE FISHERIES MANAGEMENT POLICY REPORT

May, 1981

Prepared for the
Massachusetts Marine Fisheries Advisory Commission
by the
Division of Marine Fisheries
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We also thank Assistant Director W. Leigh Bridges for his administrative support and program guidance, and Eleanor Bois and Marie Callahan for typing the manuscript.

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(May, 1981)

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I. Introduction

In recent years there has been renewed interest in the seas. Exploitation of offshore oil and minerals; utilization of fishery resources; competition for commercial, residential, and recreational uses of the coastal zone, and threats of environmental degradation have increased public concern for, and appreciation of, the marine environment. This concern has spawned state and federal regulations to protect the marine environment and resources. The federal Coastal Zone Management Act; Endangered Species Act; Marine Mammals Protection Act; Outer Continental Shelf Lands Act; National Environmental Policy Act; Marine Protection Research and Sanctuaries Act; and the Magnuson Fisheries Conservation and Management Act of 1976 (200 mile limit) has had a profound effect upon both the fishing industry and the state fisheries management agency.

With reductions in foreign fishing and possible increases in certain stocks, Massachusetts commercial fisheries have resurged. Commercial fish landings have increased and new boats have entered the fisheries. However, this prosperity created new problems and aggravated old ones. Additional vessels may have caused overfishing of certain stocks, conflicts between gear types increased, and competition with the expanding recreational fisheries intensified. Limited and poorly maintained port facilities were overtaxed, catch increases were not matched by increases in domestic and foreign market sales, seasonal gluts occurred, and ex-vessel fish prices fell.

Recreational fisheries also experienced problems relating to growth. Fishing effort has increased, but public access to the coastal waters via beaches, ramps, and piers has not kept pace. Some important sportfish species have declined, but programs to manage recreational fish are lacking.

Responsibility for these problems rests with the Commonwealth's fisheries agency, the Division of Marine Fisheries. In addition, the Division must deal with a myriad of environmental, conservation and management regulations, and programs recently promulgated by state and federal authorities. In light of the 200 mile limit, the nature of fisheries management in Massachusetts has changed drastically. Prior to 1977 the Commonwealth's participation in fisheries management was limited to the State's three-mile territorial waters. The State had no voice in managing fish stocks vital to Massachusetts fishing industry outside state waters.

Now Massachusetts plays an important role with the New England Fisheries Management Council and National Marine Fisheries Services in managing the fisheries in the Fisheries Conservation Zone (FCZ). As a participating Council member, the Division must provide information and comment on management plans. As part of a unified management approach the Division must manage fisheries in state waters in compliance with federal management regulations or face possible federal pre-emption of State management authority. This responsibility has placed an added burden on the Division's management, research, and statistics collecting programs.

Enactment of the 200 mile limit, growth of recreational and commercial fisheries, and increased government regulation make it necessary for Massachusetts to reassess its role relating to the fisheries. The State must coordinate agencies and programs to assure long-term stability of the fishing industry as well as wise management of the living marine resources. The first step in the development of a fisheries policy is to define the purposes, means, and responsibilities of the State in fisheries management, development, and promotion. A fisheries policy will provide guidance in decision making and stabilize management direction and philosophies. It will reduce conflicts, ommissions, and redundancy between State agencies. In addition, the public will obtain an understanding of their responsibilities in fisheries management and be more aware of the State's position on fishery issues. The policy will be a basis for cooperation amongst government, industry, and public for the benefit of the fisheries and the resources.

Massachusetts last examined its fishing industry and fishery programs in 1960. The report, "Final Report on the Studies of Massachusetts Marine Fisheries Problems", 1960, was prepared by the newly organized Marine Fisheries Advisory Commission, composed of members with commercial or recreational fisheries expertise. It reviewed major fisheries problems and made 18 recommendations for new regulations or programs to remedy them. The report provided the impetus for changes in fisheries that are still apparent today such as: state review of coastal alteration and wetlands projects, coastal pollution monitoring, efficient fisheries management by regulation rather than legislation, creation of a permanent Advisory Commission, creation of local shellfish constable positions, establishment of the University of Massachusetts Cooperative Fisheries Research Unit, acquisition of a research vessel, and provision for a Public Access Board. The recommended establishment of a Marine Eisheries Fund and an Estuarine Research Program allowed the Division to form a credible marine research program. Although the latter two recommendations are no longer in effect (the Marine Fisheries Fund was rescinded in 1975 by the Legislature, and the Estuarine Program was reorganized into Area Teams in 1977), the 1960 report provided the basis for the creation of a fisheries agency more responsive to fishery needs.

Some of the problems addressed in 1960, however, are still evident in 1981. The need for effective law enforcement capabilities, shellfish purification facilities, a seaworthy research vessel, a south shore research station, and sportfishing public access have not been addressed in the twenty years since first recommended. Meanwhile, recent developments have created more complex problems that require comprehensive and multidisciplinary approaches to fisheries management.

In 1978 Governor Dukakis issued Executive Order #156 calling for the Massachusetts Marine Fisheries Advisory Commission to develop a state fisheries policy. With continued support from Governor King, the Division of Marine Fisheries applied to Massachusetts Coastal Zone Management for a Coastal Fisheries Assistance Program (sec. 306) grant. In December 1979 the grant was awarded, and the Division, in conjunction with the

Marine Fisheries Advisory Commission, began policy development.

As a first step, 23 coastal states, the National Marine Fisheries Service (NMFS) and the Atlantic States Marine Fisheries Commission (ASMFC) were surveyed for existing fishery policy reports. Some states had fishery development plans, but only Alaska had a written policy outlining general management guidelines. The NMFS and ASMFC had fishery plans and policies that provided some useful information, but they dealt primarily with national and international issues that had little relation to Massachusetts fisheries. The lack of an adequate state fisheries policy model resulted in a considerable amount of time establishing a workable policy format.

To review and assess Division activities, a program questionnaire was created. Division project leaders were asked to describe their project's objectives, accomplishments, and funding. They identified how their project, and the Division as a whole, could provide improved public service. These questionnaires were reviewed by respective Assistant Directors (i.e. Bureaus of Research, Commercial Fisheries, Recreational Fisheries, and Administration), who, in turn, completed a bureau questionnaire.

The next step was to identify commercial and recreational fishery problems and issues, and provide a vehicle for the public to express their opinions. Two questionnaires were written, (see Appendix I). To obtain further public input, a series of meetings (Appendix V) were held along the Massachusetts coast in which issues and solutions were discussed in depth. Twenty-six meetings with commercial and recreational fishermen were conducted.

To define agency responsibilities and program coordination, a series of meetings with related government agencies were held (Appendix VI). Discussion centered on coordinating programs in which the Division participated, reducing duplication of independently run programs, and filling program gaps in which services are omitted.

During the input phase of the program, development of fisheries policies was initiated. Draft policy statements were formulated and submitted for comment to the Division's administrative and biological staffs, and the Marine Fisheries Advisory Commission. The administrative staff met with project personnel frequently to define and refine policies. The Marine Fisheries Advisory Commission met monthly to review, comment, and advise on policy development. After Division and Advisory Commission approval, this draft policy report is being made available for public and state agency review. After obtaining comments, the draft will be revised and the final report will be issued.

For purposes of this report, a policy is defined as the establishment of principles and guidelines for future action. Policies stated in this report do not relate to a particular situation or fishery but attempt to span the broad spectrum of fishing issues. These policies are intended to be general enough to maintain their relevance over time, but specific enough to provide guidance to administrators, biologists, and the public in dealing with fishery matters. In addition to policies, proposed actions

are included in the report. These are recommendations to improve existing situations. They may refer to ongoing programs, or suggest legislative or program changes necessary to bring Massachusetts fisheries and government closer to the stated aims of the policies. Informational sections are presented to provide the reader with an understanding and appreciation of fisheries and the agencies involved in protecting marine resources.

II. Massachusetts Fisheries

With commercial landings valued at $175.5 million in 1979, Massachusetts ranked fourth in the nation in value of fish landed (Table 1). In addition, $7.8 million worth of shellfish were harvested by recreational shellfishermen in 1978, and an estimated $30 million was expended by recreational rod and reel fishermen in 1979. The fisheries provide income for an estimated 16,200 (Mass. Division of Employment Security, 1979) to 16,443 people (Table 2), in such diverse fields as fishing, processing, wholesale, retail, bait and tackle, and charter and party boat fishing. An additional 824,954 people participated in Massachusetts saltwater recreational fishing in 1979 (Table 3).

Fishing and agriculture (i.e., livestock and crops) are the most valuable natural resource-based industries in Massachusetts. In 1979 their combined value was $431.1 million, of which 41% was derived from commercial fisheries (Table 4). The value of commercial fisheries has been growing at a 21% annual rate of increase since 1975, compared to a 6% annual rate for agriculture. Fish landings surpassed either crop or livestock value in 1978. Nationally, fish product value indices rose rapidly from 1967 to 1977, increasing by 239.4% versus 92% for crops (Council of State Governments, 1979).

While these statistics are impressive, they do not represent the real value of the Commonwealth's marine resources. First, the statistics themselves are taken from various sources, some of them estimates, some of them approximations and most of them underestimates of true fisheries value. As examples, the recreational finfish catch is commonly an estimate based on interviews of a very small portion of the total fishermen. Data on foreign fish imports to Massachusetts are unavailable because Federal Customs records imports by port of entry, not destination. Second, landing values are poor indicators of total fisheries economic impact. The fishery is a primary industry, meaning that unlike other industries producing a finfished product in one step, fishing is only the first in a series of steps. After the fish is landed it must be processed, packaged, distributed, and sold. This creates economic activity beyond the original landing value. The amount of additional economic activity generated by a dollars worth of product is commonly measured by an economic multiplier. In Rhode Island the multiplier for most industries is 1.69, but for fisheries it is 4.24 (Council of State Governments, 1979). This means for every $100 of fish landed, $424 worth of economic activity is generated in wages, materials purchased, services paid for, etc. Using the Rhode Island fisheries economic multiplier of 4.24, Massachusetts commercial fisheries landings generated $744 million in economic activity in 1979. Add to this the multiplied value of the 1978 inshore shellfish harvest ($7.8 million x 4.24 = $33.1 million), and a conservative estimate of recreational angling and its support industries in 1975 of $122 million, brings the total value of Massachusetts fisheries to almost $900 million.

The history of Massachusetts fisheries is based to a great extent

on the cod. This fish played such an integral part in the exploration of America, and the economic, political, and social life of Massachusetts and it's citizens that the Great and General Court of Massachusetts chose, in 1784, to hang a representation of the codfish in the House of Representatives as a memorial to its importance. The cod was important because of its abundance and storage qualities when salted and dried.

In 1497, John Cabot discovered the great codfish grounds of the Northwest Atlantic that would be exploited by Europeans for almost 500 years, spurring the colonization of America's Northeast seaboard. The first settlements in Maine and New Hampshire were fish curing stations established before the Pilgrims arrived. When the Pilgrims landed in Plymouth they were befriended by an English speaking Indian who had learned the language from fishermen. The Pilgrims came to escape religious persecution, but it was fishing that brought the first settlers to Gloucester, Marblehead, Salem, Weymouth, and Scituate (McFarland, 1911).

By 1630, the colonists had established a profitable fishing industry that was the only New England product valued in European markets. Because the New Englanders caught and salt-cured cod in winter, the quality was far superior than European fish and commanded a better price in the markets of Spain, Portugal, and France. To protect its' only industry, the General Court of Massachusetts established a commission for management and quality control of the fish trade in 1635. Low quality or "refuse" salt cod was shipped to the West Indies islands to feed the slaves. In trade, the boats returned with sugar and molasses to supply the new rum distilleries in Newport and Boston. This trade soon evolved into the "Golden Triangle" trade route which lasted for fifty years until the Revoluntionary War in 1775 (Jensen, 1972). New England boats brought salt cod to Europe, picked up slaves along the African coast, traded the slaves in the West Indies for sugar and molasses, and returned to New England. Many of New England's most famous families earned their fortune in the Golden Triangle trade.

Massachusetts fisheries prospered in the decade between 1765 and 1775, with 20 towns cod fishing, 605 boats fishing, 4,175 fishermen, and 9,600 men involved in curing, packaging, and transporting (McFarland, 1911). However, the Revolutionary War devastated the fisheries with losses in fishermen, boats, docks, and gear. One of the most important negotiating points in the subsequent peace treaty was the fishing rights in Canadian waters. Although John Adams secured the fishing rights, it was not the last dispute over U.S.-Canadian fisheries. Six times from 1811to 1911 treaties, conventions, and international arbitrations attempted to define fishing rights in Northwest Atlantic waters.

In addition to the direct effects of the war, the fisheries suffered from foreign import duties and fishing subsidies. To aid the fisheries, in 1791 Congress approved allowances to fishing vessels based on vessel size, amount caught, and months fished. This allowance was increased in 1819 under the stipulations that a logbook be kept and that fishermen would not be paid wages, but be compensated by a share of the sale of the

catch. The act was repealed in 1866 but the share or lay system of payment still exists.

By the 1860's the fisheries had stabilized. Although salt cod was still the most important product, mackerel (salted or pickled) had been growing in value since 1815. The European trade diminished only to be replaced by demand from the expanding western states. The last half of the century saw the rise of Gloucester as a center for salt cod, mackerel, and halibut, surpassing landings at Boston and Provincetown combined.

With the advent of the steam engine at the turn of the century, and otter trawl shortly thereafter, the fisheries changed. More fish could be landed in shorter trips, making fresh fish more available. As demand for fresh fish increased, Boston became the leading fishing port because it was the New England marketing and transportation center. Dependent on the salt cod fishery, Gloucester suffered from decreased demand and cheaper Norwegian, Canadian, and Icelandic imports in the 1920's and 30's (Boeri and Gibson, 1976). However, Gloucester's processing industry survived by processing imported salt cod, improving filleting techniques, and developing new processing methods (e.g., Clarence Birdseye quick-freezing). The improvements in transportation and processing allowed the introduction of new species to the fresh and frozen markets of the East and Midwest.

During World War II, New England fisheries prospered due to military contract buying and the European nations inability to fish. Exports were five times the amount of imports and for the first time fishermen were guaranteed a price for fish landed. However, after the war contract buying ceased and operating costs rose with postwar inflation. With the economy improving in the 1950's, demand for fish increased. Fishermen began to reduce their catch to raise prices. In a countermove, processors turned to imported fish to meet demand and found readily available supplies and lower prices from Canada and Iceland. Fish price increases reduced the effectiveness of fresh fish import tariffs based on weight. In addition, frozen whole fish and fish blocks were imported duty-free. In 1953, introduction of the frozen fish block that could be processed into fish portions and fish sticks caused a boom in the convenience food retail market and fast food franchises. Unfortunately for domestic fishermen, over 80% of frozen fish blocks were imported. U.S. fishermen were increasingly restricted to supplying the limited fresh fish market. By 1974, frozen imports were 15 times greater than domestic production (Massport, 1977).

In 1961, Russian fishing ships began fishing Georges Bank. They were followed by fleets from 15 other countries until there were approximately 300 large trawlers off our coast. Initially, the highly efficient foreign vessels fished only the non-traditional species such as hakes, herring, and squid. However, with foreign effort increasing, more of the traditional New England fisheries, particularly haddock, began to feel the mounting fishing pressure.

Table 1. Comparison of the ten top ranked states according to commercial fish landing value in 1979 with fiscal year 1981 expenditure for state marine resource programs.

	Millions of Dollars[1]	Millions of Pounds[1]	Expenditures in Millions of Dollars[2]
Alaska	597.0	898.5	26.3
California	227.5	728.4	12.1
Louisiana	198.5	1,529.1	3.5
Massachusetts	175.5	374.7	1.3
Texas	160.2	84.9	2.2
Florida	124.0	163.0	2.3
Washington	116.0	170.0	67. *
Virginia	84.6	572.7	1.9
Maine	80.3	232.1	2.7
North Carolina	58.4	390.5	1.7

* 55 million Salmon

[1]Fisheries of the U.S., 1979.

[2]Personal communication with Atlantic States Marine Fisheries Commission, data is exclusive of law enforcements costs.

Table 2. Estimates of the number of vessels and people employed in various sectors of the Massachusetts fisheries, 1977-1979.

	1977		1978		1979	
	vessels	people	vessels	people	vessels	people
Draggers[1]	933	3,359	1,170	4,212	1,629	5,664
Lobster[2]	1,513	1,513	1,560	1,560	1,674	1,674
Shellfish	632[3]	3,596[3]	861[4]	3,621[4]	NA	NA
Charter boat[5]	-	-	125	250	-	-
Party boat[5]	-	-	91	283	-	-
Bait and tackle dealer[6]	-	-	-	276	-	-
Boat rental[6]	-	-	NA	90	-	-
Processing[7]	-	6,253	-	6,040	-	-
Mariculture[8]	-	-	-	-	-	111

[1]Number of vessels is the sum of boat licenses and offshore lobster licenses issued by DMF. This assumes that most offshore licenses were issued to boats that primarily fish finfish and catch lobsters incidentally.

[2]DMF lobster licneses, combining coastal commercial and coastal seasonal only.

[3]Kilbride, 1978.

[4]Anderson, 1979.

[5]Nicholson and Ruais, 1979.

[6]Massachusetts Salt Water Fishing Guide.

[7]NMFS, Fishery Statistics of the United States, 1978, 1979.

[8]Personal communication, Michael Hickey, DMF, 1979.

Table 3. Estimated number of participants in Massachusetts marine recreational fisheries for 1977 to 1979.

	1977	1978	1979
Lobster[1]	8,559	8,915	10,479
Shellfish	38,727[2]	38,222[2]	38,475[3]
Angling	NA	NA	776,000[4]

[1]DMF license statistics.

[2]As reported by shellfish constables of coastal cities and towns.

[3]The average of the number of shellfish licenses issued in 1977 and 1978.

[4]NMFS, Marine Recreational Survey, Atlantic and Gulf Coasts, 1979, Washington, 1980.

Table 4. Estimated value of Massachusetts agriculture (based on cash receipts from farm markets)[1] and fisheries (based on ex-vessel price)[2] for 1970-79 in millions of dollars.

	Livestock & products	Crops	Total agriculture	Ex-vessel fish prices
1970	-	-	168.6	47.0
1971	82.2	76.4	158.6	48.3
1972	84.6	75.1	159.3	56.8
1973	105.0	84.3	91.1	56.2
1974	104.4	96.3	200.7	62.3
1975	107.6	98.7	206.3	82.9
1976	109.3	111.9	221.2	95.8
1977	105.1	120.5	225.6	114.0
1978	112.2	129.9	242.1	152.3
1979	117.8	137.8	255.6	175.5

[1]Dept. of Food and Agriculture, Massachusetts Agricultural Statistics, 1970-1979.

[2]Fisheries statistics of the U.S., 1971-1980.

Management responsibility for fisheries outside the 12 mile U.S. contiguous zone belonged to the International Commission for the Northwest Atlantic Fisheries (ICNAF), organized in 1950. While ICNAF's research was fairly accurate, its management efforts were ineffective. In 1973 a bill was submitted to Congress to extend U.S. management jurisdiction to 200 miles. The Fisheries Conservation and Management Act was passed in 1976, resulting in reduced foreign fishing effort and revitalization of U.S. and Massachusetts fisheries.

The following sections describe the various aspects of the fisheries, their value, and interdependency. While each section is separated for discussion purposes, the components within the fisheries are interrelated. The amount and type of fish landed is directly related to gear, regulations, processing capabilities, and imports. A change in the status of one component will affect the fisheries as a whole. The coordination and interplay of the various parts provide Massachusetts with one of it's most valuable resources.

A. Fisheries

1. Finfish

There are approximately 46 edible finfish species of varying value in the Massachusetts fisheries. Massachusetts landings of 18 of these species were worth $90.4 million in 1979, an increase of over $30 million in two years (Table 5). There were an estimated 779 finfish vessels, employing 2,789 fishermen in 1977. About 62% of the vessels were draggers, 12% gillnetters, and 23% using various gear such as gillnets, long lines, pots, and trawls, depending on the season (Mass. Division of Marine Fisheries, 1977).

Groundfish or bottomfish is a term to describe a number of commercial species dwelling on or near the bottom. These fish are primarily caught by otter trawl; however, some are caught by line trawl and recently gillnetting has become an important catch method. While the federal groundfish management plan covers only cod, haddock, and yellowtail flounder, other species such as pollock, whiting, the hakes (red and white), redfish, anglerfish, and five flounder species (winter flounder, grey sole, American dab, windowpane, and fluke) can be considered in the groundfish category. In 1979, the combined value of cod, haddock, and yellowtail was $50.1 million, almost twice the total value of other groundfish species ($27.0 million). While some fishing effort is directed specifically towards redfish, whiting, and flounder, most other groundfish species are caught incidentally in the cod, haddock, and yellowtail fishery.

There is a seasonal directed otter trawl fishery for whiting (also called silver hake) from May to November from Cape Cod Bay to Gloucester. Massachusetts boats landed 60% of the 1977 catch in the northeast, with Gloucester as the primary port. This species is usually processed frozen for human consumption but is sometimes converted to fish meal for pet food.

Nighttime midwater trawling for adult sea herring in recent years has become a profitable new fishery in Massachusetts and Cape Cod Bay. In addition to out-of-state vessels, there were three sets of Massachusetts pair trawlers fishing state waters and landing their catch in Gloucester in 1977. Gear conflicts with fixed lobster gear made it necessary to impose areal and seasonal closures for this gear in 1976. However, from 1977 to 1979, landings have increased 13.1 million pounds and value has almost doubled to $3.6 million.

Menhaden is an oily, unpalatable member of the herring family that is usually processed for poultry feed and oil. It is fished in the harbors and coastal waters by purse seiners (5 in 1977), and landed in Gloucester for processing. This migratory, schooling fish is sensitive to temperature and oxygen conditions. Cool summer temperatures may reduce migration into Massachusetts waters. Oxygen depletion and other causes may induce massive kills. Landings over the past three years have fluctuated from a high of 56 million pounds in 1972, down to 17.4 million in 1977 and back up to 48 million pounds in 1978. Menhaden were second to cod, for total pounds landed in 1978.

Atlantic bluefin tuna is a highly migratory species that enter state waters during the summer months and are fished by hand gear or purse seine. Previous to 1977, this was primarily a recreational fishery conducted by rod and reel from charter boats, although harpoons, handlines, and purse seines have been used since the 1940's. When Japanese buyers began purchasing tuna, the price per pound rose from $ .05 to well over $1.00. Since some tuna exceed 1,000 pounds each, the fishery quickly became more commercial than recreational. In 1977, 3,704 hand gear permits (e.g. land line, harpoon, or rod and reel) were issued by NMFS, and two purse seiners (limited to two by state regulation) were operating in state waters.

Because of increasing demand for adult eels in Europe, eel fishing in Massachusetts has increased in recent years. Eels are catadromous fish which leave fresh water and coastal estuaries to spawn in deep water in the Caribbean. Young eels (elvers) return to the streams and grow to adults living up to 20 years. Eels are under town management, but the Division has promulgated broad base state regulations. While no uniform reporting system exists, the best catch estimate made by Division personnel is 150,000 pounds landed, worth $90,000 in 1977.

2. Shellfish

There are over 12 shellfish species of commercial or recreational value in Massachusetts fisheries. Included in this group are species caught by otter trawl (squids), drags (sea scallops, bay scallops), pots (conchs), hydraulic dredges (sea clams and ocean quahogs), and hand gear (soft-shell clams, bay scallops, oysters, razor clams, mussels, and quahogs). In 1979, 22.6 million pounds of shellfish worth over $54.1 million were landed in Massachusetts commercial shell-

fisheries according to NMFS statistics.

Sea scallops ($48.3 million) accounted for 89% of total shellfish landing value, and 28% of total fish landing value. The sea scallop fishery has prospered since 1974 when a large population of scallops was found on western Georges Bank. Both landings and price per pound increased yearly until 1978, when landings began to decline although price per pound continued to increase. In 1977, 90 vessels and 1,000 fishermen were fishing from 8 Massachusetts ports: New Bedford, Provincetown, Martha's Vineyard, Sandwich, and Chatham were the most significant ports. Although scallops are the most valuable shellfish to Massachusetts fisheries, they are predominantly caught outside state waters and are under federal management control.

Interest in the two New England squid species, long finned (Loligo) and short finned (Illex) as domestic and export fish products has increased in recent years. The larger sized Illex squid is fished north of Cape Cod by inshore trawlers. The smaller Loligo squid supports an inshore spring trawl fishery during its spawning migration south of Cape Cod. While both species support seasonal trawl fisheries, they are considered underutilized and could provide greater landings and value to Massachusetts fisheries.

The inshore recreational and commercial fisheries for quahog, soft-shell clam, oyster, bay scallop, razor clam, sea clam, mussel, and other shellfish, were valued at $8 million and $9.8 million in 1977 and 1978, respectively (Table 6). Bay scallops (60%) and quahogs (21%) provided the greatest value to the predominantly hand raking and small boat, scallop dredge fisheries. Numbers of participants in the inshore shellfisheries averaged 41,560 in 1977 and 1978 (Table 7). In 1977 and 1978, the vast majority of participants in the shellfisheries (94% and 91%, respectively) were recreational fishermen. These fishermen accounted for 80% (1977) and 84% (1978) of landed shellfish value (Kilbride, 1978; Anderson, 1979).

3. Crustaceans

This group of 5 commercially important species contributed a reported 11.5 million pounds of landings and $17.2 million to the total Massachusetts fisheries in 1979 (Table 5). The lobster fishery, with its incidental catch of rock and jonah crabs, is the most valuable fishery conducted within state waters. The offshore red crab is a small but stable fishery, while the inshore-offshore northern shrimp fishery has suffered a drastic decline in recent years.

Lobster fishing had primarily been an inshore pot fishery under state management before offshore otter trawl and then pot fisheries developed on Georges Bank in the 60's and 70's. The Massachusetts lobster fishery can be divided into three components: coastal commercial, coastal recreational, and offshore commercial. Total 1978 lobster landings and value for all components were 8.9 million

pounds (Anderson, 1979) worth $16.9 million, about 25% of U.S. landings (Table 8). The coastal commercial lobster fishery is further divided into regular and seasonal licenses. Since 1945, the regular commercial fishery has been limited to a maximum of 1430 licenses to control expansion of the fishery and reduce the risk of overfishing. Due to new lobster license legislation to become effective in 1981, 100 licenses (80 thereafter) will be added each year from a list of applicants with fisheries experience. Seasonal commercial licenses are issued only to fulltime students (288 in 1979), and allows them to fish a maximum of 25 pots from June 15 to September 15. In 1979, 10,479 coastal recreational licenses were issued (Table 9), allowing sportfishermen to dive or fish up to 10 pots for family consumption. The third license category, the offshore permit, allows lobsters caught in out-of-state waters to be landed in Massachusetts. The reported 1978 offshore catch was 1.9 million pounds, worth $3.6 million (Anderson, 1979). This fishery is conducted by pot and otter trawls on board vessels primarily out of Harwich, Sandwich, and Westport. Many of the 521 offshore permits issued in 1979 were to finfish boats to allow them to land lobsters caught outside 3 miles incidental to trawling operations.

Although commercial license holders comprise only 18% of lobster fishermen, in 1978 they accounted for almost 97% of the reported lobster catch. Most of the lobstering activity occurs in Essex and Plymouth counties, which account for 61% of total licenses and 62% of pounds caught in 1978. In the same year, the total value of lobsters landed plus boat, pot, and diving gear value was $34.2 million. The value of the Massachusetts lobster fishery has increased over the years, as has the number of participants. Even though coastal commercial licenses have been limited since 1975, the number of licenses issued in all categories has increased 28% from 1976 to 1979 (Table 9).

Red crabs are large, deep water (250-400 fathoms), offshore crustaceans that support a small pot fishery based in New Bedford. The fishery was worth almost a million dollars in 1979 (Table 5). Crabs are kept alive onboard the vessels until cooked and shucked onshore. The meat is frozen in five pound blocks, and the legs are sometimes individually quick frozen (IQF).

Northern shrimp are a small but long-lived (six years) shrimp species that has sustained a trawl fishery in the Gulf of Maine off and on for over 40 years. Massachusetts, Maine, and New Hampshire boats began to seriously exploit this resource in the early 60's, but by the 70's the declining fishery faced reduced fishing seasons and catches.

The shrimp trawl fishery out of Gloucester between 1969 and 1975 averaged 6.4 million pounds landed and up to $5 million in value. The fishery, formerly conducted year round off Gloucester by as many as 52 boats in 1973, has declined to a short winter fishing season with annual catches not exceeding a million pounds since 1976. Although

explanations for the decline differ, a probable combination of overfishing and unfavorable environmental conditions reduced the shrimp population in spite of management efforts by Massachusetts, Maine, New Hampshire, and NMFS under ASMFC auspices.

4. Recreational Angling

Recreational angling for sportfish has always been presumed to be a small component of Massachusetts fisheries. However, recent NMFS data indicate that sportfishing accounts for a surprisingly large share of the edible fish harvest, estimated between 40-50%.

Because recreational fisheries are so difficult and expensive to survey, statistics tend to be incomplete and imprecise. In addition, since fishermen are unlicensed, fish at irregular times, and over large areas, it is difficult to estimate the real value of sportfisheries. Defining a fisherman as recreational or commercial is a problem because no distinct boundary separates the two groups. In Massachusetts one can land and sell a giant Atlantic bluefin tuna for $1,500 without a commercial rod and reel license, while someone who catches and sells $63 worth of scup (based on estimated 1980 value for 100 pounds plus one fish) must be licensed. Many anglers sell thousands of pounds of fish each year and still consider themselves recreational fishermen.

There are four categories of recreational angling based on method used to fish: from a pier or jetty, from a beach, onboard a party or charter boat, and onboard a private or rental boat. In the recent federal recreational fishing survey conducted in 1979 (NMFS, 1980), an estimated 776,000 people made over 2.7 million salt water fishing trips in Massachusetts. Interestingly, 275,000 (35%) of the total recreational anglers were out-of-state residents, indicating that sport fishing is an important attraction for tourism (Table 10). In New England, the average fishing trip lasted 3.9 hours, cost $10.60, and involved traveling 30.3 miles (Table 11). Out-of-the-pocket expenditures by Massachusetts fishermen in 1979 was estimated at $30 million. Of the four fishing categories, private/rental boat fishing was the most successful, averaging 6.2 fish caught per trip, accounting for 79% of the weight of fish caught and 54% of the trips in the region. The U.S. Coast Guard's Annual Boating Statistics for 1977 reported 170,000 private marine recreational boats in Massachusetts. It was estimated (Bromberg, 1973, cited in Nicholson and Ruais, 1979) that in 1973 there were 34,390 private boats in Massachusetts used in salt water angling. The federal fishing survey revealed that Massachusetts fishermen caught 20.5 million fish, 56% of the total fish catch (numbers) in New England. The species most sought after by fishermen in the region (Table 12) were bluefish (24%) and winter flounder (19%), while 26% of the fishermen had no preference. The most commonly caught species in Massachusetts (Table 13) in terms of millions of fish were winter flounder (10.2), cod (1.8), pollock (1.5), and mackerel (1.1).

Accurate estimates of total economic impact of recreational fishing are difficult to obtain because they involve estimates of sales of fishing tackle, boats, motors, trailers, fuel, food, lodging, travel expenses, insurance, and other costs. In 1975 an estimated $3.4 billion (U.S. Dept. of Interior, 1977) was expended nationwide on saltwater fishing. In New England and New York in 1975, after sales, value added, wages and capital expenditures were considered, the total economic impact of recreational fisheries was $610 million, with an estimated 8,300 people employed (Centaur, 1977, as cited by Nicholson and Ruais, 1979). Assuming that 20% of the value and employment figures were generated in Massachusetts (Based on 20% of total fishing trips in New England and New York area 1979), then the Commonwealth's recreational fisheries total worth was an estimated $122 million, and employed 1660 people in 1975.

Money spent by recreational anglers contribute to the Massachusetts restaurant, hotel, and tourism industries. Anglers are the main support to the charter and party boat, bait and tackle, and boat rental businesses. An estimated 91 party boats and 125 charter boats, with carrying capacity of 4,631 and 750 respectively, operate in Massachusetts (Nicholson and Ruais, 1979). Party and charter boats charge a fee for carrying saltwater anglers to fishing grounds. Party boats are usually large vessels with an average capacity of about 51 fishermen. The captain decides where and what to fish. While they pursue cod throughout the fishing year, other species fished include: winter flounder in spring; pollock, bluefish, fluke, and haddock in summer; and winter flounder, pollock, and haddock in fall. In contrast, charter boat fishermen have more influence in what is fished and they most commonly seek bluefish and striped bass in the summer months. These boats are generally smaller and carry 6 or less people (limited by Coast Guard regulation).

While making 8% of the trips in New England in 1979, charter and party boats accounted for 10% of the recreational catch (Table 14). Data from Nicholson and Ruais, 1979, indicate that seasonal employment in the Massachusetts charter and party boat industries averages 250 and 283 people, respectively (Table 14).

There are 138 bait and tackle shops and 45 boat rental operations located in coastal Massachusetts that are dependent on recreational fishing. In addition, there are 148 public and private coastal boat launching ramps in Massachusetts waters, approximately one every 14 miles of coastline. Assuming that two people are employed per boat rental and bait and tackle operation, the total estimate of people employed at some time of year by Massachusetts recreational fisheries, including charter and party boats, is 899 (Table 14). While the involvement of people and expenditure of money in recreational fisheries is probably large, the precise value of recreational fisheries in Massachusetts is still an unknown quantity.

Table 5. Massachusetts commercial landings and value of selected species and total landings and value for all species, 1977-1979 (in millions of pounds and millions of dollars).

	1977		1978		1979	
	Pounds	Value	Pounds	Value	Pounds	Value
Cod	41.4	13.7	49.2	17.2	81.3	23.9
Haddock	25.1	8.0	33.2	10.6	33.4	14.2
Pollock	16.2	2.4	21.6	3.8	19.7	4.0
Hakes	5.8	0.8	6.2	9.9	6.4	1.1
Yellowtail flounder	28.1	13.3	33.2	10.6	22.9	12.0
Other flounder	34.1	11.5	38.8	17.6	35.8	15.7
Redfish	14.2	2.2	13.1	2.3	16.1	3.6
Whiting	27.2	2.3	27.2	3.8	7.6	1.4
Sea herring	37.7	1.4	40.5	2.7	50.8	3.6
Atlantic bluefin tuna	1.6	1.1	2.1	2.1	2.1	3.2
Swordfish	0.8	1.2	4.2	5.6	3.7	5.8
Menhaden	17.4	0.4	49.0	1.2	29.0	0.7
Anglerfish	1.9	0.7	2.2	0.8	2.6	1.2
Total all finfish[1]	279.3	62.1	336.5	83.3	329.4	94.5
Lobster	5.1	9.3	7.3	14.4	7.7	16.0
Rock crab	0.1	-	0.3	0.6	0.2	0.1
Northern shrimp	0.5	0.3	0.1	-	0.9	0.3
Red crab	2.5	0.8	2.7	0.9	2.7	0.9
Total all crustaceans[1]	8.3	10.5	10.3	15.4	11.5	17.2
Quahog	0.3	0.7	0.5	0.9	0.5	1.5
Soft-shelled	0.1	0.3	0.1	0.2	0.3	0.7
Surf	0.2	0.1	-	-	-	-
Conch	0.1	-	0.1	0.1	0.1	0.1
B. scallop	0.2	0.5	0.3	1.1	0.3	1.4
S. scallop	17.0	28.0	17.0	42.2	14.2	48.3
Squid	3.1	0.5	1.2	0.2	7.0	2.0
Total all shellfish[1]	20.1	30.1	18.8	44.7	22.6	54.1
Total all species[2]	319.3	114.0	376.9	152.3	374.7	175.5

[1]NMFS, Massachusetts landings, 1978, 1979 with Massachusetts supplemental landings added.

[2]NMFS, Fisheries of the United States, 1978, 1979.

Table 6. Combined commercial and recreational shellfish harvest and estimated value for Massachusetts in 1977 and 1978.

	1977		1978	
	Bushels	Value *	Bushels	Value *
Quahog	181,123	3,224,421	104,267	2,081,441
Soft-shelled clam	62,133	1,353,118	56,698	1,363,708
Oyster	23,403	386,510	4,978	86,397
Bay scallop	151,731	2,388,573	297,329	5,978,874
Razor clam	754	11,048	722	12,226
Sea clam	36,543	281,171	14,339	108,423
Mussel	24,914	73,371	15,312	95,805
Other	43,882	375,079	14,004	146,142
		8,093,291		9,873,016

*Calculated by using value of commercial harvest price/bushel expanded to include recreational catch.

[1]Kilbride, 1978

[2]Anderson, 1979

Table 7. Number of shellfish permits issued by the local cities and towns of Massachusetts in 1977 and 1978.

	1977[1]	1978[2]
Resident family	33,036	31,254
Non-resident	4,776	3,995
Commercial	2,550	3,621
Other	915	2,973
	41,277	41,843

[1]Kilbride, 1978

[2]Anderson, 1979

Table 8. Massachusetts coastal and offshore lobster landings and values for 1977 and 1978 (in millions of pounds and millions of dollars).

	1977[1]		1978[2]	
	Pounds	Value	Pounds	Value
Coastal commercial	5,432,427	10,136,748	6,729,745	12,748,445
Coastal recreational	333,103	621,560	298,853	554,139
Offshore commercial	488,465	967,811	1,897,699	3,633,048
	6,253,995	11,726,119	8,926,297	16,947,622

[1]Kilbride, 1978

[2]Anderson, 1979

Table 9. Number of lobster licenses issued by the Division of Marine Fisheries from 1976 to 1979[1].

	1976	1977	1978	1979
Coastal commercial	1,369*	1,371*	1,368*	1,386*
Coastal seasonal	146	142	192	288
Coastal recreational	8,122	8,559	8,915	10,479
Offshore commercial	243	298	414	521
	9,880	10,370	10,889	12,674

[1]Division of Marine Fisheries license records.
*Moritorium on licenses.

Table 10. Estimated number of marine recreational fishing trips and participants in Massachusetts, 1979[1]

	Coastal Residents	Non-coastal Residents	Out-of-state Residents	Total Participants
Number of trips	2,015,000	166,000	562,000	2,743,000
Number of participants	454,000	47,000	275,000	776,000

[1]Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts, 1979, NMFS, 1980.

Table 11. Estimated marine recreational fishery cost, effort, and catch statistics for New England region in 1979[1].

Method	Hrs	Mean Cost	Miles (one way)	# fish caught/trip	% weight fish caught	# of trips (thousands)
Pier/jetty	3.2	3.7	19.0	3.1	7	1,425
Beach	3.5	8.1	28.9	1.7	4	1,254
Party/charter	4.1	27.1	60.8	4.7	10	533
Private/rental	4.7	12.5	31.1	6.2	79	3,771
All methods	3.9	10.6	30.3			

[1]Marine Recreational Fishing Statistics Survey, Atlantic and Gulf Coasts, 1979, NMFS, 1980.

Table 12. Percentage of type fish sought and estimate number of fish caught by New England recreational anglers in 1979[1].

Species	Species sought as % of interviews *	Number caught (thousands)
No preference	26	-
Bluefish	24	4,824
Winter flounder	19	12,448
Mackerel	9	2,172
Cod	8	2,602
Striped bass	6	185
Other fish	6	2,499
Tautog	6	999
Pollock	4	2,277
Flounder, summer	3	571
Flounders	3	523
Smelt	3	644
Scup	3	4,581
Total catch all species		40,064

* Exceeds 100% because of multiple answers.

[1]Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts, 1979, NMFS, 1980.

Table 13. Estimated Massachusetts marine recreational fishery catch in numbers and percent for 1979[1].

Species	Number (thousands)	Percent
Winter flounder	10,249	45
Cod	1,835	8
Pollock	1,510	7
Mackerel	1,093	5
Bluefish	969	4
Scup	949	4
Tomcod	698	3
Smelt	521	2
Herrings	475	2
Flounder, summer	378	2
Black sea bass	330	1

[1]Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts, 1979, NMFS, 1980.

Table 14. Estimated number of people and vessels involved in recreational fishing support businesses in Massachusetts.

	Vessels or dealers	People
Charter boats[1]	125	250[1]
Party boats[1]	91	283[1]
Bait and tackle dealers[2]	138	276*
Boat rental dealers[2]	45	90*
TOTAL		899

[1]Nicholson and Ruais, 1979.

[2]Massachusetts Salt Water Fishing Guide.

*Estimated on the basis of two people per dealer operation.

5. Other marine resources

In addition to the well known commercial and recreational species, there are other marine organisms of substantial, but for the most part, undocumented value. The bait fisheries supply recreational rod and reel fishermen, and party and charter boat operators with seaworms, shellfish, and finfish for bait. Seaworms are the most valuable bait species, bringing about $2.50 per pound to the diggers. Squid, surf clams, ocean quahogs, and grossly contaminated soft-shelled clams are commonly used as bait for cod, haddock, mackerel, and flounder. Menhaden, minnows, small eels, and certain small shrimp species provide bait for striped bass, bluefish, and smelt. Small unmarketable finfish and refuse from processed commercial species are employed for lobster bait. While bait fisheries are undoubtedly valuable, estimates of actual value are not available.

Marine algae are sometimes harvested for food purposes. In Canada dulce is gathered and dried for human consumption. In Massachusetts, particularly on the South Shore, Irish moss (*Chondrus crispus*) is raked from intertidal rocks and processed for carrageen, a binding substance used in ice cream and makeup. The Irish moss harvest in 1978 was reportedly worth over $14,000 (Anderson, 1979).

Other commercial and recreational fisheries exploit marine species on a small scale basis. Periwinkles and limpets are harvested to fill ethnic market demands. Horseshoe crabs are in demand not only for eel bait, but also for medical research. Blue claw crabs support a popular recreational dipnet fishery in Nantucket Sound. Adequate data does not exist to substantiate the actual value of these fisheries.

In recent years, public appreciation of the marine environment's aesthetic values have increased. The annual spring alewife runs attract hundreds of spectators. The public is willing to expend money to observe marine fauna in their natural habitat as evidenced by the popularity of whale watching and SCUBA diving. Because these activities support commercial ventures it underlines the importance of maintaining the quality of the marine environment.

B. Fishing Ports

There are 51 commercial fishing harbors in Massachusetts (Figure 1). Five ports (based on 1977 landing exceeding $1 million) can be considered of major commercial importance: Gloucester, New Bedford, Boston, Provincetown, and Sandwich. Other ports of importance are: Chatham, Plymouth, Scituate, Hyannis, Martha's Vineyard (four harbors), and Nantucket. Each port differs in number and types of vessel, processing, port facilities, and species landed. Within each port, the catch varies with fluctuations in fish prices and seasonal fish migration. Addition of new boats, transient nature of the fleet, and seasonal gear changes (e.g. from lobstering to gill netting) make it difficult to categorize the numbers and types

of vessels in each port. According to DMF estimates, these eleven ports in 1977 accounted for 252 million pounds of fish (not including sea scallops, shellfish, and lobsters), valued in excess of $56 million, employing an estimated 2083 fishermen on 565 finfish boats (Table 15). In 1979, the number of finfish boats in these eleven ports increased to an estimated 628 (Table 16, Martha's Vineyard and Nantucket totals were estimated). Landings in the five major ports in 1979 accounted for 84% of the catch and 73% of the value of all commercial species landed in Massachusetts.

1. Gloucester

Gloucester is a fresh fish harvesting port, and also a frozen fish processing port. It has consistently been the leading New England port in terms of volume landed and is ranked seventh nationwide. In 1979, 160.2 million pounds of fish worth 29.7 million dollars (Table 17) were landed in Gloucester by a fleet of 369 vessels (Table 16). Finfish vessels numbered 243, and consisted of offshore and inshore trawlers, gillnetters, seiners, herring pair trawlers, and Danish seiners. The 126 lobster boats made this port the leading lobster center on the North Shore. Groundfish, whiting, menhaden, sea herring, redfish, and shrimp are important to the fresh fish industry. The areas fished encompass the Gulf of Maine and Georges Bank.

While fresh fish is important to the fishermen, only one out of the 12 processors deals solely in fresh fish. Much of the fresh fish is shipped to New Bedford, New York, and Philadelphia. The lack of processing, cold storage, and offloading facilities restricts the quantities that can be landed and the price that can be paid. Many processors deal with imported frozen fish and fish blocks.

2. New Bedford

New Bedford is noted for both fresh fish and scallops worth over $40 million in 1977. Scallops alone accounted for $20.2 million or half the value of the total catch. The 164 finfish, 50 scallop, and 17 lobster boats, landed 86.0 million pounds of fish valued at $67.4 million in 1979. Many of the draggers are new steel hulled vessels. Fishing is conducted for scallops on Georges Bank and Nantucket Shoals, for yellowtail on Nantucket Shoals and Rhode Island Sound, and for cod and haddock on Nantucket Shoals and Georges Bank.

Twelve of the fifteen processors handle fresh fish, mostly flounder, cod, and haddock. In 1977, an estimated 700 to 800 people were employed in fish processing. Although processing and cold storage facilities exist, docking space is limited.

3. Boston

While Boston ranked third in Massachusetts in pounds landed (30.3

million) in 1979, it is primarily a center for fresh fish importing and processing. Fresh fish is trucked in from Canada, Maine, and other Massachusetts ports. Boston's 21 fresh fish and 5 frozen fish processors deal in cod, haddock, flounder, and redfish.

The 37 finfish vessels range from small gill net boats fishing outside Boston Harbor to large offshore trawlers fishing Georges Bank and the Gulf of Maine. While the docking space is adequate for the number of vessels, offloading and processing facilities need improvement. Massport has undertaken the task of remodeling and improving the Boston Fish Pier's facilities.

Centered around the Boston Fish Pier is the largest lobster landing, importing, and wholesale center in Massachusetts. Numerous dealers purchase lobsters from the 98 lobster boats moored throughout the harbor. In 1977 over 788,000 pounds of lobsters worth $1.5 million were landed in Boston.

4. Provincetown

In 1979 this port landed 23.4 million pounds of mostly flounder, cod, and scallops worth $10.3 million, an increase of over 5 million pounds since 1977. Many Boston and New Bedford vessels contribute to the landings of the Provincetown fleet of 44 finfish, 4 scallopers, and 6 lobster vessels. The addition of 25 vessels over the past four years has aggravated the berthing conditions on the deteriorating town wharf. Lack of ice and cold storage facilities means that ice must be trucked in from New Bedford and fish trucked out immediately after landing. Two wholesale buyers truck fresh fish to Hyannis for freezing and chilling and then on to markets in Boston, New Bedford, New York, and Philadelphia.

5. Sandwich

The Sandwich fleet increases from about 18 finfish and scallop boats in summer, to about 30 during the winter. Recreational boats leave the basin at the east end of the Canal and vessels from New Bedford and Provincetown return. Fourteen lobster vessels are based in Sandwich. Landings in 1979 totaled 17.5 million pounds worth $9.8 million, up almost $5 million from 1977. Three processors handle fresh fish, shellfish and lobsters. A fourth processor, with two freezer plants, purchase mackerel, menhaden, and sea herring.

6. Other Ports.

Many of the Plymouth and Scituate boats fishing for cod, yellowtail, winter flounder, and swordfish land at either port. In 1979, there were 14 finfish and 31 lobster boats in Plymouth, and 19 finfish and 12 lobster boats at Scituate. A number of lobster boats switch to cod gillnetting during the winter. At both ports, boats tie up at the town pier, ice is delivered, and fish shipped by truck.

Figure 1. Massachusetts commercially important ports and harbors

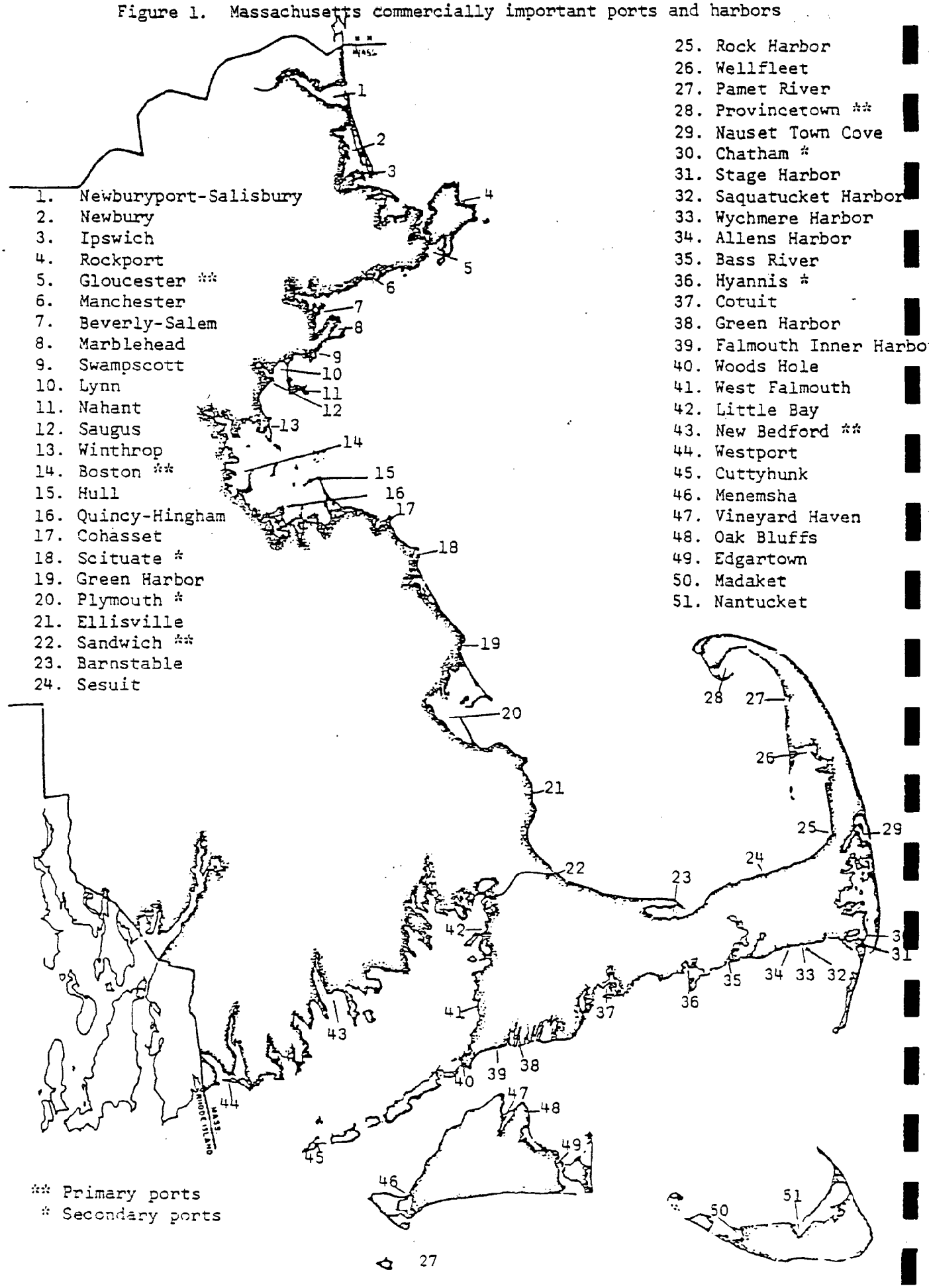

Table 15. Massachusetts fishery (finfish) by port.[1]

1977

	Total pounds landed	Total value	Total boats	Total fishermen
Gloucester	147,646,535	$20,852,897.	180	650
New Bedford	62,219,000	22,232,697.	124	750
Boston	22,251,298	5,960,077.	37	175
Provincetown	8,360,000	2,686,040.	44	174
Sandwich	4,996,000	1,930,106.	16	31
Chatham	3,050,000	838,470.	88	207
Plymouth	1,770,000	528,000.	14	50
Scituate	775,000	282,000.	22	80
Hyannis	613,600	191,000.	7	12
Martha's Vineyard	283,960	228,282.	21	88
Nantucket	19,903	9,177.	12	41
Totals	251,985,296	$56,215,746.	565	2,083

[1]Source: The Commercial Fisheries of Massachusetts, 1977, Division of Marine Fisheries.

Table 16. Estimated numbers of vessels for selected ports, 1979.

Gloucester

243 finfish
126 coastal lobster

New Bedford

164 finfish
50 sea scallopers
17 coastal lobster

Boston

20 finfish
98 coastal lobster

Provincetown

44 finfish
4 sea scallopers
6 coastal lobster

Chatham

68 finfish
5 sea scallopers
8 coastal lobster

Plymouth

14 finfish
31 coastal lobster

Scituate

19 finfish
12 coastal lobster

Hyannis

6 finfish
1 sea scalloper
1 offshore lobster

Sandwich

17 finfish
1 sea scalloper
14 coastal lobster

628 - Total for finfish boats for above major ports (Marthas Vineyard and Nantucket estimated).

Estimated total for all Massachusetts ports, 1979.

Finfish:	735
Sea scallopers:	76
Coastal lobster:	1243
Offshore lobster:	27

Source: Division of Marine Fisheries, 1979.

Table 17. Commercial landings at certain Massachusetts Ports[1] and total Massachusetts landings for 1977 to 1979[1] (millions of lbs, millions of dollars, all species).

	1977		1978		1979	
	Lbs	Value	Lbs	Value	Lbs	Value
Gloucester	150.9	21.5	185.1	28.9	160.2	29.7
New Bedford	75.5	43.2	71.9	54.6	86.0	67.4
Boston	22.2	6.0	27.3	8.1	30.3	10.7
Provincetown	17.9	6.9	19.9	9.1	23.4	10.3
Sandwich	15.3	5.0	(*)	(*)	17.5	9.8
Total Massachusetts	319.3	114.0	376.9	152.3	374.7	175.5

(*) Not reported to avoid disclosure of private enterprise.

[1]NMFS, Fisheries of the U.S. 1977, 1978, 1979.

Chatham has a unique fishing fleet because of the harbor's physical characteristics. The shallow sand bar at the entrance to Pleasant Bay limits the 88 boats (1977) to a vessel size between 30-50 feet. In 1977, most of the smaller vessels (20) jigged for cod, while the larger boats (68) primarily longlined for cod and flounder. By 1979, almost all the longline boats had switched to gill nets. Although catches have increased because of gill nets, many fear damage to the cod stocks and a lessening of the previously high fish quality. There are two buyers that ship the catch to markets in Boston and New York.

Hyannis' small commercial fleet is limited in summer to six vessels (1979), due to recreational boats competing for the scarce berthing space. During the winter as many as 16 scallop and finfish boats land in Hyannis and sell to the one local buyer.

Martha's Vineyard has four ports: Vineyard Haven, Oak Bluffs, Edgartown, and Menemsha. Menemsha is the main commercial port for the Island's finfish, scallop, lobster, and swordfish fisheries. The Island has buyers, one in Vineyard Haven, two in Menemsha, and one in Edgartown. Except for Menemsha, commercial docking facilities are limited.

As with other ports in vacation areas, the commercial fleet in Nantucket must make way for recreational boats, especially in summer. The 12 local scallop and finfish fleet swells to over 32 in summer during the squid and fluke season, putting a further strain on dockage facilities. There are three buyers on Nantucket, but they ship fish to the mainland and most of the locally consumed fish is shipped in from Hyannis.

C. Resource Management Zones

Fish distribution, bottom type, vessel size, and gear type are all factors influencing where fishing is conducted. Other, more artificial, factors are the resource management areas controlled by federal, state, and local governments. These areas are primarily controlled for environmental and resource management purposes, however, some are restricted due to contamination. The following is a discussion of regulated resource areas affecting Massachusetts waters.

1. Fisheries Conservation Zone (FCZ)

The federal Magnuson Fisheries Conservation and Management Act (FCMA) of 1976 (200 mile limit) established federal authority over management of fisheries from state territorial seas out to 200 nautical miles. With regulations promulgated by the New England Fisheries Management Council (NEFMC), the National Marine Fisheries Service (NMFS) has the authority to enforce regulations for foreign and domestic fishing in this zone. A state must manage fish stocks common to state territorial seas and the FCZ consistent with NEFMC fisheries management plans, or face possible pre-emption of management authority by the Secretary of Commerce.

The New England Council has fishery management plans in place for groundfish (cod, haddock, and yellowtail) and sea herring. A sea scallop plan has been submitted to the Secretary of Commerce and management plans for lobster, silver hake, other hake, redfish, red crab, and pollock are under various stages of development. The Mid-Atlantic Fisheries Management Council has approved management plans for butterfish, surf clams, ocean quahogs, mackerel, and squid (both Loligo and Illex). Striped bass and fluke (summer flounder) management plans are being developed by the NMFS funded Interstate Management program in conjunction with the Atlantic States Marine Fisheries Commission. Swordfish are managed under the Billfish-Shark management plan of the South Atlantic Fisheries Management Council. Atlantic bluefin tuna are managed by the International Convention for the Conservation of Atlantic Tuna (ICCAT).

2. Massachusetts territorial waters

Before the American colonies were established, the territorial seas were defined in English common law as extending one marine league (three nautical miles) from shore, later popularized as the distance a cannonball could be fired, (Massachusetts Water Resources Commission, 1970). Under common law, English sovereigns had property rights to the soil under the sea extending to the high water mark, and the authority to regulate and govern navigation for the common use and benefit of all persons (the Supreme Judicial Court of Massachusetts has always defined "navigation" as including fishing). English common law applied to the Massachusetts Colony as well, as stated in the Colony Ordinance of 1641-47. This ordinance made one change in common law to give private property rights to the proprietor down to the low water mark with the stipulation that "Every inhabitant who is an householder shall have free fishing and fowling in any great ponds, bays, coves, and rivers so far as the sea ebbs and flows..." This provision allowed the public the right to cross private property to fish or fowl in coastal waters. After the American Revolution, the English King's authority over the Massachusetts territorial sea was transferred to the state's legislative powers. This authority covers over 1,200 miles of coastline and over 1600 square nautical miles of ocean.

The Massachusetts territorial sea extends three miles (amended from three nautical miles) from the mean low water mark. In addition, the internal waters under jurisdiction of the Commonwealth include bays and inlets where a baseline from headland to headland is drawn to represent the shoreline. The internal waters extend seaward three miles from the baseline. Under this provision the western portion of Massachusetts Bay, southwest Buzzards Bay, and all of Cape Cod Bay fall under the Commonwealth's jurisdiction (Figure 2).

The Commonwealth manages most living marine resources in the territorial waters, and generally regulates consistent with FCZ regulations. Marine mammals are protected by the National Marine Fisheries Service.

Endangered species are protected by both the National Marine Fisheries Service and the U.S. Fish and Wildlife Service. Control over shellfish (in contaminated waters), sea worms, and eels is exercised by cities and towns. Local communities may manage alewives if the Director approves their petition to do so. Town jurisdiction extends only to three miles and does not include central Cape Cod Bay and western Massachusetts Bay.

Management actions can be enacted either as statutes by the Legislature or as regulations promulgated by the Division of Marine Fisheries. Statutes enacted by the Legislature are codified under M.G.L. c. 130, General Laws relating to Marine Fish and Fisheries. However, many statutes or special acts dating back hundreds of years have not been codified, and in some cases are antiquated, conflicting or forgotten. Under M.G.L. c. 130, s. 17A (approved 1962) the Director of the Division has the power, upon approval by the Marine Fisheries Advisory Commission, to specify the manner, size, quantity, season, hours, and areas by which fish may be taken. Founded in 1960, the nine members commission is made up of commercial and recreational fishermen, people associated with the commercial and recreational fisheries, and other individuals chosen for their knowledge and experience in Massachusetts' fisheries. The Commission reviews, comments and votes on regulations affecting Massachusetts marine fisheries and discusses fisheries problems and issues and recommends solutions. It works closely with the Director in matters pertaining to the Division and its programs and advises on policy matters. The Attorney General's Office is of the opinion that regulations promulgated under authority of s. 17A (10) supercede conflicting special acts.

a. Restricted Fishing Areas

Certain areas of the Commonwealth's internal waters have fishing gear and seasonal restrictions imposed for management purposes (Figures 3 and 4). A myriad of statues and regulations have evolved to form a patchwork of regulated areas to discourage gear conflict, protect the resources, and avoid navigation hazards. Restrictions range from banning netting in an area (as in Buzzards Bay) to requiring a special permit to fish in an area (e.g., seining Atlantic bluefin tuna in Cape Cod Bay). Additional restrictions were established to prevent mobile trawling gear from damaging stationary lobster gear. The waters three miles from shore from the New Hampshire border along the coastline to Provincetown, off the eastern coast of Chatham and Orleans, and the eastern coastline of Nantucket Sound are closed to trawling during the lobstering season from spring to fall. The inner harbors and coastal bays are managed under regulations which require a special permit to net in these specified areas. In recent years the Division has attempted management regulations by special permit as a means to control fishing effort, reduce gear conflict, and obtain management information. By issuing or revoking special permits, the number of fish-

ing vessels in an area can be controlled and fishing regulations effectively enforced.

3. Contaminated areas

Restricting resource harvesting in certain coastal areas for public health reasons is a responsibility of the Division of Marine Fisheries. The Shellfish Sanitation Program within the Department of Environmental Quality Engineering (DEQE) works under regulations established by the Department of Public Health and guidelines established by the U.S. Food and Drug Administration. They conduct frequent tests of the waters overlying shellfish beds and issue notices of reclassification. Upon notification, the Division issues area opening and closure notices. Primarily, these closures are the result of sewage pollution, but seasonal closures for paralytic shellfish poisoning (PSP) and long-term closures for toxic substances have also occurred.

a. Contaminated shellfish areas

From Boston Harbor north, an estimated 6,250 acres of productive shellfish bottom, with an estimated annual potential harvest of 73,450, are contaminated by sewage waste to an extent that shellfish harvesting must be restricted. South of Boston, additional shellfish areas, primarily containing quahogs, are restricted. The Shellfish Sanitation Program classifies these areas according to the MPN (mean probable number) of *Escherichia coli* (*E. coli*) bacteria per 100 ml of the overlying waters; 70-700 MPN being moderately contaminated and above 700 grossly contaminated. *E. coli* is a harmless bacteria, commonly found in mammalian intestinal tracts, however, its presence in the water column indicates the possible presence of more harmful bacteria and viruses which cause hepatitis, gastroenteritis, and other diseases. Filter feeding bivalve shellfish like soft shelled clams, surf clams, quahogs, mahogany quahogs, oysters, and razor clams filter out and store bacteria and viruses along with their planktonic algal food. Non-filter feeding shellfish (periwinkles and whelks), crustaceans (lobster and shrimp), and finfish do not take up bacteria and viruses. Scallops are filter feeders also, but because only the adductor muscle or eye of the scallop is eaten, they do not pose a health hazard.

Some of Massachusetts most productive shellfish areas are contaminated. Of the 6,250 acres of contaminated productive shellfish bottom on the North Shore, 49% are classified as moderately contaminated. From this area an estimated annual production of 38,800 bushels are available for harvesting. Through the work of the DEQE's Division of Water Pollution Control, many of the formerly grossly contaminated areas have had pollution levels reduced and have been reclassified as moderately contaminated. The Division of Marine Fisheries, in conjunction with the DEQE,

Shellfish Sanitation Program, and the U.S. Food and Drug Administration issues Master Digger Permits for the harvesting of soft shelled clams from moderately contaminated areas. These clams must be purified at the Division-operated Newburyport Shellfish Depuration Plant prior to sale. After holding the clams in sterilized waters for forty-eight hours, the result is a clean, high quality product.

The Division's Shellfish Relay Permit program allows the transfer of shellfish from contaminated to clean areas for natural purification. This is commonly used for purifying quahogs on the South Shore and the Cape where there are no purification facilities, but many clean areas for relaying.

b. Paralytic Shellfish Poisoning (PSP) Closures

Since 1972, periodic blooms of the single-celled dinoflagellate, *Gonyaulax tamarensis*, have appeared in Massachusetts waters. *Gonyaulax* will bloom when sunlight and nutrient conditions are just right, usually in the spring and fall. Rarely does it occur in sufficient quantities to discolor the water, however, the 1972 bloom was so massive that the colorful but misleading nickname "red tide" was applied. This may be confused with the fish killing red tide in southern waters caused by another dinoflagellate. As with sewerage pollution, *Gonyaulax* does not effect finfish or crustaceans. Only filter feeding (bivalve) shellfish can filter out and store the dinoflagellate, although whelks may become poisonous from eating bivalve shellfish. When a person eats contaminated shellfish, the *Gonyaulax* releases a powerful chemical poison, called a neurotoxin, which attacks the human nervous system. Effects range from slight tingling sensations to severe respiratory arrest and, very rarely, death, depending on the amount of toxin.

Certain areas along the coast such as the North Shore and Nauset Inlet are more prone to annual PSP outbreaks. Although the shellfish eventually purge themselves, occasionaly the PSP persists, particularly if the bloom was large or winter temperatures reduce shellfish activity. Shellfish along the entire coast are tested periodically for PSP by DEQE's Shellfish Sanitation Program. The test results are sent to the Division for public notification of shellfish area openings and closures.

c. Toxic substances

The accumulation or spilling of toxic substances such as Polychlorinated biphenyls (PCB's), oil, or mercury has forced resource closures of certain harbors in Massachusetts. PCB's discharged from two plants on the Acushnet River (Kolek, 1980), led to the 1977 restrictions on harvesting certain species in three areas off New Bedford (Figure 5). A buildup in mercury in the substrate resulted

in shellfish closures in small areas of upper Sippican Harbor and Falmouth Inner Harbor, and oil spills or leaks have closed Great Harbor, Falmouth and Red Brook, and Bourne to shellfishing.

4. Sanctuaries

Sanctuaries are areas of the ocean set aside to protect important habitat, an exceptionally productive ecosystem, an area of historic or cultural interest, or an area of scientific or educational value (Conservation Law Foundation, 1980). Sanctuaries exist on both the state and federal levels. Under M.G.L. c. 132A, s. 14 and 15, the Massachusetts Department of Environmental Management (DEM) has named five Massachusetts Ocean Sanctuaries: North Shore, South Essex, Cape Cod Bay, Cape Cod, and Cape and Islands (Figure 6). In these sanctuaries any act which disturbs the seabed, such as drilling, dumping industrial wastes, building structures, removing sand and gravel is prohibited. Fishing activities are not restricted under Massachusetts Ocean Sanctuary provisions.

The U.S. Department of Commerce may also designate areas as Federal Marine Sanctuaries (16 USC 1431-1434).

Recent court litigation concerning a jurisdictional dispute between Massachusetts and the Federal Government over central Nantucket Sound was temporarily resolved. While neither party conceded jurisdictional control over the area, both agreed that if central Nantucket Sound was designated a federal marine sanctuary, Massachusetts would relinquish its claim provided (a) no additional federal regulations governing fishing activities be imposed, and (b) that federal marine sanctuary rules conform with regulations of the Massachusetts Ocean Santuary Act.

5. Coastal Zone

The Federal Coastal Zone Management Act of 1972 (P.L. 92-583) is administered by the Department of Commerce and funds development of coastal zone programs in coastal states. The Massachusetts Coastal Zone Management Program has the responsibility of achieving "effective management beneficial use, protection, and development of the coastal zone" (Section 302 (a) of CZMA). This extends to:

"The seaward limit of the state's territorial sea (i.e., 3 miles), extending from the Massachusetts-New Hampshire border south to the Massachusetts-Rhode Island border, and landward to 100 feet inland of specified major roads, rail lines or other visible rights-of-way. The coastal zone includes all of Cape Cod, Martha's Vineyard and Nantucket" [1] (Figure 7).

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[1]Massachusetts Coastal Zone Management Program and Final Environmental Impact Statement, 1978.

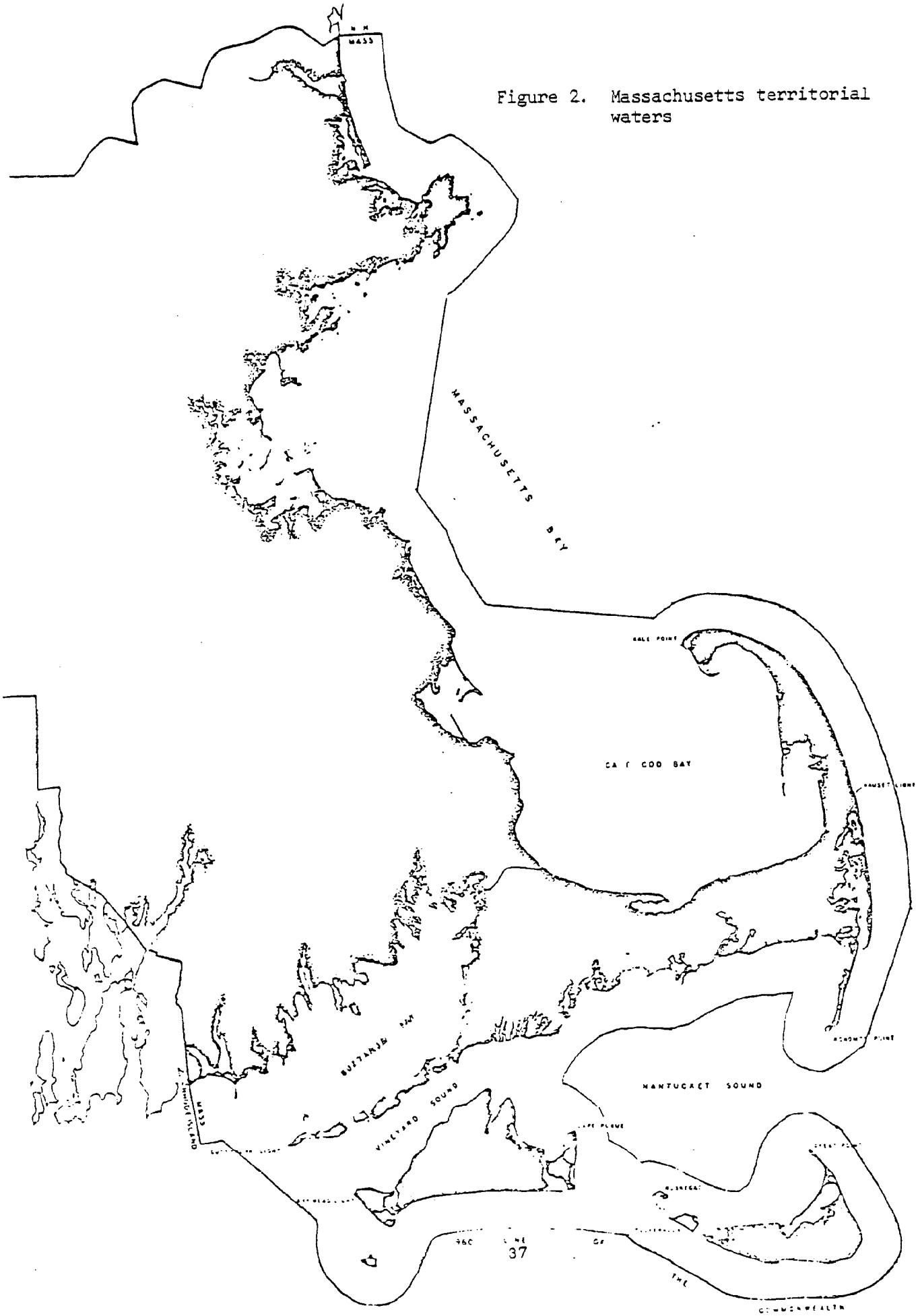
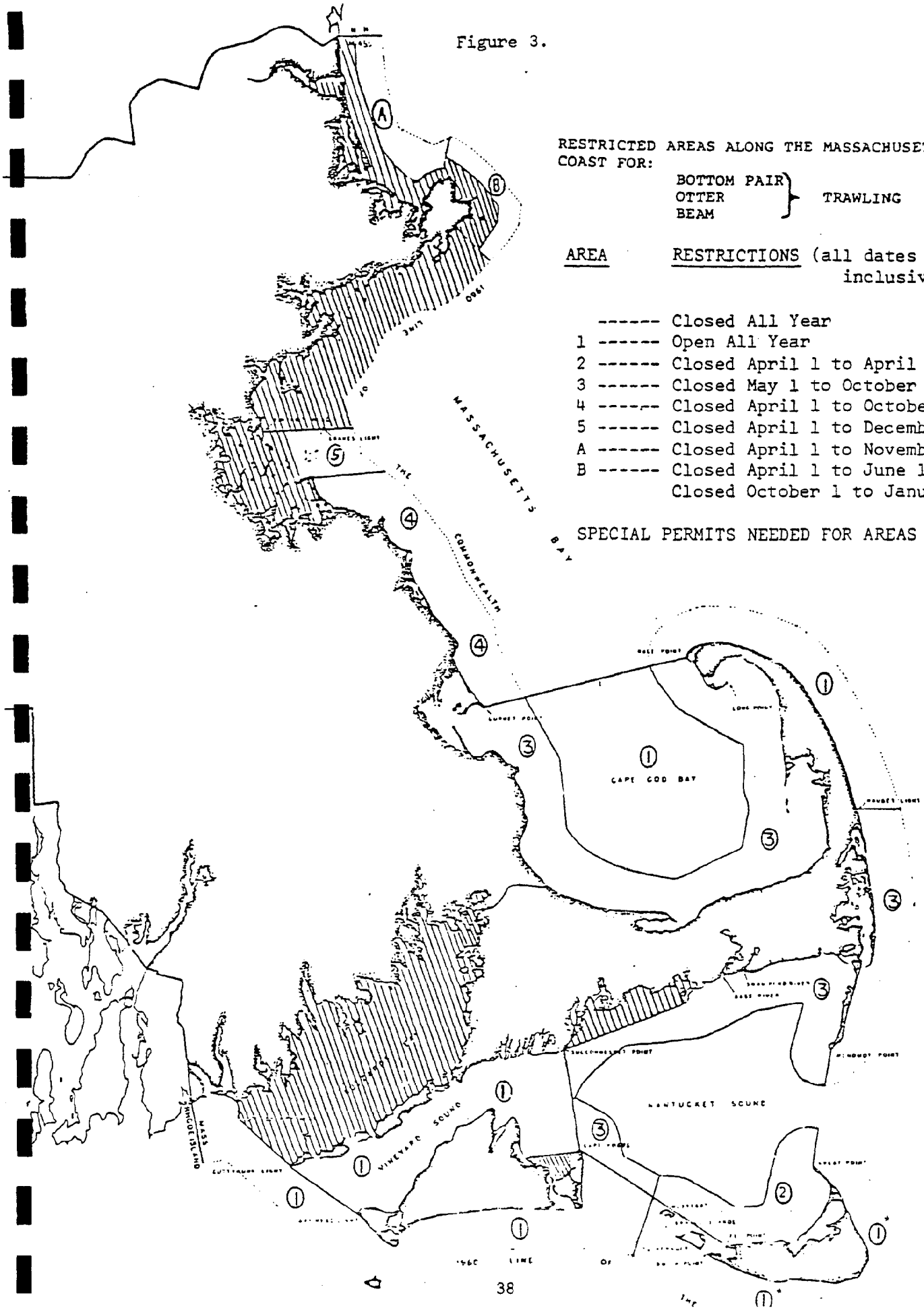


Figure 2. Massachusetts territorial waters

Figure 3.



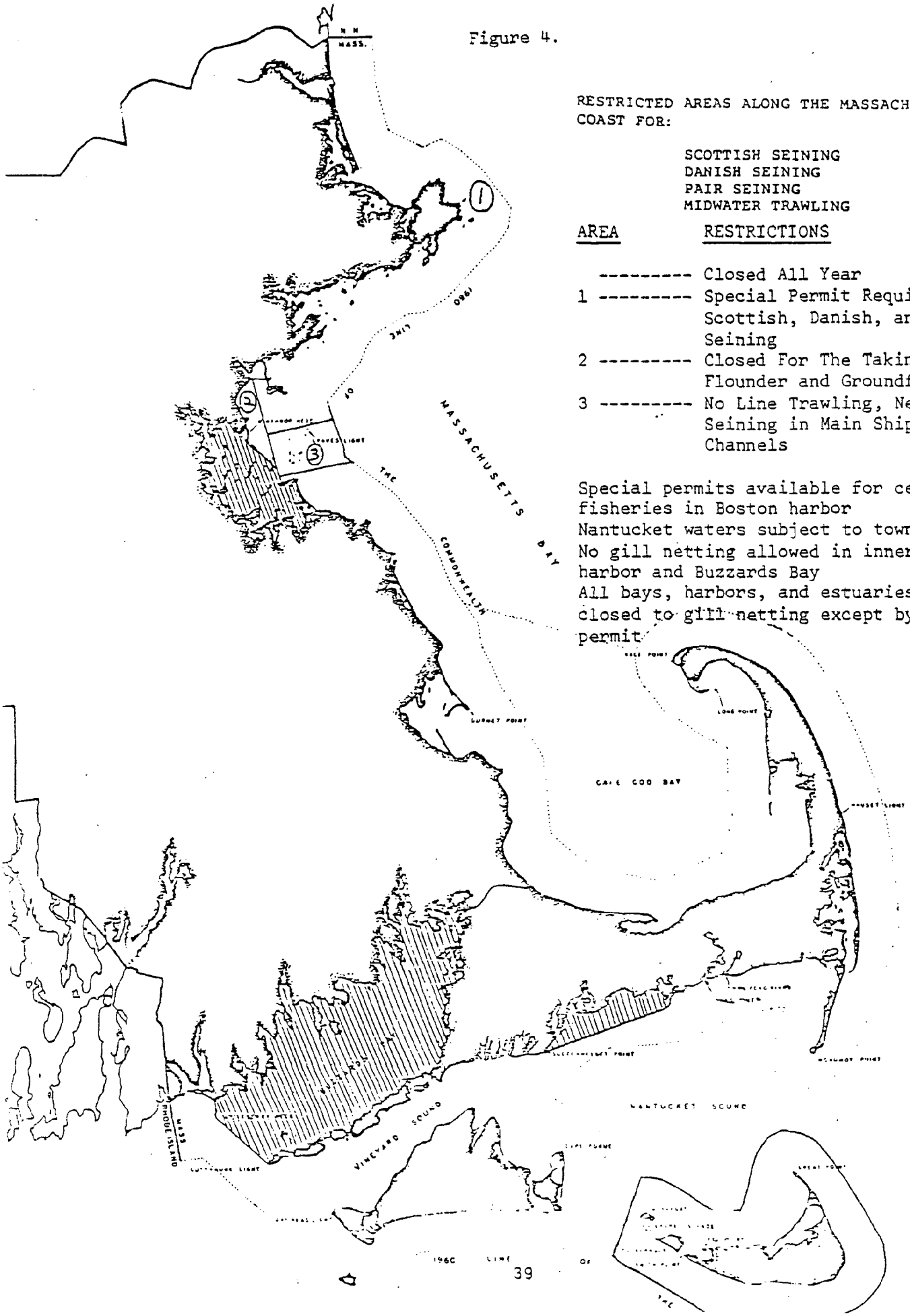
RESTRICTED AREAS ALONG THE MASSACHUSETTS COAST FOR:

BOTTOM PAIR
OTTER } TRAWLING
BEAM

AREA	RESTRICTIONS (all dates are inclusive)
------	Closed All Year
1 ------	Open All Year
2 ------	Closed April 1 to April 30
3 ------	Closed May 1 to October 31
4 ------	Closed April 1 to October 31
5 ------	Closed April 1 to December 31
A ------	Closed April 1 to November 14
B ------	Closed April 1 to June 14 and Closed October 1 to January 31

SPECIAL PERMITS NEEDED FOR AREAS A & B

Figure 4.



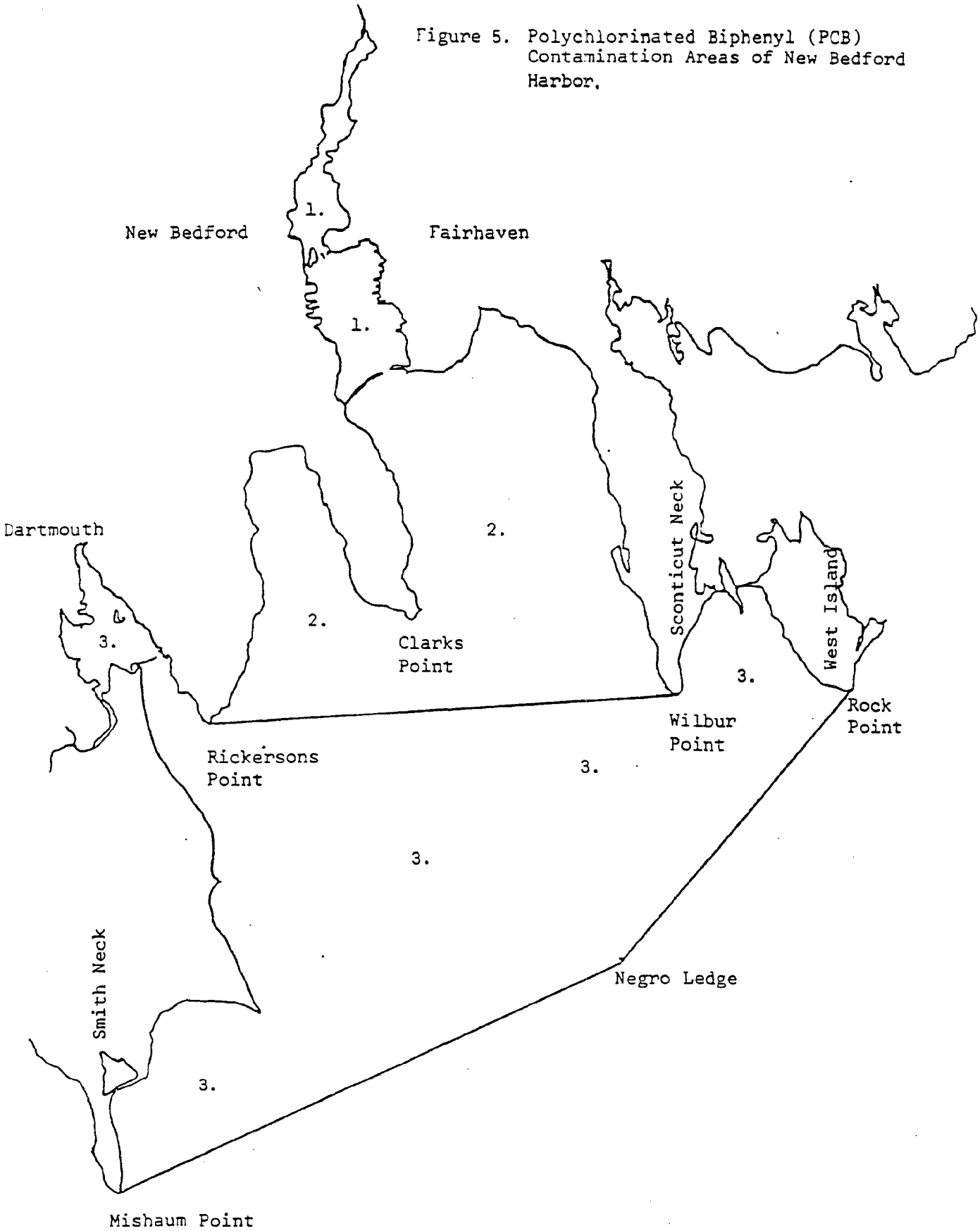
RESTRICTED AREAS ALONG THE MASSACHUSETTS COAST FOR:

SCOTTISH SEINING
DANISH SEINING
PAIR SEINING
MIDWATER TRAWLING

AREA	RESTRICTIONS
---------	Closed All Year
1 ---------	Special Permit Required For: Scottish, Danish, and Pair Seining
2 ---------	Closed For The Taking of Flounder and Groundfish
3 ---------	No Line Trawling, Netting, or Seining in Main Shipping Channels

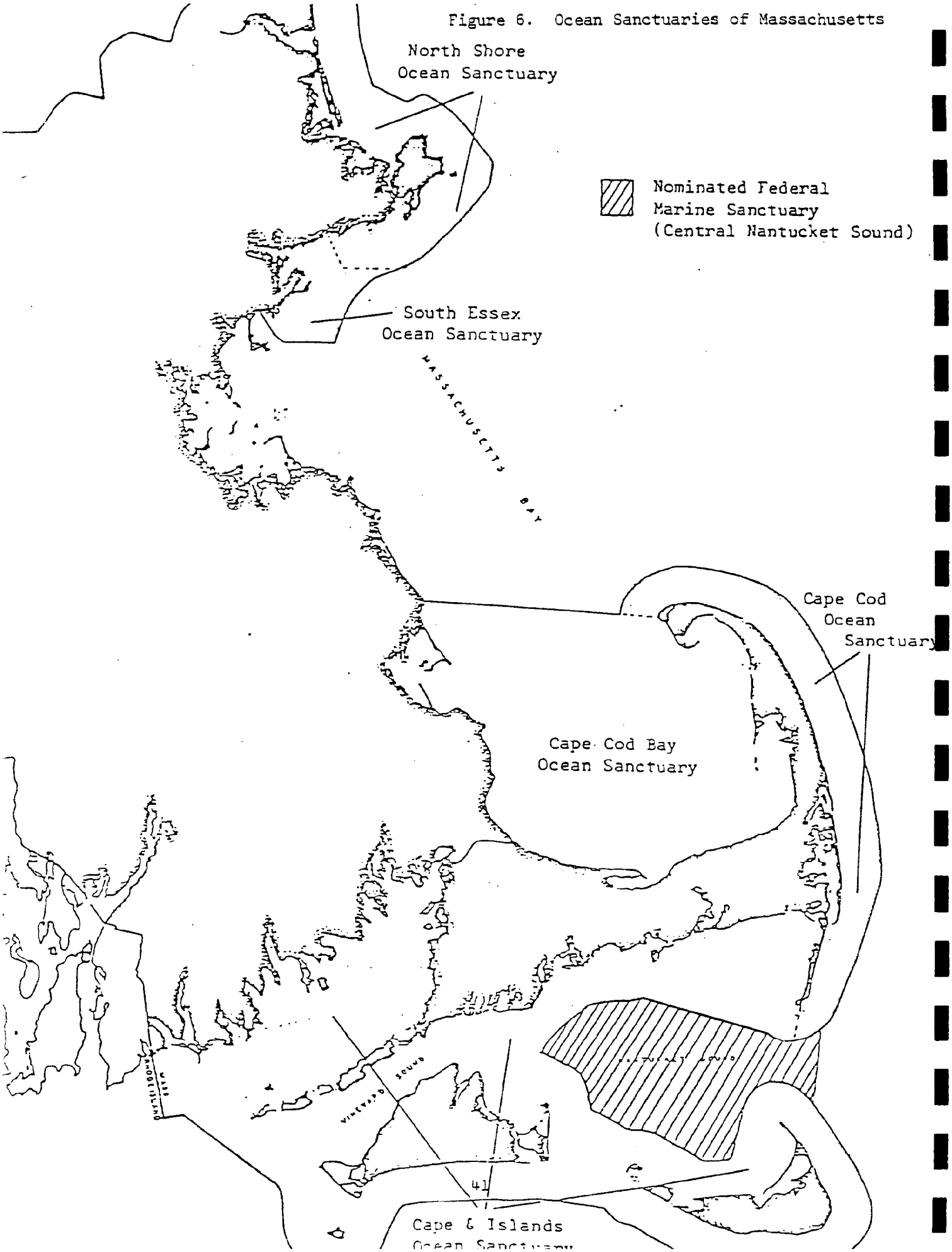
Special permits available for certain fisheries in Boston harbor
Nantucket waters subject to town regulation
No gill netting allowed in inner Boston harbor and Buzzards Bay
All bays, harbors, and estuaries are closed to gill netting except by special permit

Figure 5. Polychlorinated Biphenyl (PCB) Contamination Areas of New Bedford Harbor.



Areas subject to PCB closures include (1) waters closed to all fishing activities, (2) waters closed to the taking of lobsters, flounders, eels, scup, and tautog, and (3) waters closed to lobstering only.

Figure 6. Ocean Sanctuaries of Massachusetts



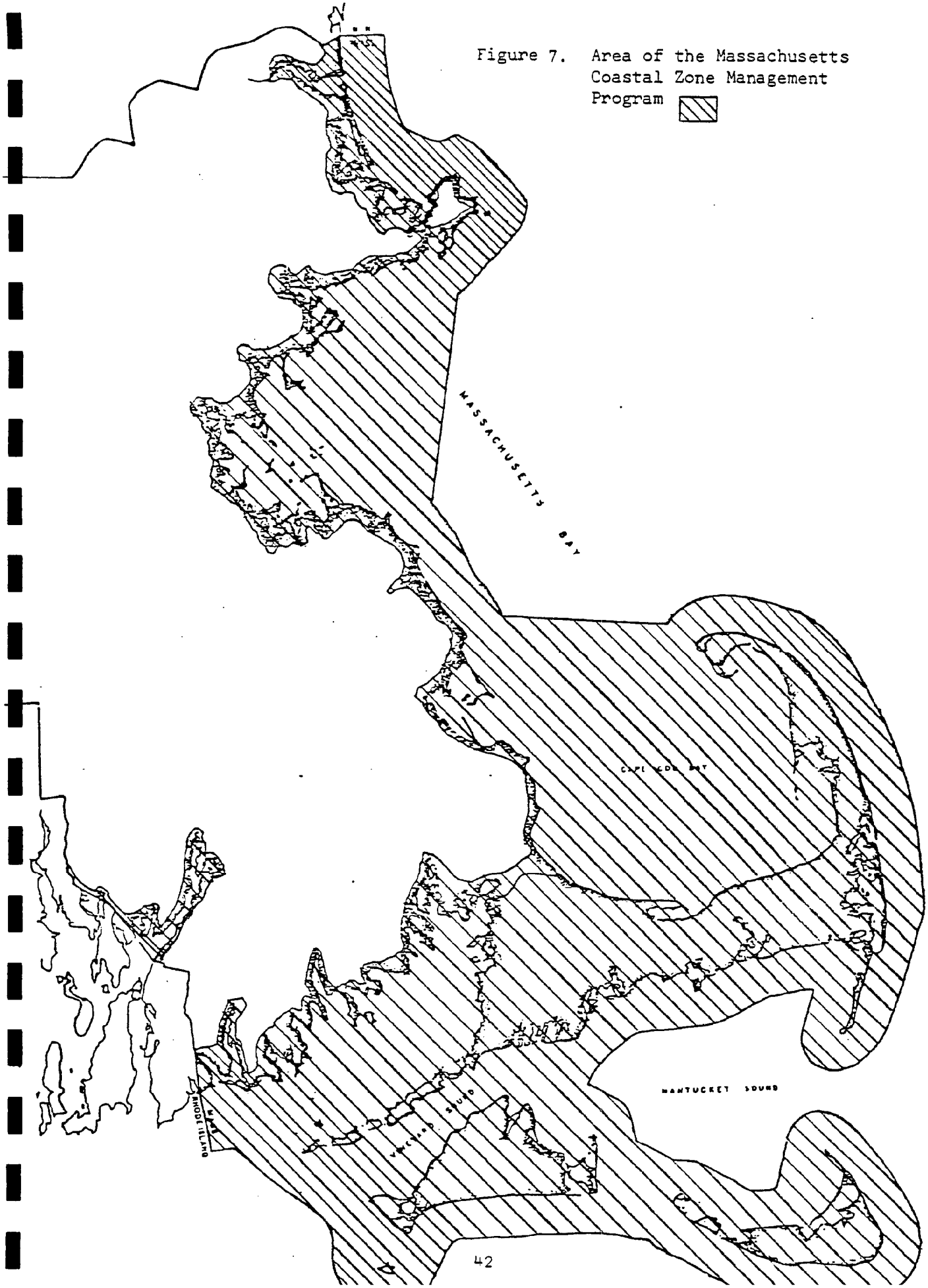


Figure 7. Area of the Massachusetts Coastal Zone Management Program

D. Processors

In 1976, approximately 114 Massachusetts fish processing firms produced $311 million worth of fish products or about 68% of the total New England value of fish products (Hughes and Kellogg). The Massachusetts value of processed products increased to $358 million in 1977, with 123 plants employing 4,454 people on a yearly basis and 5,302 seasonally (Table 18). In addition, 86 wholesale plants, employing 951 people, purchased and marketed processed fish to 845 retail markets (from DMF licensing statistics). Using these figures, and assuming one person for each retail market, an estimated 7,098 people were employed at sometime in 1977 in fish processing, wholesale, and retail firms.

There are four general types of fish processors in Massachusetts. Fifty-one out of 123 processing firms in 1977 primarily filleted fresh finfish. They handled about 22% of the processed fish product value, employed 27% of the processing work force, and averaged $1.8 million in sales. Their supply for the most part came from Massachusetts landings, but a significant amount was imported from other states, Canada, and other countries.

Although reliable figures are not available, as much as 90% of the fish supply for the 13 large finfish processors originated from foreign imports in the form of frozen fish blocks. These processors, located in Gloucester and New Bedford, produced unclassified (i.e., not identified by species name) frozen fish portions, sticks, dinners, and other products for a nationwide market. Although small in number, they produced about 53% of the Massachusetts processed fish product value (1977), employed 50% of the work force, and averaged $14.3 million in sales.

Fifty-five shellfish processors make up the third category of Massachusetts seafood processing firms. Except for shrimp and soft-shelled clams, these processors deal in shellfish supplied by Massachusetts fishermen. This sector averaged sales of $1.1 million annually (1977), employed 23% of the work force, and produced 17% of the product value.

The three industrial fish processors averaged $3.6 million in sales (1977), employed 12% of the work force, and produced 3% of the product value. Gloucester is the primary industrial fish processing port in Massachusetts. Menhaden and other unmarketable fish are reduced to fish oil and meal, the latter is used for chicken feed.

The centers for fresh fish processing in Massachusetts and New England are New Bedford, Boston, Gloucester, and Cape Cod (Georgianna et al., 1978). Gloucester processors handle mostly cod, haddock, pollock, and ocean perch. Boston processes 79% of the haddock, 67% of the cod, and 81% of the pollock processed in Massachusetts. New Bedford, the scallop processing center, also processed cod, haddock,

and flounder, especially yellowtail flounder. Massachusetts firms import and process a large percentage of the Maine landings of cod (59%), haddock (90%), pollock (76%), and flounders (67%). It was estimated that virtually all of the annual Newport, R.I., cod, haddock, pollock, and ocean perch landings and 90% of the flounder landings were shipped to Massachusetts for processing.

In the wholesaler category there were six Massachusetts fishermen's cooperatives operating in 1979 (NMFS, 1980). Cooperatives are owned and operated by fishermen. They buy fish from fishermen and purchase supplies for fishermen. Collective pooling of their catch can sometimes increase profits by eliminating a layer in the marketing process. The cooperatives assist fishermen by purchasing fuel, ice, and fishing gear at lower bulk rates. All six cooperatives marketed the members' catch, five were also involved in purchasing. The six cooperatives represented 929 fishermen and 514 vessels.

Since establishment of the 200 mile limit in 1976, foreign fish buyers have expressed interest in joint ventures to supplement fish supplies reduced by foreign fishing quotas. A typical proposed joint venture would involve U.S. fishermen harvesting underutilized species for direct transfer and sale to foreign processing ships. U.S. fishermen would profit from harvesting species with little or no marketability in the U.S. and fishing pressure on some traditional species may be reduced. However, direct sales to foreign buyers may prevent U.S. processors from establishing necessary processing capabilities to create domestic and export markets.

E. Imports

About 60% of the fish products consumed in the United States are imported from foreign countries. Before World War II 95% of the fish products were supplied by the domestic fleet, this fell to 71% by 1948 (Massport, 1977). Between 1950 and 1970, U.S. population and fish consumption rose, while domestic landings remained between 2 to 2.5 million metric tons. During this period imports rose from 25% to 60% of U.S. fish consumption.

Fish imports are classified into two major categories; frozen (whole and blocks) and fresh (whole, headed or filleted finfish, live lobsters, and shellfish). It is virtually impossible to obtain statistics on foreign imports into Massachusetts. Federal import statistics are kept by custom district, not by state. Although all imports to the Boston Custom District may be processed in Massachusetts, it is difficult to estimate the percentage of Massachusetts imports originating from the Portland Custom District. Most of the 116 million pounds of frozen fish portions, sticks, and dinners processed in Massachusetts in 1976 were European and Canadian imports.

Imported fresh finfish, lobsters, and shellfish are primarily of Canadian origin. It is estimated that 8.3 million pounds of fresh

finfish worth $3.1 million (Kellogg, 1980) were imported into Massachusetts from Canada in 1978 (Table 19). Canada exports 90% of its groundfish harvest to the United States (Environment Canada, 1976). Canada also exported 13.1 million pounds of live lobster, and 2.3 million pounds of lobster meat to the U.S. in 1978. An unknown quantity of imports from Canada, estimated at 25% (Brown, 1974), originate on the duty free French islands of St. Pierre and Miquelan off Newfoundland. Polish, West German, Portuguese, and Spanish vessels offload fish at these ports for processing in Canada and the United States. This circumvents the U.S. law prohibiting landing fresh fish in U.S. ports by foreign built and operated vessels.

Frozen fish imports do not directly compete with the mainstay of the New England fisheries, fresh fish. However, the import of primarily Canadian fresh finfish, lobsters, and shellfish do suppress the ex-vessel prices paid to Massachusetts fishermen. Fishermen claim that Canadian federal and provincial subsidies to the fishing industry provide Canadians with an unfair advantage in U.S. markets. Government subsidies on vessel purchase, construction, repair, and conversion; fish handling and storage; processing plant construction and expansion; boat insurance and fuel have reduced the Canadian imported fish prices by an estimated $ .30/pound (Capalbo et al., 1977) and lobster prices an estimated $ .33 to $ .44/pound (Hasselback, 1979). Concern over imports is not new. Until 1939, tariffs ($ .025/pound) on foreign groundfish effectively increased import prices 40% (Massachusetts Port Authority, 1977). Tariffs were reduced for Canadian fish in 1939 to $ .018/pound for the first 15 million pounds or 15% of U.S. consumption and $ .025/pound thereafter. This rate was extended to other countries in 1948, and because fish prices increased, this lower rate only added 9% to the import costs. Today tariffs present even less of a barrier to fresh fish imports, while there are no tariffs at all for imported frozen fish processed in the United States.

Since 1952 there have been five attempts (1952, 1954, 1956, 1962, and 1977) to increase tariffs on Canadian fresh fish imports. All of these petitions have either been disapproved by the U.S. Tariff Commission or vetoed by the President. Even though U.S. laws state that foreign subsidies provide justification for countervailing duties, opposition to increased tariffs has been based on maintaining international relations and keeping fish prices to consumers low.

F. Mariculture and Fisheries Enhancement

Mariculture can be defined as the propagation and husbandry of marine animals or plants by private industry for commercial reasons. For purposes of this report, fisheries enhanvement is defined as use of

public funds for propagation or husbandry of marine species to augment existing stocks or introduce new species for public use. Recently mariculture has engendered an increasing amount of public interest and support. However, this support must be tempered by the realization of mariculture's limitations. Massachusetts' climate conditions are not optimum for most established mariculture species. Any species selected for mariculture must be short-lived, fast-growing, and command a high market value. It's nutritional needs, reproductive cycle, and disease susceptibility must be well understood. In addition to facing local opposition to seashore use, a mariculture operation may need five state permits (three from DEQE, one from DEM, and one from DMF), two federal permits (EPA and Army Corps of Engineers), and three local permits (from the Zoning, Conservation, and Shellfish Commissions).

Depending on techniques used, mariculture (and fisheries enhancement) can be intensive or extensive. In intensive mariculture most or all of the animals life cycle, feeding, and grow-out is under complete control. Biomass produced per acre is high, as is labor and capital costs, but a high quality product is produced with low mortality. In extensive mariculture the fish spend part of their life cycle in the natural environment. While total biomass produced is large and measures are taken to control reproduction and mortality, the death rate is greater in the open ocean than in a controlled environment. Anadromous fish can be raised in this manner, but legal questions exist over who owns the fish when they return to the river.

The most common form of mariculture in Massachusetts is the private shellfish grant. Under M.G.L. c. 130, s. 57, municipalities, after Division inspection, may grant private individuals exclusive rights to the sea bottom for shellfish mariculture for periods not exceeding 10 years. In addition, M.G.L. c 130, s. 68A allows municipalities to license off-bottom shellfish culture using rafts, racks, or floats.

As of 1980, 50 grants in 13 towns were issued encompassing a total of 391 acres; the grants range in size from 1/4 acre to 93 acres. The average grant was 5-7 acres and usually consisted of a small 'family-type' operation; larger grants employed up to 10 people. Assuming two people per small grant, an estimated 111 people are involved in shellfish grant mariculture in Massachusetts. Seventy-five percent of the grants cultured eastern oysters, the remainder grew quahogs, bay scallops or mussels. All were leased from towns for a 3-10 year period with option of renewal at the discretion of the Division and the town involved (personal communication, J.M. Hickey).

In addition to shellfish grants, there are three closed system aquaculture operations in Massachusetts. A commercial prawn (Macrobrachium) growing farm in New Bedford, a commercial operation in Salem growing crustaceans and finfish for sale as marine speci-

mens, and a non-profit, educational fresh water aquaculture center in Falmouth.

The Division of Marine Fisheries has a number of fishery enhancement programs such as the Coho Salmon Project, Lobster Hatchery, and Anadromous Fish Project. The Division is involved in the Merrimack River Anadromous Fish Restoration Project and various local shellfish enhancement programs. Other publically funded marine enhancement programs include shellfish hatcheries in Mashpee, Eastham, Tisbury, and Edgartown. Other coastal towns have expressed interest in regional shellfish hatcheries to provide seed stock and learning centers for their constituents. Interest in mariculture development has been demonstrated by other agencies such as: Coastal Zone Management, Sea Grant, Department of Food and Agriculture, the Secretary of Environmental Affairs, Massachusetts Cooperative Extension Units, and local Economic Development Commissions.

Table 18. Number of processing and wholesale plants and average employment in Massachusetts from 1970 to 1978.

	Processing			Wholesale			Total		
	Plants	Season	Year	Plants	Season	Year	Plants	Season	Year
1970	125	4,800	4,097	108	1,043	894	233	5,843	4,991
1971	110	4,643	3,965	102	918	812	212	5,561	4,777
1972	107	4,482	3,876	99	942	851	206	5,424	4,727
1973	104	4,875	4,208	97	852	751	201	5,707	4,959
1974	117	4,739	3,885	92	849	746	209	5,588	4,631
1975	120	4,638	3,845	91	885	787	211	5,523	4,632
1976	114	4,370	3,637	96	1,019	868	210	5,389	4,505
1977	123	5,302	4,454	86	951	831	209	6,253	5,285
1978	113	4,999	4,312	93	1,041	809	206	6,040	5,121

Source: Fishery Statistics of the U.S. 1978, 1979.

Table 19. Estimated imports of fresh, whole, or headed Canadian groundfish by Massachusetts in 1978.[1]

	Quantity (thousand-lbs)	C.I.F. Value (thousand dollars)
Cod	1,461	487
Haddock *	5,341	2,166
Flounders	1,491	488
Ocean Perch	13	8
Pollock *	0	0
Whiting	0	0

* Votes: All imports of fresh, whole, or headed fish classified as cusk, haddock, hake or pollock are assumed to be haddock.

[1]Source: Massachusetts Imports of Canadian Fish Products. C. Kellogg, Massachusetts Division of Marine Fisheries, 1980.

III. Division of Marine Fisheries

The Division of Marine Fisheries within the Department of Fisheries, Wildlife and Recreational Vehicles under the Executive Office of Environmental Affairs is responsible for the management of the Commonwealth's living marine resources. The Division is charged with promoting and developing the commercial and recreational marine fisheries of Massachusetts. Functioning under the statutes of M.G.L. c. 130 and regulations approved by the Marine Fisheries Advisory Commission, the Division manages the harvest of finfish, mollusks, crustaceans, seaworms, and marine plants within the territorial waters of Massachusetts. To accomplish these duties, the Division issues licenses, conducts research, provides technical assistance to communities and fishermen, collects statistics, publishes information and educational material, constructs fishways, purifies shellfish, and propagates fish and crustaceans. In addition, Division personnel interact with many federal, interstate, state, and local management agencies and various private fisheries related organizations.

Prior to 1942, responsibility for marine fishery management rested within a bureau of the Division of Fish and Game. In 1943 the Division of Marine Fisheries was established with a staff of six biologists and five conservation helpers. The first marine facilities were the Martha's Vineyard Lobster Hatchery, built in 1948, and the Shellfish Depuration Plant, acquired from the town of Newburyport in 1961. The Division remained a small organization until two events occurred: the formation of the Marine Fisheries Advisory Commission in 1960 to study fishery problems in Massachusetts, and the Congressional passage of the Fisheries Conservation and Management Act of 1964 (P.L. 88-309). The Commission recommended establishment of a Marine Fisheries Fund, fishery research programs, construction of laboratory facilities, and purchase of a research vessel. P.L. 88-309 provided federal funding to realize many of these recommendations.

Presently, the Division has a professional staff of seventy-seven including administrators (7), biologists (33), biological aids and laborers (16), marketing and extension specialists (6), clerical (10), laboratory personnel (3), a lawyer (1), and an economist (1). In addition to its Boston office, the Division maintains five facilities: the Newburyport Shellfish Purification Plant; Cat Cove Marine Laboratory (Salem); two offices for south shore personnel (Sandwich); and a lobster hatchery (Martha's Vineyard). An Anadromous Fish Hatchery and Rearing Station to be operated jointly by the Division of Fisheries and Wildlife and Division of Marine Fisheries, is being constructed in East Sandwich. A 52' research vessel and a number of smaller outboard boats are employed for sea sampling. Future plans call for construction of a marine station to house south shore personnel and replacement of the existing research boat with a larger, more seaworthy, and versatile vessel.

Before 1975, Division program, administration, and operating costs were appropriated from the Marine Fisheries Fund. The Fund was estab-

lished in 1962 from revenues received from licenses, and fees and a portion of the unrebated gas tax proportional to fuel usage of fishing boats. With State reorganization in 1975, the Fund was repealed and Division revenues reverted to the General Fund. The Division's budget for Fiscal Year 1979 was $1,656,448. Although $1,153,993 was appropriated from the General Fund for FY 1979, this does not reflect the actual cost to the state. The Division contributed $573,977 to the General Fund from its licensing program, fees from the shellfish purification plant and fines. In addition, $896,529 was received from private trusts, 100% federal grants and federal reimbursements. These monies reduce the actual cost to the state of managing its marine resources and developing its fisheries to $185,942.

Not included in the above budget is the annual appropriation for shellfish reimbursement to the cities and towns. Although it varies from year to year, $250,000 was distributed to local communities to partially reimburse (up to 50% depending on the amount appropriated) them for shellfish management work in FY 1979. The Division administers the distribution of these funds for the Legislature.

The Director of the Division reports to the Commissioner of the Department and oversees the Marine Fisheries Advisory Commission, Council Liaison to the New England Fishery Management Council, Legal Counsel, and four bureaus. The Counsel represents the Division and is responsible for all legal/legislative aspects of Division operations. Council Liaison participates in New England Fishery Management Council meetings/hearings as a representative of the Director and reviews fishery management plans to provide state input and assure state compatibility with management and enforcement practices. Four bureaus, each with an Assistant Director, govern various research, administrative, and management of sport and commercial fisheries programs (Table 20).

The Bureau of Administration and Operations coordinates and administers all fiscal activities of the Division. This includes budget preparation, requisitions for goods and services, vendor payments, and maintenance of the Budgetary Control Register. It coordinates personnel recruitment, administers federal grant and non-federal trust activities, and issues licenses and permits. It is involved in conducting public and adjudicatory hearings as prescribed by M.G.L. c. 30A, and administering distribution of financial aid to communities for shellfish propagation and management.

In addition, the Bureau is responsible for the operation of the Division's offices and laboratories. Cat Cove Marine Laboratory provides the Division with comprehensive, accurate, and timely laboratory services including testing for Polychlorinated Biphenyls (PCB's), heavy metals, pesticides, and Paralytic Shellfish Poisoning (PSP). The Shellfish Depuration Plant purifies moderately contaminated soft-shelled clams to produce a product suitable for human consumption. Two field offices on the South Shore house a variety of projects. The Lobster Hatchery and Research Station on Martha's Vineyard is responsible for the hatching, rearing, and

liberating of post-larval lobsters into state waters to augment the natural population. The Hatchery also conducts research on the biology, genetics, and possible mariculture of lobsters.

The Division issues licenses in three major categories: commercial fishermen, dealer, and special permit. In 1979, a total of 19,946 licenses were issued, an increase of 4,801 since 1976. During this period the number of commercial shellfish licenses increased by 625, commercial boat under 60 feet licenses by 558, and non-commercial lobster licenses by 2,357. Total revenues from licenses in 1979 were $526,884. Although license fees provide partial funding for Division research, management, and administration, licensing is important for other reasons. Licenses serve as an indicator of resource use, specifying the number of fishermen, type of gear, and size of vessel utilized. Name and address information provide a directory for distributing information to fishermen and collecting statistics from fishermen. Limiting the number of licenses issued is a management tool for reducing overfishing. Finally, licenses, and the threat of revocation, are vital to enforcement of marine regulations.

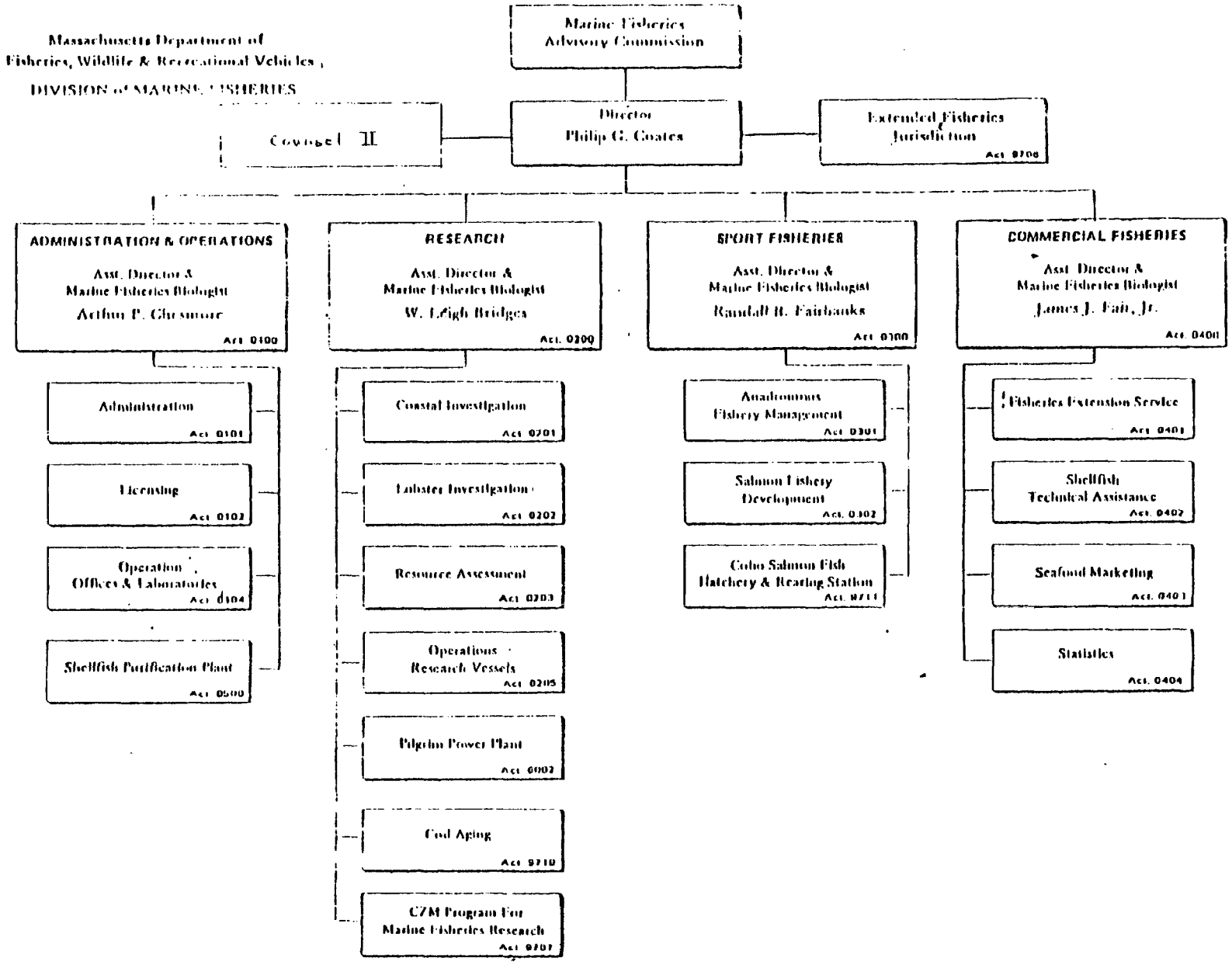
The Bureau of Research provides information which will result in improved fishery management, enhancement of stocks, habitat protection, and development of the fishing industry. Specific objectives include: research that has direct application to fishery management problems; evaluation of environmental impacts of coastal alteration; and, providing liaison with other states and federal agencies on marine research matters. Five major programs operate from this Bureau. Three area teams, geographically divided into the North Shore, South Shore, and Cape and Islands provide information and technical assistance to the public. They recommend management strategy for wise utilization of coastal resources to commercial and recreational fishermen, state and federal agencies, and resource user groups. Coastal Lobster Investigations Program is responsible for managing coastal lobster resources. Through catch sampling and tagging studies, an indication of resource condition can be estimated. The Resource Assessment project conducts semi-annual bottom-trawl surveys of the state's territorial sea to acquire a perspective on marine resources subject to state management. Objectives include an estimate of relative abundance, population structure, and fish distribution in relation to temperature, salinity, and depth. A codfish ageing program assists the National Marine Fisheries Service in evaluating the age structure of sampled populations. The Pilgrim Power Plant study, under contract to the Plymouth Nuclear Power Plant, evaluates long-term effects of power generation on the marine ecosystem. The knowledge accumulated adds to the large data base necessary to predict, assess, and guide operation of the existing unit and possible future units. The Division resource economist evaluates the supply and demand implications of management practices and generates information on costs and returns of fishing efforts as influenced by management.

The Bureau of Sportfisheries is concerned with management of sportfish and development and maintenance of anadromous fish resources. The Division cooperates with the Public Access Board to assess recreational

fishing access needs and develop plans for boat launching and fish pier facilities. A Coho Salmon project has developed techniques of hatching, rearing and stocking of a strain of Massachusetts Coho Salmon to establish a recreational fishery during low cycles of native sportfish populations. The Anadromous Fish Management program restores, maintains, and enhances existing fish runs and manages the various anadromous fish species.

The Bureau of Commercial Fisheries is responsible for management of the State's commercially important marine resources and supports development of the Commonwealth's commercial fishing and seafood industries. Four projects, each dealing with specific aspects of commercial fisheries are incorporated in this Bureau. The Fisheries Extension Service provides the commercial fishing industry with technical assistance, workshops and training seminars, introduction of new fishing techniques, and distribution of fisheries information. The Seafood Marketing Program objectives are to stimulate market development for underutilized species, promote domestic and foreign expansion of Massachusetts markets, and encourage institutional use of state fish products. The Shellfish Technical Assistance Project aids local shellfish and the shellfish industry in management and enhancement of shellfish resources. The Fisheries Statistics Project collects, compils, and distributes landings and economic data for Massachusetts marine resources.

Table 20. Organizational chart, Division of Marine Fisheries



IV. Fishery Related Agencies and Organizations

A. International

1. International Convention for the Conservation of Atlantic Tunas (ICCAT)

Established in 1969, the Convention is responsible for the management of the Atlantic bluefin tuna (*Thunnus thynnus*) in the Atlantic Ocean and adjacent seas. After national quotas and other management measures are established by ICCAT, the National Marine Fisheries Service establishes U.S. quotas and regulations for commercial and recreational fishing. While the Division regulates the number of tuna purse seining boats in Cape Cod Bay, all management and quota restrictions in state waters are under ICCAT and NMFS control.

2. Northwest Atlantic Fisheries Organization (NAFO)

Formerly the International Commission for the Northwest Atlantic Fisheries (ICNAF), this organization conducts research and manages the fisheries of the Northwest Atlantic outside the 200 mile limit of the United States and Canada.

B. National

1. National Marine Fisheries Service (NMFS)

The National Marine Fisheries Service is part of the National Oceanic and Atmospheric Administration in the Department of Commerce and is the Federal marine fisheries management and research agency. Massachusetts is one of the 20 states within the NMFS Northeast Region, which includes the New England states, all the states south to Virginia, and west to Minnesota. The Northeast Region is divided into two regional organizations: The Regional Office and the Northeast Fisheries Center. The Regional Office interacts with state fishery agencies and the fishing industry, and it organizes and implements fishery management plans. Programs conducted out of the Regional Office include Marketing, Financial Assistance, Fisheries Development, Law Enforcement and Marine Mammals, Fisheries Management, Statistics and Market News, and Federal Aid (i.e., P.L. 88-309 and P.L. 89-304). The Northeast Fisheries Center is the regional research organization for the Northeast and Mid-Atlantic areas. The Center is directed from Woods Hole and includes seven labs each with specific objectives.

The Division works closely with NMFS in many areas and numerous Division programs are partially funded by NMFS's Federal Aid Program. Under the Commercial Fisheries Research and Development Act (P.L. 88-309) NMFS partially funds the Division's Fishery Statistics Program, Resource Assessment Project, Shellfish Technical Assistance Project, Fisheries Extension Program, and Seafood Marketing Program. Under

the Anadromous Fish Conservation Act (P.L. 89-304) NMFS provides partial funds for the Division's Anadromous Fisheries Management Project, and the Anadromous Fish Hatchery and Rearing Station. The latter is in cooperation with the Massachusetts Division of Fisheries and Wildlife. The Division's Codfish Ageing Program is funded under contract with the Northeast Fisheries Center, Woods Hole.

2. U.S. Fish and Wildlife Service (USF&WS)

The USF&WS operates fish hatcheries and conducts research to preserve and manage freshwater fish, waterfowl, and wildlife on federal and open lands. It jointly administers the Anadromous Fish conservation Act with NMFS and it disperses Dingell-Johnson funds to the states (obtained from a 10% tax on rod and reel gear) for recreational fisheries programs, development, and research. The Division participates in the Merrimack River Anadromous Fish Restoration Program funded by USF&WS under the Anadromous Fish Conservation Act (P.L. 89-304). Together with the Massachusetts Division of Fisheries, Wildlife and New Hampshire Department of Fish and Game, the USF&WS and the Division are attempting to restore Atlantic salmon and shad to the Merrimack River. The Division also reviews and comments on coastal alteration projects under the Fish and Wildlife Coordination Act (P.L. 85-264).

3. New England Regional Fisheries Management Council (NEFMC)

One of nine quasi-governmental management bodies created by the Magnuson Fisheries Conservation and Management Act of 1976 (i.e., the 200 mile limit), the Council is responsible for developing management plans for species in the New England region of the Fisheries Conservation Zone (FCZ). Seventeen voting members, including 10 Governors' nominated members-at-large serving 3-year terms, the fisheries administrator, the five coastal New England states, the Regional Director of NMFS, and the Executive Director of the Atlantic States Marine Fisheries Commission serve on the Council. Non-voting members are representatives of U.S. Fish and Wildlife Service, United State Coast Guard, and Department of State.

Massachusetts is represented on the Council by the Director of the Division. He is assisted by the Council Liaison. Other Division personnel participate in meetings, oversight committees, and the Scientific and Statistical Committee to provide state input in the management of the New England fisheries. The Division works for consistency with federal regulations in state territorial waters.

4. Office of Coastal Zone Management (OCZM)

Created by the Coastal Zone Management Act of 1972 (P.L. 92-583), the office provides funds to coastal state governments for developing and conducting Coastal Zone Management programs (refer to Massachusetts Coastal Zone Management Program).

5. Office of Sea Grant (OSG)

Developed through the National Sea Grant College and Program Act of 1966 (P.L. 89-688), the office is the only national intergovernmental program cooperating with state and local governments, academic institutions, and industry to promote marine research development, technology, environmental research, education, training, and advisory services for coastal zone areas. It provides grants to public and private universities, institutes, laboratories, and other agencies.

In Massachusetts, the Woods Hole Oceanographic Institution Sea Grant Program conducts studies in the biological, physical, and chemical aspects of the coastal zone while supporting aquaculture, pollution studies, and a marine policy program. The Massachusetts Institute of Technology is the designated Massachusetts Sea Grant College and by utilizing its' engineering and scientific skills, conducts research projects and advisory services for the benefit of the fishing industry. MIT Sea Grant has supported fisheries education programs at Massachusetts Maritime Academy and the Cooperative Extension Service at the University of Massachusetts. The Division reviews and comments on Sea Grant Fishery technology projects.

6. United States Army Corps of Engineers

The Corps approves applications for construction in coastal zones, rivers, and waterways. They inspect and approve construction projects, establish danger zones, prescribe navigation regulations, and investigate obstructions and complaints. The Division, from time to time, is asked to comment on fishery impacts resulting from alteration of marine environment and ocean disposal sites for dredge spoils.

7. Food and Drug Administration (FDA)

Working under the Department of Health and Welfare, the major responsibility of the FDA is to enforce federal legislation and programs to assure that all food, including seafood, shipped interstate is safe for human consumption. FDA regulates and inspects interstate shipments of fish and shellfish for possible contamination. In particular, sportfish caught beyond state territorial waters are tested for mercury content exceeding the federal .5 parts per million limit. FDA administers the State-Federal Industry Cooperative Shellfish Sanitation Program. This program provides for the harvesting, depuration, and marketing of moderately contaminated shellfish that otherwise would remain unutilized. The Division's Newburyport Shellfish Purification Plant is operated under Shellfish Sanitation Program guidelines.

C. Interstate

1. Atlantic States Marine Fisheries Commission (ASMFC)

Based in Washington, D.C., the Commission is composed of all Atlantic coastal states, each represented by the head of the fisheries administrative agency, a legislative appointee, and a governor's appointee. The Commission provides a forum for discussion and resolution of common fishery problems. Under Amendment I of its charter, the states can develop joint management regulations for fishery resources primarily in state waters and shared by one or more states. Under contract from NMFS, the Commission administers the federally funded Interstate Fisheries Management Program. The Division is involved actively in the ASMFC, and has assisted in developing interstate fisheries management plans for northern shrimp, lobster, striped bass, and summer flounder.

D. State

1. Executive Office of Environmental Affairs

The Secretary of Environmental Affairs is appointed by the Governor and is responsible for the State's environmental policies and laws. The following departments and divisions come under the direct supervision of the Secretary.

a. Department of Fisheries, Wildlife and Recreational Vehicles (DFW&RV)

The DFW&RV manages and studies, under the direction of a commissioner, inland and marine fish and wildlife resources. The following Divisions act directly under this Department:

(1) Division of Marine Fisheries (DMF)

See Section III.

(2) Division of Fisheries and Wildlife (DF&W)

This Division is supervised by a public-staffed, seven-man board and is responsible for the management, protection, and enhancement of all wildlife and freshwater fisheries of the State. Their fisheries jurisdiction commences on rivers and streams where the water does not rise and fall with the tide or above the first upstream dam. The DF&W conducts reserach, promulgates regulations, and issues licenses for freshwater recreational fishing. It stocks and manages such sportfish as trout, largemouth bass, sea run brown trout, walleye pike, and pickerel, and assumes management responsibilities over anadromous fish in fresh water. Many of its fishery programs are partially funded up to 75% by the Dingell-Johnson Federal Aid Program. The Division of Fisheries and Wildlife has a cooperative agreement with Marine

Fisheries and NMFS in the building and operation of a coho salmon and sea-run trout hatchery in East Sandwich. In addition, both Divisions participate in the program for restoration of Atlantic salmon and shad in the Connecticut and Merrimack Rivers.

(3) Public Access Board

This Board purchases land, design projects, and funds construction of access facilities to forests, ponds, and sea shores for recreational purposes. In particular, the Board facilitates construction and operation of ramps and fishing piers for public access to salt water angling. The Board has an Executive Director and is composed of one member from each of the Departments' agencies, including the Division of Marine Fisheries.

b. Division of Law Enforcement (DLE)

In addition to enforcing the rules and regulations relating to marine fisheries (M.G.L. c. 130), the Division of Law Enforcement performs similar service for the Division of Fisheries and Wildlife (M.G.L. c.131), Division of Forests and Parks, Division of Water Pollution Control (M.G.L. c.21), and the Division of Wetlands (M.G.L. c. 131, s. 40). There are 17 coastal enforcement districts (1 officer per district) and two enforcement vessels to patrol approximately 2,000 miles of coastline.

c. Massachusetts Coastal Zone Management (MCZM)

This office is responsible for developing policies, implementing studies, and advising wise use of the Massachusetts coastal zone. Studies include the impact of Georges Bank oil exploration, Outer Continental Shelf (OCS) dredge and spoil disposal practices, and port and harbor development. They also review projects under the Massachusetts Environmental Policy Act. CZM offers technical assistance to coastal communities through a management program and financial assistance. It provides for federal consistency with CZM policies, and strives for making the state's regulatory and management programs work in a more assured, timely, and consistent manner. CZM interacts directly with the Division through grants providing funds for such positions as the Resource Economist, and Marine Fisheries Management Policy Program personnel.

d. Department of Environmental Quality Engineering (DEQE)

The main regulatory agency under the Secretary of Environmental Affairs, the Department administers most permit programs dealing with coastal alteration and municipal and industrial waste disposal. It monitors contaminated shellfish areas, and air and water quality. Several Divisions operate under the jurisdiction of DEQE: the Division of Land and Water Use administers the Wetlands Protection Act (M.G.L. c. 131, s. 40), the Waterways Program (M.G.L. c. 91, s. 1-59), and the Community Sanitation Program (M.G.L. c. 111).

The Division of Air and Hazardous Materials is responsible for monitoring sources of air pollution to assure they do not exceed federal emission standards. The Division of Water Pollution Control has permitting authority over municipal sewage treatment works (M.G.L. c. 21, s. 27, 43), awards grants for the construction of sewage treatment and collection systems, and issues water quality certificates. The Division of Mineral Resources licenses exploration and extraction of mineral resources in coastal waters (M.G.L. c 21, s. 54).

Division of Marine Fisheries reviews proposals for coastal alterations under the Wetlands Protection Program and coastal dredging under the Waterways Programs to prevent damage to marine resources. Upon notification by DEQE's Shellfish Sanitation Program, the Division opens or closes shellfish areas to harvesting (see contaminated areas, II, C, 3).

e. Department of Environmental Management (DEM)

This department administers the Coastal Wetlands Restriction Program (M.G.L. c. 130, s. 105) and Ocean Sanctuaries (M.G.L. c. 132 A, s. 13-17). The Coastal Wetlands Restriction Program imposes restrictions to environmentally harmful development on selected coastal wetlands. Occasionally the Division is asked to comment on a restriction proposal.

2. Department of Commerce and Development

The Department assists in the establishment and expansion of industries in Massachusetts. It provides industries with local statistics, aids in site selection, imports financial advice, and works for legislative support. Through the Division of Tourism, it promotes sportfishing by distributing informational literature and by sponsoring the Governor's Cup fishing derby.

3. Department of Public Health (DPH)

Through the Division of Food and Drug, the DPH oversees and inspects seafood processing plants and implements health and sanitation regulations relating to fish and shellfish. Food and Drugs' seven fish inspectors examine trucks, shucking houses, and retail businesses dealing in seafood before the Division of Marine Fisheries issues permits. The Shellfish Sanitation Program of DEQE operates under regulations and guidelines established by DPH as part of the National Shellfish Sanitation Program.

E. Educational Institutions

1. Massachusetts Cooperative Fisheries Research Unit

The Unit is based at the University of Massachusetts (Amherst),

Department of Forestry and Wildlife, and is primarily funded by the U.S. Fish and Wildlife Service, with additional financial support from the Commonwealth's Division of Marine Fisheries and Division of Fisheries and Wildlife. The Unit Leader and Assistant Leader teach fishery courses and advise graduate students conducting fisheries research. In recent years the Unit has concentrated on anadromous fish research, and plans to build a research laboratory on the Connecticut River. The Unit had a small research facility in Gloucester, but the station was recently transferred to the Food Technology Department.

2. Massachusetts Maritime Academy

In 1978 the Academy established a Marine Fisheries Education and Training Program to provide commercial fishermen with training in fishing gear design and repair, marine engines, electronics, navigation, and business management. Courses are conducted at the Buzzards Bay Campus, Essex Agricultural School, and onboard its training vessel MARITIME QUEST. The Academy is striving towards an instruction program to certify new fishermen in safe navigation and gear handling.

3. Massachusetts Cooperative Extension Unit

This unit serves as a public information and education distribution network for agriculture, home economics, youth, and community resource development. Funded by the U.S. Department of Agriculture and based at the University of Massachusetts (Amherst), it supports the County Extension Agents (funded 20% by the Unit and 80% by the County). The Unit's Community Resource Development Program, through a three-year MIT Sea Grant contract, is training it's extension agents in fisheries related matters at the Massachusetts Maritime Academy, and, in cooperation with the Division of Marine Fisheries, has recently reprinted the Massachusetts Salt Water Fishing Guide.

F. Local

1. Board of Selectmen or City Council

The Board of Selectmen or City Council has management responsibilities over shellfish, eels, and seaworms in the coastal towns and cities (M.G.L. c. 130, s. 52-56). In areas where waters are mildly or grossly contaminated by sewage pollution or contaminated by paralytic shellfish poinsoning (PSP) or toxic substances, control remains or reverts to the state. However, local management control over contaminated shellfish is possible through development of management plans approved by the Division. Local communities may issue commercial and recreational licenses for the taking of these resources and are responsible for management regulations, propagation, and enforcement. Many communities have shellfish commissions which act for the board of selectmen or city council. The Division of Marine Fisheries may

reimburse the cities and towns for up to 50% of their shellfish management expenditures from monies annually appropriated by the legislature (M.G.L. c. 130, s. 20A). The board of selectmen or city council may issue grants in coastal waters to private individuals for purposes of growing and harvesting shellfish (M.G.L. c. 130, s. 57, 68A). Upon written request to and approval from the Director of the Division, the board of selectmen or city council may control and manage the anadromous fisheries within their towns or cities (M.G.L. c 130, s. 94).

2. Conservation Commissions

The conservation commissions of the local cities and towns review applications for dredging, filling, and other coastal alterations under the Wetlands Protection Act (M.G.L. c. 131, s. 40). Their responsibility is to assess the probable impact of a project and assure that the fisheries are not harmed. The area of purview extends to 100 feet beyond either the 100 year flood plain or the landward edge of a wetland, whichever is greater.

3. Regional Development Groups

A number of county or regional commissions have taken an active role in developing the fisheries in their area. These groups organize meetings, distribute information, and fund studies in an effort to improve the economic climate for fisheries. While not limited to fisheries development, the Cape Cod and Nantucket Planning and Economic Development Commissions and the Martha's Vineyard Commission are particularly involved in assisting the fisheries on a regional basis.

G. Private Organizations

1. New England Fisheries Development Foundation (NEFDF)

The newly formed NEFDF evolved from the New England Fisheries Development Task Force which oversaw NMFS funded fisheries development activities. The NEFDF is a private, non-profit foundation dedicated to developing the harvesting, processing, and marketing sectors of the commercial fishing industry. Reorganization into a foundation provides greater operational flexibility through the receipt of funds from private, federal, regional, and state sources. The foundation will examine proposals and issue grants for projects to improve gear and processing technology, develop fisheries for underutilized fish, expand markets for traditional species, and other projects to spur the growth and diversity of the New England fishing industry.

2. New England Fisheries Steering Committee, Inc. (NEFSC)

The general purpose of the committee is to promote the welfare of the New England fishing industry by disseminating information on

fishing techniques and by improving markets for fishery products. The Committee acts as the regional representative for industry at the national level and provides a channel of communication between industry segments. The Division supports the objectives of the Committee and serves as a non-voting associate member.

3. Fisheries Associations

A number of organizations have been founded to bring together fishermen and/or processors with common interests and problems (Appendix III). These groups take an active role in providing services to their members, distributing fisheries information, and advising regulatory agencies. The Massachusetts Lobsterman's Association (MLA) has assisted in developing state lobster conservation regulations and participated in federal lobster management plan development. It has developed group life insurance and boat insurance plans for its members. MLA and Massachusetts Inshore Draggerman's Association (MIDA) officers have worked with the New England Fisheries Management Council and Marine Fisheries Advisory Commission. MIDA has established an insurance plan with safety guidelines for its members. Other organizations (Appendix II) such as the Interstate Party Boat Association, Cape Cod Charter Boat Association, Massachusetts Sportsmen's Council and various sportfishing clubs have actively served recreational fishermen by promoting and protecting their interests.

Processor associations in Gloucester, Boston, and New Bedford perform a similar function in cooperating to solve problems and advising government on regulatory issues. These associations provide a vital link between government agencies and the fishing industry by which information and public input are exchanged.

The Massachusetts Shellfish Officer's Association, while not a government agency, brings together the shellfish managers from all the cities and towns. The MSOA promotes management consistency between local communities, regional shellfish development and enhancement plans. The association provides a unique opportunity for coordination and cooperation between state and local shellfish managers.

V. Public Concerns

In developing a comprehensive marine fisheries policy, a necessary and important part of the process is the involvement of the public. Before the policies were drafted, the fishing public had the opportunity to air their concerns to affect the shaping of policy. This was provided at meetings with commercial and recreational fishermen, sportfishing clubs, fisheries organizations, and other fishery related interests to obtain their views and opinions on topics affecting their livelihood and/or recreational enjoyment.

Public meetings were held in major ports and coastal communities throughout the Commonwealth of Massachusetts mainly during the two-month period of February and March, 1980 (Appendix V). Adequate notification of meetings was a high priority and was accomplished by direct mail, newspaper ads, television and radio interviews, and posters. While meeting attendance ranged from excellent to poor, most meetings provided a good forum for the exchange of ideas. Issues discussed included port and harbor facilities, licensing, gear conflict, distribution of fisheries information, boat insurance and loans, law enforcement, fisheries regulations, habitat protection, and topics pertaining to state fisheries management or lack thereof.

In conjunction with public meetings, two fisheries questionnaires were distributed (see Appendix I). One addressed problems in the commercial fisheries sector including finfish, lobster, and shellfish. The other, a recreational questionnaire, concerned problems facing rod and reel fishermen, recreational shellfish and lobster fishermen, and party and charter boat fishing activities. Specific comments on other problem areas were encouraged. In addition, questionnaires were mailed to members of organizations such as the Massachusetts Lobsterman's Association (MLA) and the Massachusetts Inshore Draggermen's Association (MIDA); and, a Portuguese translation of the commercial questionnaire was prepared and distributed in New Bedford. Letters were sent to sportfishing organizations to solicit additional comments on public access, fishing information, commercial vs. recreational fishing, sportfish, and a saltwater fishing license.

The following topics drew the most response from the questionnaires, public meetings, and personal communications. Since these topics evoked similar responses coastwide, they are discussed on a collective basis, while citing specific examples.

A. Port and Harbor Facilities

Lack of adequate piers, docks, dredged channels, ice, and other facilities was a major concern for all areas of the coast including the primary ports of Gloucester, Sandwich, and Provincetown, but particularly the secondary ports of Scituate, Chatham, and Plymouth and smaller ones like Newburyport, Hull, Beverly, and Nantucket. Conditions cited by fishermen were deteriorating docks, conjested offloading and

docking areas, and lack of ice and boat maintenance facilities. The public contends that the communities give little or no support to the commercial fishery regarding improvements in harbor facilities.

Since fishing is not a highly visible industry in small ports, it is difficult to convince local officials of its economic value. Coastal communities with fiscal constraints are not willing to allot money to improve facilities that only benefit a small percentage of the population and tax base. Newburyport, for example, expends a great deal of effort and money for downtown and waterfront restoration to induce tourism and pleasure draft usage and very little on their commercial fishing industry.

The public suggested the following courses of action. The state should assist the fishermen by providing economic studies documenting the importance of commercial fishing in each port. Fishing generates a lot of unnoticed dollars back into the community by way of employment, fish processing, marketing, boat supplies, boat maintenance, taxes, and tourist interest. Massachusetts should initiate a statewide port and harbor development program. Fisheries extension agents should survey areas, solicit opinions, and make preliminary recommendations on projected port facility needs. The state should provide port and harbor development funds or act as liaison to find federal development grants for local communities. The state should assist communities with the technical aspects of applying for grants, obtaining permits, and designing facilities. A comprehensive statewide program would be more efficient than expecting individual communities to organize, plan, and fund port development projects.

B. Gear Conflict

The traditional conflict between stationary and mobile fishing gear has been well documented in the past. In 1977, the Division organized an ad hoc Gear Conflict Committee, composed of knowledgeable fishermen, to deal with disputes between gill netters and trawlers on the North Shore and lobstermen and pair trawlers on the South Shore. As different species became valuable, new gear is developed, and economic conditions evolve, the intensity and scope of fishing activities change and new conflicts are created.

This was found to be true in the rapidly developing gill net fisheries on the North Shore, South Shore and outer Cape Cod. It is easy to enter the gill net fishery because of the small capital outlay for gear and boat, and the lack of restrictions on net numbers, mesh size, or length. As a result the fishery is experiencing a large influx of inexperienced and part-time fishermen unfamiliar with proper net setting and marking techniques. Nets are sometimes set perpendicular to shore or without adequate markings or radar reflectors making it difficult for trawlers to avoid them. In addition, a large number of experienced lobstermen are seasonally fishing gill nets, while many longlines have switched to gill nets. The general increase in gill net numbers result in

encroachment onto traditional trawling grounds. This and improper handling techniques result in both natural and man-induced gear loss.

Many were concerned over the effects of gill netting on fish quality, spawning success, navigation, fish stock, and recreational fishing. Fish quality suffers if a fish is caught in a gill net and not boarded for 24 to 48 hours after it is dead. Gill nets can be set on most bottom types, including some important spawning grounds heretofore unavailable to mobile gear. Nets stretched across river mouths or near shoals present hazards to navigation. Non-biodegradeable gill nets may continue to catch and destroy fish long after they are lost at sea. Party/charter boat fishermen complained of gill nets set in "star patterns" on Jeffrey's Ledge that interfere with traditional hook and line fishing.

Both commercial and recreational fishermen declared a strong desire for State regulatory action. Suggestions included a thorough research into the developing Massachusetts' gill net fishery and what actions other states have implemented. Regulations should be based upon protecting spawning grounds, improving fish quality, limiting number of gill nets, and reducing gear loss.

Gear conflicts between trawlers, and between pair trawlers and lobster gear was discussed. Large offshore and out-of-state trawlers compete with small inshore trawlers in state waters. Inshore trawlers have a limited fishing range and depend on resources within State territorial waters, especially during bad weather seasons. Larger vessels capable of fishing offshore in most weather conditions, deplete inshore waters before moving offshore, leaving less for the inshore boats. Pair trawlers fishing for herring in State waters at night have caused extensive damage to lobster gear on the South Shore.

In an issue related to gear conflict, sportfishermen contend that trawlers and fish weirs take large quantities of sportfish, spawning fish, and forage fish within state waters. The public suggested seasonal closures of certain areas known to contain large numbers of spawning sportfish and initiating a system of limited entry and/or vessel size constraints to limit inshore fishing to a reasonable number of small boats.

C. Law Enforcement

The Division of Law Enforcement operates within the Executive Office of Environmental Affairs. Although it is not part of, or controlled by, the Department of Fisheries, Wildlife, and Recreational Vehicles, DLE primarily enforces rules and regulations of the Division of Marine Fisheries (M.G.L. c. 130) and the Division of Fisheries and Wildlife (M.G.L. c. 131). In addition it must enforce the rules and regulations of four other agencies. The Law Enforcement Division is severely hampered by shortages of personnel, budget constraints, and numerous responsibilities. Officers find it difficult to enforce both marine and inland laws within the large coastal enforcement districts.

The lack of effective enforcement was expressed at all meetings and was rated a severe problem on a high percentage of the questionnaires. Many abuses were mentioned in the lobster fishery such as: violation of the ten pot limit by recreational lobstermen, improper marking or construction of buoys and pots; taking short and egg-bearing lobsters; divers removing lobsters from traps; lobstermen setting pots in closed areas and in marked channels; and, poachers hauling pots at night.

A logical solution suggested at a number of meetings was to incorporate law enforcement directly into the resource agency it primarily serves and/or create a marine law enforcement unit. Commercial lobstermen suggested using smaller and less conspicuous vessels to enforce lobster laws. In addition, this would facilitate the laborous task of checking licenses, gear markings, and escape vents. Increasing the authority and/or training of local shellfish officers, policemen, and harbor masters and Marine and Recreational Vehicle officers would also aid the enforcement of marine fishing laws.

Examples of enforcement problems in the mobile gear fisheries included trawlers landing fish during closed seasons, exceeding landing quotas, fishing with small mesh nets, and fishing inside closed state waters. Fishermen contended that too many conflicting and restraining regulations were already in effect and were impossible to enforce even with more officers. They favored institution of mesh regulations rather than closed areas and quotas. Enforcement of mesh size regulation could be eased if there were minimum fish size limits enforced for fishermen and buyers alike. Fishermen said that as long as there is a market for 'snapper' cod and small flounder, they would continue catching them with small mesh nets.

The public believed Law Enforcement officers had limited knowledge of commercial fishing operations and gear; this hampered interpretation of marine regulations. A solution to this problem would be to provide seminars and courses in gear and fishing techniques for the officers.

Other topics of discussion were problems related to prosecution of violations. Most violations, however small, must be tried in court. Rather than bring minor violations to court, on-site citations similar to traffic tickets should be issued. Because judges commonly deal with serious crimes, they tend to underrate the importance of resource violations. Many convicted resource violators receive little or no punishment.

D. Licensing

The major concern involving licenses was abuse of the $5.00 rod and reel permits' exemption for those who catch and sell less than one hundred pounds plus one fish per day. Many fishermen, including some from out-of-state, catch and sell more than the limit without a license. While some fishermen ignore the regulations, others find ways around the law, such as selling 100 pounds of fish at five dif-

ferent markets or distributing fish to friends for them to sell. These violations commonly occur in the striped bass sportfishery and results in the loss of valuable management statistics.

In a related issue, the definition of a commercial versus a non-commercial sportfish fisherman was discussed. This is of particular concern for Cape Cod residents who feel out-of-state fishermen take advantage of the Massachusetts striped bass fishery by landing and selling 500 to 600 pounds per day. They expressed the need for a license residency requirement and/or a $100-500 rod and reel license for selling striped bass. While some favored a license others opposed any kind of license that would effect the catch or sale of sportfish. These people felt that the fish they sell offset the cost of fuel and maintenance for their boats and they should not be subject to further bureaucratic regulation and cost.

There appeared to be few problems with procedures for submitting catch reporting or processing license applications. However, the public did suggest that licenses be issued at Division field stations in addition to the Boston office. This would reduce traveling when licenses are needed quickly. Mail handling and costs would also be reduced. Others thought that the numerous types, fees, and conditions for obtaining licenses were confusing, and that the Division should either simplify the licensing system or provide more information. This is particularly true in issuing seasonal lobster permits where there is confusion over student eligibility, fishing seasons, and pot limits.

A number of people questioned the legality of restricting the number of commercial lobster licenses issued. They felt that this was unconstitutional and inhibited a persons right to make a living from the sea.

E. Underutilized Species, Marketing, Fish Quality, and Joint Ventures

Underutilized species are relatively untapped resources for Massachusetts fisheries. With traditional fish and shellfish such as cod, haddock, flounder, scallops, and lobster fully utilized and increasingly regulated, fishing communities have to look for other types of fish with market potential. Consequently, consumers must be made aware of the many nontraditional fish available that are nutritional, flavorful, and less expensive. This can be done through promotion campaigns and expanding domestic and export markets.

Commercial fishermen, particularly in the ports of Chatham, Sandwich, and Provincetown, expressed interest in developing markets for underutilized species such as dogfish shark, cusk, and hake. They lacked knowledge of proper techniques to keep catch quality high enough to satisfy foreign market standards. They needed information on modern storing, offloading, and processing techniques to maintain fish quality. Fishermen indicated the need for consumer information programs to educate the public in the availability and preparation of nontraditional

fish. Fihsermen urged the greater use of Massachusetts caught fish in State institutions, school lunch programs, hospitals, and nursing homes.

Fish quality, fish prices, and Canadian imports were also discussed. Since buyers do not always acknowledge better quality by paying higher prices, some fishermen suggested a State-sponsored grading system similar to the U.S. Department of Agriculture's system for meat and poultry. Other marketing suggestions included promoting "Massachusetts caught fish" following the idea of "Massachusetts grown vegetables". Advertising "Massachusetts lobster" rather than the commonly used 'Maine lobster' was also suggested. Competition from foreign imports, particularly from Canadian lobsters and fresh fish reduced ex-vessel prices to Massachusetts fishermen. Canadian government subsidies and low import tariffs keep imported fish prices low and increase price competition for U.S. caught fish.

The subject of joint ventures with foreign countries correlated with marketing underutilized species. Some fishermen did not want the red tape or high quality demands involved with joint ventures. While others feared losing their domestic buyers and felt that foreign markets were not secure. The Division, by providing information on foreign buyers regulations, quality standards, and processing methods, could aid fishermen and fishing organizations that are interested in a joint venture. In this way the U.S. fishermen could make their own negotiations and insure a quality product at a fair price.

F. Information and Education, Gear Technology

Most commercial fishermen expressed considerable interest in obtaining information on gear technology developments, European fishing methods, and fisheries meetings. There was strong support for the publication of an informative monthly newsletter or periodical. Included in such a newsletter could be articles on various Division programs, new legislative acts, and biological data obtained from research projects.

The Division's Fisheries Extension Program was appreciated by those that have come in contact with it. However, some fishermen said the agents, while knowledgeable about traditional gear, needed more information on new techniques and large boat gear (40 feet +). While the Extension Agents were helpful, they did not tell experienced fishermen anything new. In realizing that there were just three agents and one coordinator, the fishermen suggested an increase in part-time or seasonal personnel.

The Marine Fisheries Education and Training Program conducted at the Massachusetts Maritime Academy was well received. According to its Director, over 800 commercial fishermen and other participants received instruction and training in fishing gear, marine engines, electronics, net mending, navigation, and business management. People who took the courses remarked that they were informative, but were geared toward the novice fisherman or to persons that were not actively pursuing

fishing as their main source of income. In the future they would like to see a more intensive curriculum for the experienced fishermen, held evenings at local high schools. Although the MIT Sea Grant Program funded the Fisheries Training Program, the fishermen felt that Sea Grant had done little else to help commercial fishermen.

Recreational fishermen believed that sportfishing information could be best distributed through the local Chambers of Commerce. This would help both the vacationer and novice find where to fish and what to catch. The Division should supply brochures and bookelts describing fishing areas, access areas, and state fishing regulations. The Division should further educate the novice in fishing techniques and inform them that there are other edible fish to catch besides striped bass, bluefish, and flounder.

G. Vessel Safety, Insurance, Financing and Loans

Fishermen all agreed that vessel safety and complying with Coast Guard safety guidelines was important. Insurance companies give premium deductions as incentives for installing special safety gear on vessels (i.e. survival suits). Some fishermen wanted more information on insurance company safety guidelines. In most cases, fishermen felt that insurance matters were best handled through group co-ops and fishing organizations. Several associations already had excellent comprehensive insurance packages for their members and it was the general concensus that the state need not become involved.

Fishermen thought that financing and loans for new boats, gear, and electronic equipment was best handled by the individual, even though banks are not inclined to loan money to repair older vessels. Some fishermen found that federal loan applications involved too much red tape and paper work. Local banks that are more familiar with the fishing industry, were generally more favorable and charged less interest than federal guaranteed loans.

While fishermen did not want any new state financial aid programs, most felt that assistance would be needed in the event of a natural (e.g. paralytic shellfish poisoning) or chemical (e.g. oil spill) disaster, provided the Division could substantiate individual catch loss on the basis of post catch reports.

H. Shellfish

At meetings in Ipswich, Bourne, and Westport and with the Massachusetts Shellfish Officers Association, shellfish issues were discussed in depth. Topics of concern included shellfish licensing issues, the need for a regional shellfish hatchery, use of contaminated shellfish as bait, and State shellfish sanitation and purification programs.

Dual state and local commercial shellfish licensing requirements were not a problem. However, the delay involved in obtaining a State license

before shellfishermen can be issued a local permit does create problems. These delays are also experienced with shellfish seed and transplant permits. As previously mentioned, a recommended solution would be to issue licenses at Division field stations and upgrade the efficiency of all licensing procedures.

MSOA members expressed interest in developing a regional South Shore public shellfish hatchery to augment the supply of seed stock. Although seed stock is available from private sources, the seasons or amounts available are not always adequate for local shellfish propagation needs. While a public facility may satisfy the town's seed shellfish needs, the hatchery could also be used as a training center, possibly affiliated with a university. An additional hatchery function could be shellfish disease inspection. Instead of sending shellfish specimens out-of-state for required disease-free certification, the work could be done in-state more timely. Meanwhile, it was suggested that the Division provide pathological inspection capabilities for shellfish and other fish.

The State's shellfish purification plant was discussed at a number of meetings. With the plant operating at full capacity and still not able to meet increased demand, shellfishermen recommended expanding the existing facility and, building additional facilities, encouraging construction of private depuration facilities, or decreasing depuration time from 48 to 24 hours. In addition, shellfishermen felt that more coordination between the Department of Environmental Quality Engineering (DEQE) and the Division of Marine Fisheries was necessary in conducting the Shellfish Sanitation Program. Delays in opening areas, early closures and general bureaucratic malfunctions were cited in control of Paralytic Shellfish Poisoning (PSP) areas and management of contaminated shellfish. Unnecessary delays in opening and closing notification resulted in loss of valuable fishing time or confiscation of PSP contaminated shellfish after purification at the Depuration Plant. Another aspect of the contaminated shellfish issue is the use of this neglected resource for bait. A North Shore party boat owner said a large population of contaminated shellfish off Newburyport cannot be harvested and used for bait because of the inability to resolve interagency problems over regulation and enforcement. Some believe that when bait fishing was allowed a portion of the shellfish were illegally sold for consumption. Therefore the whole area was closed to any shellfishing.

The public recommended the Division take action on a number of fronts. The Division should implement a shellfish resource assessment program to define the extent and value of inshore and offshore shellfish resources and aid in state and local shellfish management. The Division should provide more mariculture technical assistance including information on culture techniques, species selection, proper equipment and cost estimation. Finally, commercial shellfishermen claimed that local shellfish regulations discriminated against them in favor of recreational shellfishermen, and they asked for Division support.

I. Public Access

The decreasing availability of coastal recreational fishing sites and launching ramps was a major concern at all recreational fisheries meetings. With the scarcity and overcrowding of existing ramps and piers and the closing down of other access sites, the public's ability to enjoy recreational fishing has decreased. The State-run Public Access Board builds ramps and piers to be maintained by the city or town, but the Board's funding and thus it's construction rate has decreased in recent years. Existing ramps are falling into disrepair due to vandalism and lack of maintenance. Some towns are restricting ramp use to residents only. A number of proposed ramp construction sites are being opposed by local residents who claim new ramps will cause environmental degradation. These factors, in conjunction with increasing recreational fishing activity, have caused a severe shortage of publically funded fishing access.

Similar problems exist with shore fishing sites. Many beaches and shoreside parks are closed at night due to vandalism. Beach property owners are attempting to restrict beach fishing access by closing paths or persuading the town to ban nearby parking. Many bridges and piers are being closed to fishing because of alleged safety problems.

The public believed the Division must provide strong support for adequate funding and administration of the Public Access Board. The Board must begin to make long range plans for improving coastal access. Coastal land must be set aside for future access use and economic and ecological data must be provided to justify constructing ramps and piers. In addition, either the Division or the Board must distribute information on beach, pier, ramp, and party/charter boat locations.

J. Recreational Saltwater License

In general, public opinion is against any new license or regulatory burden, so the initial public opinion for a recreational rod and reel license was understandably negative. The public believed that recreational fishing was the last free, god-given right that wasn't licensed or taxed. Since they already pay for tackle, bait, and gas, the imposition of a fishing license would only add an additional financial burden. A license may force the young, old, and financially pressed to abandon recreational fishing.

After the initial objections were expressed, the general reaction boiled down to how, if at all, would a recreational license benefit the fishermen? Would the revenues be used for sportfish programs? Would there be more Division sportfish programs? Would public access be upgraded? The questionnaire results indicated that if the above questions were answered in the affirmative then 55% of the recreational fishermen would favor a license, otherwise they were against a license.

Other facets of the recreational license question was the need for recreational catch statistics and the possibility of Massachusetts increasing it's share of Federal Dingell-Johnson funds. Without a license the Division's ability to estimate numbers of fishermen, fishing method used, and resulting catch is extremely limited. This makes substantiating the value of recreational fisheries and the need for sportfish management and development programs difficult. Funds for additional programs may come from license revenues but substantially more money may be obtained from the Dingell-Johnson fund.

Dingell-Johnson monies are collected through the ten percent Federal excise tax on all fishing gear and tackle. The U.S. Fish and Wildlife Service redistributes funds to the states based 60% on the number of licenses issued and 40% on land area. An estimated $280,000 was alloted to Massachusetts in 1980. Because Massachusetts has no saltwater license all the money went to fresh water fishery programs, even though saltwater fishermen contributed a substantial amount to the Dingell-Johnson fund. The final recommendation was for a feasibility study to examine the possible revenues (both state and federal) from a license; its effects on the fisheries, individuals and dependent industries; and what sportfish programs revenues could support.

VI. Principles, Policies, and Proposed Actions

A. Statement of Principles

1. Massachusetts fisheries are renewable resources that are of major importance to the employment, economic, and recreational needs of the people. They contribute significantly to the supply of valuable fisheries products, to tourism, and to state revenues.

2. Renewable marine resources can be maintained and enhanced if properly managed, but there is a limit to their productivity. If mismanaged or unwisely utilized, they may be depleted and the fisheries disrupted.

3. The public has a right to utilize the Commonwealth's living marine resources because they are common property. Historically, this right was "free and open", based on the presumed inexhaustibility of these resources. However, increases in commercial and recreational fishing, use of modern fishing technology, and environmental alterations have proven this premise false. Therefore, it is clearly necessary that the Commonwealth protect, manage, and enhance marine resources for continued use and enjoyment by present and future generations.

4. Those who derive benefit from a public resource must share the responsibility for management. They must participate in the regulatory process, comply with regulations, contribute necessary information, and share in management costs.

5. The Division of Marine Fisheries is the lead agency in the Commonwealth for the management and enhancement of marine fishery resources and the promotion and development of the recreational and commercial marine fisheries.

B. Statement of Policies and Proposed Actions

1.0 Fisheries Management

1.1 Resource Management - Management of living resources requires a delicate balance between their conservation to allow for natural biological growth and replenishment and their utilization to obtain economic, social, and aesthetic rewards of their abundance. The Commonwealth will actively promote conservation, management, and optimum utilization of living marine resources for the benefit of all. Implied in the concept of optimum utilization is the consideration of relevant social, economic, and biological factors in determining highest beneficial uses of the resource.

The goal of managing the Commonwealth's marine resources is to maximize their availability over time. In this way, to the extent possible given resource limitations, long-term social and economic benefits can be derived from their utilization. The resources shall be managed to provide: economic stability and social well-being in the commercial fishing industry; enjoyment and food to recreational fishermen; economic benefit to the industries dependent on commercial fishing, recreational fishing, and tourism; and wholesome, high quality protein to the public.

Fisheries are conducted by individuals and private enterprise. The opportunity to engage in fishing should be available to everyone except when it is necessary to limit entry to a fishery for biological, social, or economic reasons. Although economic stability of the fisheries is a desirable objective, the preferred approach is to maintain fish abundance at adequate levels rather than directly managing the economic performance of the fishing industry.

1.1 Proposed Actions

The Division will:

A. work closely with the following agencies whose management responsibilities affect stocks utilized in Massachusetts fisheries: National Marine Fisheries Service to exchange assessment and statistical data and conduct fisheries research; New England, and other Fisheries Management Councils, to develop fishery management plans and regulations for fisheries outside Massachusetts waters; Atlantic States Marine Fisheries Commission and other coastal states, to manage fish stocks common to territorial waters of two or more states;

B. improve capabilities to gather and analyze biological, sociological, and economic data to provide a sound basis for

fisheries management by

(1) maintaining existing NEFMC liaison position to review federal fisheries management plans for offshore fisheries important to Massachusetts;

(2) establishing staff with capabilities to develop state management plans for species predominantly under Massachusetts jurisdiction;

(3) implementing a sea sampling program on board Massachusetts commercial fishing boats to collect valuable catch and effort data unobtainable elsewhere, and to assess fishery conditions and fishermen's views.

C. solicit input from user groups and the general public concerning management issues, and form ad hoc advisory committees when needed to address management problems;

D. propose legislation to require coastal communities to develop regional management plans for shellfish beyond traditional inshore harvesting areas;

E. propose legislation to change the shellfish local aid fund reimbursement system to a grant system that will provide towns with incentives to prepare management plans to facilitate full development of their shellfish resources;

F. examine possibilities of integrating all aspects of the Shellfish Sanitation Program responsibilities into the Division of Marine Fisheries to bring the management, testing, and purification of contaminated shellfish under one State agency;

G. recommend a change from local to regional or state eel management control. Because of the eels' migratory nature and the general lack of effective local management a new approach is necessary;

H. support efforts to decentralize and streamline the federal fisheries management process so that timely and effective management can be achieved. By transferring more management authority from Washington to the Regional Councils, management plans can more efficiently respond to changing fishery conditions;

I. support efforts to implement the state-federal management program under the Atlantic States Marine Fisheries Commission in order to fully develop fishery management of species that occur predominately in state waters;

J. propose the adoption to necessary legislation to implement Amendment I of the Atlantic States Marine Fisheries Commission charter to allow Massachusetts to enter into interstate fishery management agreements.

1.2 Restrictions and Allocations - Fisheries management employs statutes and regulations limiting the amount, means,or types of resource harvesting as tools to maintain and increase resource abundance. Fishery resources will be available for utilization by all user groups unless fishing conflicts or resource depletions dictate the need for allocation or fishing restrictions. Restrictions can be based on area, gear, time, season, or fish size. Allocations may limit the number of fishermen or quantities of fish taken, and allowances may be considered for traditional fishing practices and historical resource users.

Introduction of new fishing practices or patterns may result in resource or gear conflicts. The Division supports resolution of these conflicts by mediation, with allocation or restrictions to be instituted when other means fail. In such cases, the Division recognizes the importance of traditional fishing practices and patterns but may modify or introduce restrictions to prevent conflicts resulting from new fishing practices. The Division may reserve fishery resources or areas for certain recreational or commercial uses where social, economic, or other factors make joint utilization inappropriate.

1.2 Proposed Actions

The Division will:

A. consult with the Marine Fisheries Advisory Commission on fisheries problems and issues, and submit to the Commission regulatory proposals relating to marine fisheries for appropriate action;

B. promulgate regulations that complement Federal Fisheries Management plans developed by the New England, Mid-Atlantic, and other Fisheries Management Councils and international management organizations, subject to the needs and concerns of the Commonwealth;

C. implement reasonable and enforceable landing/possession limits as a means to regulate total harvest. Refrain from using quotas when possible;

D. consider adopting seasonal area closures in state territorial waters to allow for spawning of important commercial and recreational species;

E. re-establish the Gear Conflict Committee to develop recommendations for reducing present and potential gear conflicts.

1.3 Regulations and Enforcement are essential components of effective management. Effective resource management is impossible if regulations are unenforceable or unsupported by user groups.

The Division shall advocate minimum regulatory control. The regulatory process shall be timely, simple, and provide opportunity for public input. Regulations shall be designed to achieve well defined goals, maximize public compliance, and facilitate enforcement. Each regulation shall contain a clear statement of rationale, and provide for penalties commensurate with the violation.

Recognizing that fisheries support commercial enterprises and that illegal harvesting adversely affects the commercial fishermen's livelihood, the recreational fishermen's enjoyment, and the fishing industry as a whole, the Division advocates effective enforcement of laws and regulations established for management of the Commonwealth's marine fisheries resources. The Division of Marine Fisheries will cooperate with the Division of Law Enforcement to increase the level of effectiveness of marine fisheries law enforcement.

1.3 Proposed Actions

A. The Division will

1. propose legislation to increase penalties and fines for violations of fishery statutes and regulations. At present, illegal fishing can be highly profitable even after existing fines are paid;

2. utilize Division adjudicatory hearing procedures for recurring resource violators;

3. re-codify all statutes relating to marine fisheries and replace archaic, inappropriate and conflicting statutes and special acts with up-to-date regulations and statutes; and promulgate all future fishery management restrictions other than emergency actions, through regulations approved by the Marine Fisheries Advisory Commission;

B. The Division recommends

1. supporting legislation to transfer the Division of Law Enforcement into the Department of Fisheries, Wildlife and Recreational Vehicles;

2. the creation of an Enforcement Policy Board, composed of members from each agency served by the Division of Law Enforcement, to assign direction and priorities consistent with managment needs for enforcement of state resource and environmental laws;

3. the creation of a separate marine fisheries law enforcement unit within the DLE, staffed with officers trained in, and assigned to, enforcing marine fisheries laws;

4. continuing the marine fisheries enforcement training program for Division of Law Enforcement officers, and encourage deputization of Division of Marine and Recreational Vehicle officers, and local shellfish constables;

5. that the Division of Law Enforcement develop capabilities to provide intensive short term enforcement in certain problem areas and during certain fishing seasons;

6. the Division of Law Enforcement establish a Counsel position acting as a prosecuting officer to expedite processing of court cases for fishery violations;

7. initiation of an informational program to appraise the Massachusetts judicial system as to the serious nature of resource violations as threats to the economic and social well-being of major commercial and recreational industries.

1.4 Fisheries and Habitat Enhancement - Creation of artificial habitat, introduction of exotic species, and restoration and development of anadromous fish and shellfish populations are effective methods of increasing productivity, providing additional recreational and commercial fishing opportunities, and enhancing the forage base. The Division will support and participate in such enhancement efforts if these activities do not disrupt traditional fishing practices or adversely impact existing fish populations or the ecosystem.

Restoration efforts involving construction of fish passage facilities will be prioritized to achieve maximum benefit at minimal cost. The Division will discourage development of alewife populations in drinking water supplies where stream flows are generally inadequate to support fish passage on a sustained basis.

Introduction of fish species not native to the Massachusetts marine ecosystem will only be considered if life histories and disease relationships are well documented, and a substantial need can be demonstrated.

Artificial reef construction will be supported where reef-type fish exist, substantial natural cover is absent, and hydrographic conditions, materials used, and construction methods employed will ensure long-term usefulness.

In light of the existing energy situation, many tidal rivers and streams are being studied as possible locations for low-head hydroelectric installations. While the potential benefits are great, consideration must be given to protection of anadromous fisheries. Low-head hydroelectric installations shall be designed and constructed with fishways as an integral part, provided the Division believes the resource justifies the cost. Installations shall be operated to minimize adverse effects on fish and fisheries as a result of drawdowns, dewatering below the dam, or fish impingement on turbines.

1.4 Proposed Actions

The Division will:

A. expand the Anadromous Fisheries Management Project to increase native anadromous fisheries by managing existing runs, removing hinderances to migration, preventing pollution, building fishways, re-establishing or introducing new runs where feasible; and developing a research capability that will form a sound scientific basis for managing anadromous fish resources;

B. increase stocking levels of coho salmon as a means of accumulating data to evaluate the potential of a hatchery sustained coho fishery in Massachusetts coastal waters;

C. determine feasibility of restoring or creating discrete populations of striped bass in Massachusetts coastal waters as a means of compensating for lost fishing opportunities resulting from the recent decline in coastal migratory stocks;

D. in the absence of private shellfish hatcheries, support development of cost-effective public shellfish hatcheries to supplement natural reproduction;

E. support the shellfish relay system as a means to purify and utilize contaminated shellfish resources.

1.5 Mariculture - The Commonwealth encourages and supports mariculture as a potentially valuable method of increasing the supply of seafood products and employment. The Division will adopt a lead role in reducing institutional, social, technical, and economic barriers restricting mariculture growth. Institutional barriers will be lessened by streamlining the cumbersome permit process and reducing legal impediments to construction of mariculture facilities and product sales. While recognizing that priorities assigned to mariculture depend on local competition for coastal usage, the Division will support mariculture operations when they do not adversely impact on local marine resources and traditional industries. The Division will provide technical assistance and favor economic incentives to improve conditions under which mariculture in Massachusetts can grow.

1.5 Proposed Actions

The Division will:

A. prepare a Massachusetts mariculture plan to detail methods, programs, and legislation necessary to improve the climate for mariculture. The plan will clarify legal ambiguities and define areas where mariculture should receive high priority. It will create guidelines for types of species and operations that the Commonwealth will support, and actions necessary to further private mariculture development;

B. propose legislation to streamline the permit process for mariculture operations;

C. inform the public of available financial and tax incentives to encourage private enterprise investment in mariculture;

D. support efforts to develop state fish and shellfish pathology capabilities to provide shellfish disease free certification, discern causes for fish kills, and promote disease prevention in mariculture operations.

1.6 Environmental Concerns - Maintenance and enhancement of fishery resources are partially dependent on the protection of habitat, sustaining a viable food chain, and improvement of water quality. Habitat protection need not exclude other uses of coastal areas.

The Division shall review coastal alteration proposals with the intent of lessening and if possible, eliminating significant impacts on marine resources. The Division will provide data or identify data needs necessary to render sound judgements regarding impacts of coastal alterations on marine resources. Recommendations on alteration projects shall include those measures of established technology necessary to mitigate resource impacts.

In the absence of any adverse environmental impacts, it shall be Division policy to favor fishery related coastal development over non-fishery related development. When resource values ultimately conflict with coastal facility development, the Secretary of Environmental Affairs shall resolve the issue.

In conflicts between fishermen and marine mammals or endangered species, the Division will work for a reasonable compromise providing safety for protected species, while limiting negative impacts on fisheries.

In the exploitation of non-renewable resources, the Division will work towards minimizing the impacts on fisheries.

1.6 Proposed Actions

The Division will:

A. support existing policies established by the Coastal Zone Management Program of 1978;

B. comply with its' responsibilities to review and comment respective to the Fish and Wildlife Coordination Act (1934) amended 16 U.S.C. (661-66C) for protection of fish and fish habitat in coastal waters and streams;

C. take an active part, when requested, in the review process of the:

(1) Wetlands Protection Program (M.G.L. C. 131, s. 40) in order to conserve coastal wetlands as valuable spawning and nursery habitat for commercial, recreational, and prey species, and as an area of high primary productivity in the marine food chain;

(2) Waterways Program (M.G.L. C. 91, s. 1-59) in order to protect marine resources, promote maintenance dredging of fishing ports, and prevent hazards to navigation;

(3) Water Pollution Control Certification Program (M.G.L. C. 21, s. 43) in order to protect the public health and increase the utilization of available shellfish resources;

(4) Army Corps of Engineers Section 10 Permit Program in order to protect the marine environment and resources from any deleterious effects of coastal alteration, dredging or ocean dumping;

D. oppose introduction into the marine environment any substances that:

(1) reduce fish and water quality;

(2) cause fish kills;

(3) induce fish stress or diseases that reduce an organisms' ability to survive, grow, or reproduce.

E. support utilization of living marine resources in any area designated as a state ocean sanctuary or federal marine sanctuary;

F. request that the Secretary of Environmental Affairs resolve any interagency conflict over recommendations on coastal alteration proposals.

1.7 Coordination of Marine Management, Research, and Academic Programs - Fishery programs at all levels of government are interdependent. Because fish populations recognize no jurisdictional boundaries, the Division will encourage coordination and nonduplication of fishery related programs conducted by federal, state, and local government agencies, the academic community, and private industry. The Division will actively participate in and/or advise regional, interstate, and local management entities so that the interests of Massachusetts fisheries are represented and protected.

1.7 Proposed Actions

The Division will:

A. provide information to the Washington, D.C. staff of the Office of State-Federal Relations so that they can properly address fisheries issues of concern to Massachusetts fishermen;

B. promote the rational protection of marine mammals and endangered species through the National Marine Fisheries Service and the U.S. Fish and Wildlife Service;

C. support Massachusetts Maritime Academy proposed fishermen's Navigation and Safety Certification Program provided that fishermen active at the time of program inception are exempt from any certification requirement;

D. coordinate with the Division of Fisheries and Wildlife in the management of diadromous fish to provide consistency of regulations and programs;

E. propose legislation to give the Division of Marine Fisheries and the Division of Fisheries and Wildlife joint authority in determining the boundary of fresh and salt water in the Commonwealth's rivers and streams;

F. recommend the coordination of the Commonwealth's various marine related research, management, and educational programs into a Massachusetts Marine Fisheries Research and Educational Consortium. This consortium should be composed of the Division of Marine Fisheries, Massachusetts Maritime Academy, Massachusetts Institute of Technology Sea Grant, University of Massachusetts (Amherst) Cooperative Fisheries Research Unit, Southeastern Massachusetts University, and Massachusetts Cooperative Extension Service. These agencies and academic institutions, already linked individually by various grants and agreements, could develop cooperative programs and share facilities to improve fishery knowledge at no increase in State spending. Available resources are as follows:

(1) Division of Marine Fisheries - research lab, research

vessels, and professional fisheries personnel;

(2) Massachusetts Maritime Academy - fisheries library, dormitory facilities, and fisheries education programs;

(3) MIT Sea Grant - grant funds for fisheries research, information and education;

(4) University of Massachusetts (Amherst) Cooperative Fisheries Research Unit - fisheries research faculty, facilities, and graduate students;

(5) Massachusetts Cooperative Extension Service - fisheries information distribution system, printing capabilities, and editorial expertise;

(6) Southeastern Massachusetts University - fisheries courses, research vessel.

2.0 Research and Development

2.1 Fisheries Development - The Commonwealth will participate actively in development of commercial and recreational fisheries utilized by its citizens. Although increased fishing effort will not be encouraged in fully utilized fisheries where it will lead to over-exploitation and overcapitalization, expanded fishing opportunities in non-traditional fisheries will be carefully explored.

The Commonwealth will support the development and implementation of innovative techniques to improve fish quality, reduce fishing costs, modernize existing port facilities, and improve services to the existing fleet. For fishery development and other purposes, the Commonwealth will recognize party and charter boats as commercial vessels. In recreational fisheries, the Commonwealth will promote opportunities available in sportfisheries, while working to reopen, maintain, and construct points of public access to the fisheries.

The Division will assume a lead role in marine fisheries development in the Commonwealth, coordinating publicly funded activities by federal, state, and regional development programs at the state level, while recognizing the New England Fisheries Development Foundation as the lead fisheries development agency in the New England Region.

2.1 Proposed Actions

A. The Commonwealth shall establish programs to modernize and improve fishing ports and support facilities to provide better services. The office of Coastal Zone Management and the Division of Waterways should be given prime port development responsibilities. These and other state agencies involved in port development should adopt the following criteria and priorities in carrying out these programs:

Criteria

(1) programs will be directed at rehabilitating facilities in existing fishing ports;

(2) no program should be approved with the sole intent of increasing fishing effort on the fully utilized fisheries;

(3) conversely, programs should be aimed at developing non-traditional fisheries, improving fish quality, and reducing fishing costs.

Priorities

(1) new docking facilities for ports where existing dockage is inadequate, causes damage to vessels, or presents danger of personal injury;

(2) maintenance dredging of fishing port harbors and channels;

(3) offloading facilities and equipment that improve fish quality and reduce costs;

(4) support facilities such as ice, fuel, cold storage, and marine railways that improve fish quality or reduce costs;

(5) processing plants that improve fish quality, reduce product costs, and increase product diversity and markets.

B. The Division will assist the fishing industry in development of new or improved techniques for harvesting, handling, and processing fish. The following areas will receive high priority:

(1) techniques for improving fish quality at all stages from harvesting to sales;

(2) techniques for reducing fuel consumption, insurance, or other operating costs;

(3) techniques that will establish fisheries for under-utilized species;

(4) techniques that will promote vessel and personal safety;

(5) distribution of technical information on any of the above.

C. The Division will encourage, advise, and assist commercial fishermen in the following areas:

(1) establishing fisheries co-operatives to create more favorable market conditions for seafood products;

(2) formation of fishermen's associations to promote improved communications between fishermen and federal, state, and local government agencies that affect their livelihood;

(3) acquiring information on regulatory, biological, economic, and gear conflict developments in the fisheries;

(4) establishing short-term joint marketing ventures with foreign buyers, unless or until U.S processing capabilities exist for a particular species.

D. The Public Access Board should receive adequate funding to maintain and improve public access to recreational fisheries. The

Board's activities should center on the following objectives:

(1) developing criteria for siting,estimating size, and prioritizing construction of boat ramps, fishing piers, and parking facilities;

(2) recognizing that undeveloped coastal land is rapidly diminishing, acquire available land for future use as public access sites;

(3) construct and maintain boat ramps and fish piers for public access to fisheries;

(4) oppose unreasonable restrictions on public access to bridges, piers, and beaches for recreational fishing.

2.2 Marketing and Promotion - Much of Massachusetts fishing industry is composed of many small, independently owned units within the harvesting, processing, and distribution sectors. The diversity of small units makes it unprofitable for individual companies to promote and advertise fishery products. As a result, consumers are often not well informed about value and characteristics of Massachusetts seafood. Whereas the Commonwealth derives substantial benefit from industry in the form of taxes, employment, and valuable consumer products, it will benefit the Commonwealth to assist industry to improve quality, marketing and utilization of fishery products. It is the responsibility (M.G.L. C. 130, s. 17), of the Division to aid industry in finding new markets, improving fish quality, and fostering industry's ability to assume this role.

2.2 Proposed Actions

A. The Commonwealth will assist the fishing industry in improving both foreign and domestic markets in the following ways:

(1) expand the Division's existing marketing program to increase promotion of all Massachusetts seafood products in local, regional, and international markets. Through cooking demonstrations, media promotions, and marketing literature distribution, this program will increase utilization of traditional and non-traditional species. It will educate consumers and the seafood industry as to the value, characteristics, and proper handling of Massachusetts seafood products;

(2) state operated institutions should make every effort to purchase Massachusetts harvested and processed fishery products when available;

(3) Massport's European and Japanese offices should encourage the development of foreign markets for Massachusetts fish products;

(4) work toward reducing U.S. dependence on foreign imports by encouraging development of competitive domestic frozen fish processing capabilities;

(5) work towards establishing industry marketing capabilities through an industry sponsored regional marketing and promotion program.

B. The Commonwealth will assist the fishing industry in improving fish quality in the following ways:

(1) the Commonwealth should adopt the Federal Fish Quality Standards as criteria for seafood purchases by state institutions. This would eliminate the duplicative and

arbitrary method now employed by the State, simplify purchasing procedures, and provide incentives to the processor to adopt the federal inspection program;

(2) the Division will work towards improving fish quality through voluntary incentives. By promoting higher sales value of quality fish, clarifying fish nomenclature, educating the consumer to recognize fish quality, and informing industry personnel of improved fish handling techniques, imposition of government quality regulations can be avoided;

(3) the Division's Extension Service will promote the use of gear and product handling methods that will improve seafood quality onboard fishing vessels;

(4) the Division will consider the possible effects on fish quality of any proposed management regulation.

2.3 Fisheries Assistance - Assistance to the fishing industry can be in the form of financial, technical, tax regulatory, or planning programs. It is to the Commonwealth's benefit to maintain a strong and vital fishing industry by assisting it in overcoming hardships or improving its economic potential. Due to its diversity and its dependence on a fluctuating resource base, the industry may encounter various economic impediments.

If it will benefit the Commonwealth, the State may consider assisting the fisheries. Examples might include: for economic hardship from natural or man caused resource disasters; for common needs that the industry cannot provide for itself; for developing non-traditional fisheries; or for technical assistance. State assistance should not be provided if it duplicates a federal or other assistance program, if it competes with a service provided by private enterprise, or if it attracts more fishing units into a fully utilized fishery.

2.3 Proposed Actions

A. The Commonwealth should consider the following assistance programs for the fishing industry:

(1) seek financial support and alternate programs for fishermen deprived of harvesting a resource due to natural (e.g. paralytic shellfish poisoning) or chemical contamination (e.g. oil spill, toxic chemicals, etc.), provided the DMF can document the individuals' historic catch value through statistical reports;

(2) give the fishing industry equal priority with the agriculture industry in emergency fuel allocation plans;

(3) expand or implement the Commonwealth's;

(a) port and harbor development programs (see sec. 2.1);

(b) fisheries marketing program (see sec. 2.2);

(c) fisheries technical assistance programs (see sec. 2.1).

B. The Commonwealth should not consider the following assistance programs:

(1) vessel construction and loan programs. This would duplicate a federal program and possibly increase effort on overexploited fish stocks;

(2) vessel insurance program. This is a role more appropriate to private enterprise. The fishing industry could decrease its high insurance rates through organization to obtain group rates and by instituting self-imposed safety requirements.

C. The Division shall investigate, develop, and propose legislative tax changes to provide tax incentives to the commercial and recreational fishing industry with the following conditions:

(1) fisheries tax revenue at local and state levels should benefit the fisheries by funding port development, marketing, and other programs directed to improving the commercial fishing industry;

(2) commercially licensed fishermen should remain exempt from sales tax on fishery related purchases;

(3) party and charter boats should be considered commercial fishing enterprises;

(4) excise tax revenues on recreational boats should be directed to improving public access.

2.4 Research - The basis for sound fishery management is a strong and continuing research program. Since the Division's statutory mandate to conduct fisheries research is very broad and funds are limited, it is necessary to prioritize research efforts.

The Division will emphasize applied research leading to improved management of marine fishery resources and development of the commercial and recreational industries. Research will include stock assessments, developing new and improved assessment methodology, and ecological studies leading to a better understanding of the marine ecosystem.

Marine environmental impact studies involving coastal alteration and development projects will be considered and undertaken on a case-by-case basis. The Division supports basic marine biological research resulting in a better understanding of interactions and factors controlling marine ecosystems, but believes this research is more appropriate for the academic community.

2.4 Proposed Actions

The Division will:

A. with the ultimate goal of developing a long range predictive capability;

(1) continue to conduct resource assessments on demersal species and expand capabilities to conduct resource assessment on crustaceans, shellfish, and other commercial and recreational species. These assessments are basic to developing management plans for species in State territorial waters;

(2) develop and implement new techniques for resource assessment of lobster, pelagic finfish, recreational species, and anadromous fish in State territorial waters;

B. perform fisheries catch and effort monitoring studies as needed to judge effects of management plans and regulations;

C. conduct marine environmental impact assessment studies on marine situated power generating or other facilities when requested. Research on alternative impacts will be performed under the direction of committees composed of agencies having either an interest or regulatory authority for marine environmental impact;

D. perform only those socio-economic studies necessary to provide information for developing management plans and conducting fishery programs.

E. increase support facilities for conducting research by:

(1) constructing a research station on the South Shore as originally proposed in 1964 by the Marine Fisheries Advisory Commission;

(2) purchasing an adequate coastal research vessel;

(3) utilize the potential of Cat Cove Marine Laboratory to conduct applied laboratory research to complement Division field research capabilities;

(4) improving lobster hatchery research capabilities.

F. continue to partially fund the University of Massachusetts (Amherst) Cooperative Fisheries Research Unit to conduct basic fisheries research. Provide support and assistance in improving the units' coastal research capabilities by obtaining Sea Grant research funds, constructing a coastal research facility, and by sharing existing Division research facilities.

3.0 Information and Education

3.1 Statistics - The Division advocates collection of complete, accurate fisheries statistics necessary for resource management, guidance for state and local programs, assistance in private investment decisions, substantiating disaster relief needs, providing data to evaluate environmental alterations, and for general public information. Resource harvesters are obligated to take an active part in management by contributing accurate statistical information as a requisite for continued resource use.

While statistics are public information, the Division maintains a policy of confidentiality to protect individuals and businesses. Statistics shall not be used for tax or law enforcement purposes except that mis-reporting or non-reporting of statistics will be subject to administrative action. Statistics shall be publicly available in an anonymous-grouped format (minimum of three reports). Individual data shall not be released without written consent.

3.1 Proposed Actions

The Division will:

A. propose legislation for approval of a statistics confidentiality system mutually acceptable to the Division, National Marine Fisheries Service, and New England Regional Fisheries Management Council to allow reciprocal access to fisheries statistics;

B. propose legislation for approval of statistical reporting requirements providing penalties for non-reporting or mis-reporting ranging from fines to license suspension or non-renewal. Require submission of statistics for species under local control;

C. implement an expanded Statistics Program to collect data on fisheries primarily conducted within state waters or managed by either the Division or local communities. This will encompass most commercial fisheries for finfish, shellfish, and lobsters within state territorial waters. To accomplish this increase in workload a computerized reporting and distributing system will be adopted.

3.2 Information/Education - Informed and enlightened users of fishery resources tend to be more conservation oriented, possess an appreciation of the resource base, and provide constructive input to the management process. Management regimes developed in concert with a knowledgeable and cooperative public are more widely accepted, voluntarily complied with, and hence require minimal enforcement. Informed fishermen are also better able to avail themselves of fishing opportunities, thereby maximizing utilization of the resource and benefits derived therefrom.

It shall be the policy of the Division to inform and educate the public on all aspects of utilization, development, management, and appreciation of marine resources.

3.2 Proposed Actions

The Division will:

A. continue to encourage public participation in the management process by soliciting input through well publicized meetings and hearings;

B. develop staff and funding necessary to prepare and distribute printed material in the form of periodicals, newsletters, leaflets, and guides and to otherwise disseminate information on fishery resources, marine fisheries and related matters;

C. solicit guidance and advice regarding recreational fisheries issues through an informal committee to be comprised of knowledgeable sportfishermen, charter boat operators, and tackle-shop owners;

D. coordinate the printing and distribution through the University of Mass. (Amherst), Cooperative Extension Unit, of information on fishing gear, recreational fishing, fish cookery, fish species, and other educational material of public information.

3.3 Licensing - In accordance with the principle that those deriving benefit from a public resource must contribute to its management, it shall be the Division's policy to require licenses for all fisheries for which the state provides management, research, or other services. Licensing is necessary for management, enforcement, statistical and informational purposes, and to offset state expenditures for fishery programs.

The Division may at times restrict the number of licenses issued to reduce fishing effort in fully utilized fisheries. Licenses may be suspended or not renewed for violations of fishing regulations or statistical reporting requirements. Licenses provide a source listing of fishery utilizers necessary to obtain statistical data and to inform fishermen of regulatory changes.

3.3 Proposed Actions

The Division will:

A. investigate the integration of statistics and licensing functions into a single computerized system;

B. propose the elimination of the rod and reel ($5) license;

C. initiate a legislative study resolve on the feasibility of establishing a marine recreational fishing license in Massachusetts;

D. effect the necessary legislation to allow the issuance of licenses solely for the commercial harvest of edible crabs.

VII. Program Recommendations

A. Division of Marine Fisheries Programs

1. Construct a research station near the Cape Cod Canal [2.4, E., (1)].

2. Purchase an adequate coastal research vessel [2.4, E., (2)].

3. Improve and investigate by professional consultation the systems for issuing licenses and gathering statistical data by a computerized system [3.3, A.].

4. Expand capabilities to gather biological, sociological, and economic data necessary for fisheries management by:

   a. obtaining adequate funding for New England Fisheries Management Council liaison position to review fisheries management plans [1.1, B., (1)];

   b. establishing staff with capabilities to develop state management plans for species predominantly under Massachusetts jurisdiction [1.1, B., (2)];

   c. establishing staff to implement a sea sampling program aboard Massachusetts commercial fishing vessels [1.1, B., (3)];

   d. expanding resource assessment studies to include crustaceans, shellfish, and other species [2.4, A., (1)];

   e. develop new resource assessment techniques for lobster, pelagic finfish, recreational species, and anadromous fish [2.4, A., (2)].

5. Increase the ability of marketing programs to promote seafood in the local, regional, and international markets [2.2, A., (1)].

6. Implement an Information and Education Program to prepare and distribute commercial and recreational fisheries information [3.2, B.].

7. Determine feasibility of restoring or creating discrete populations of striped bass in Massachusetts [1.4, C.].

8. Establish state fish and shellfish pathological capabilities [1.5, D.].

9. Prepare a Massachusetts Mariculture Plan [1.5, A.].

10. Expand Anadromous Fish Restoration and Enhancement Program to increase the number and size of native anadromous fish runs [1.4, A.].

B. State Programs

1. Establish a program to modernize and improve fishing port and harbor facilities [2.1, A.].

2. Improve the enforcement capabilities of the Division of Law Enforcement by:

   a. transferring DLE into the Department of Fisheries, Wildlife and Recreational Vehicles [1.3, B. (1)];

   b. establishing a DLE counsel (lawyer) position to prosecute resource violations [1.3, B., (6)];

   c. establishing a separate marine enforcement unit within the Division of Law Enforcement or Division of Marine Fisheries [1.3, B., (3)];

   d. creating a Law Enforcement Policy Board [1.3, B., (2)];

   e. continuing a marine fisheries enforcement training program [1.3, B., (4)].

3. Examine the possible integration of all testing, management and purification aspects of the Shellfish Sanitation Program into the Division of Marine Fisheries [1.1, F.].

4. Establish or assign staff within the Washington, D.C. office of Massachusetts State-Federal Relations to address fishery issues [1.7, A.].

5. Create the Massachusetts MArine Fisheries Research and Educational Consortium [1.7, F.].

6. Develop a Navigation and Equipment Safety certification program at Massachusetts Maritime Academy [1.7, C.].

C. Recommended Legislation

1. Amend M.G.L. c. 130, s. 83 to eliminate the Rod and Reel - Unlimited license ($5.00) for the sale of more than 100 lbs plus one fish. Elimination of this license would require a rod and reel fisherman to purchase an individual Commercial fishermans license ($25.00) to sell any fish [3.3, B.].

2. Petition the Legislature for a study resolve funds to explore feasibility, format, benefits and costs of establishing a recreational fishing license [3.3, C.].

3. Amend M.G.L. c. 130 to increase the fines and penalties for violations of laws and regulations pertaining to resource harvesting, pollution, licensing, gear, and statistical reporting [3.1, A. (1) and 3.1, B.].

4. Amend M.G.L. c. 130, s. 21 to:

   a. provide for a confidential statistics reporting system mutually acceptable to the Division and National Marine Fisheries Service to allow reciprocal access to fisheries statistics [3.1, A.];

   b. provide penalties for misreporting or non-reporting of statistics ranging from fines to suspension or non-renewal of license [3.1, B.].

5. Amend M.G.L. c. 130, s. 20A to change the present shellfish local aid reimbursement fund system to a grant system [1.1, E.].

6. Amend M.G.L. c. 130, s. 52 to:

   a. require local communities to collect and submit statistics to the Division for species under local control [3.1, B.];

   b. remove eel management from local control and place it under state or regional management [1.1, G.];

   c. require local communities to develop regional management plans for shellfish resources beyond traditional inshore harvesting areas. This will facilitate commercial fishing of a resource presently unharvested due to conflicting local restrictions [1.1, D.].

7. Develop and submit for legislation recommendations for changes in taxation to provide incentives to the fishing industry and secure funds for fishery related construction programs [2.3, C. (1-4)].

8. Amend M.G.L. c. 130, s. 16 to allow the Division of Marine Fisheries and Division of Fisheries and Wildlife to define boundaries between fresh and salt water for fisheries management purposes [1.7, E.].

9. Propose enabling legislation to adopt Amendment I of the Atlantic State Marine Fisheries Commission charter [1.1, J.].

10. Amend M.G.L. c. 130, s. 37, 38, 38A, and 83 to allow the Division to issue a permit for commercial harvesting of edible crabs separate from any lobster permit [3.3, D.].

11. Develop and propose legislation to streamline the mariculture permit process [1.5, B.].

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