Marine Fisheries Conservation in New York State:

Policy and Practice of Marine Fisheries Management

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Photograph: Jim Jacobs and Bert Hillier on board the Josephine *out of Hampton Bay. Courtesy of Sea Grant Advisory Service.*

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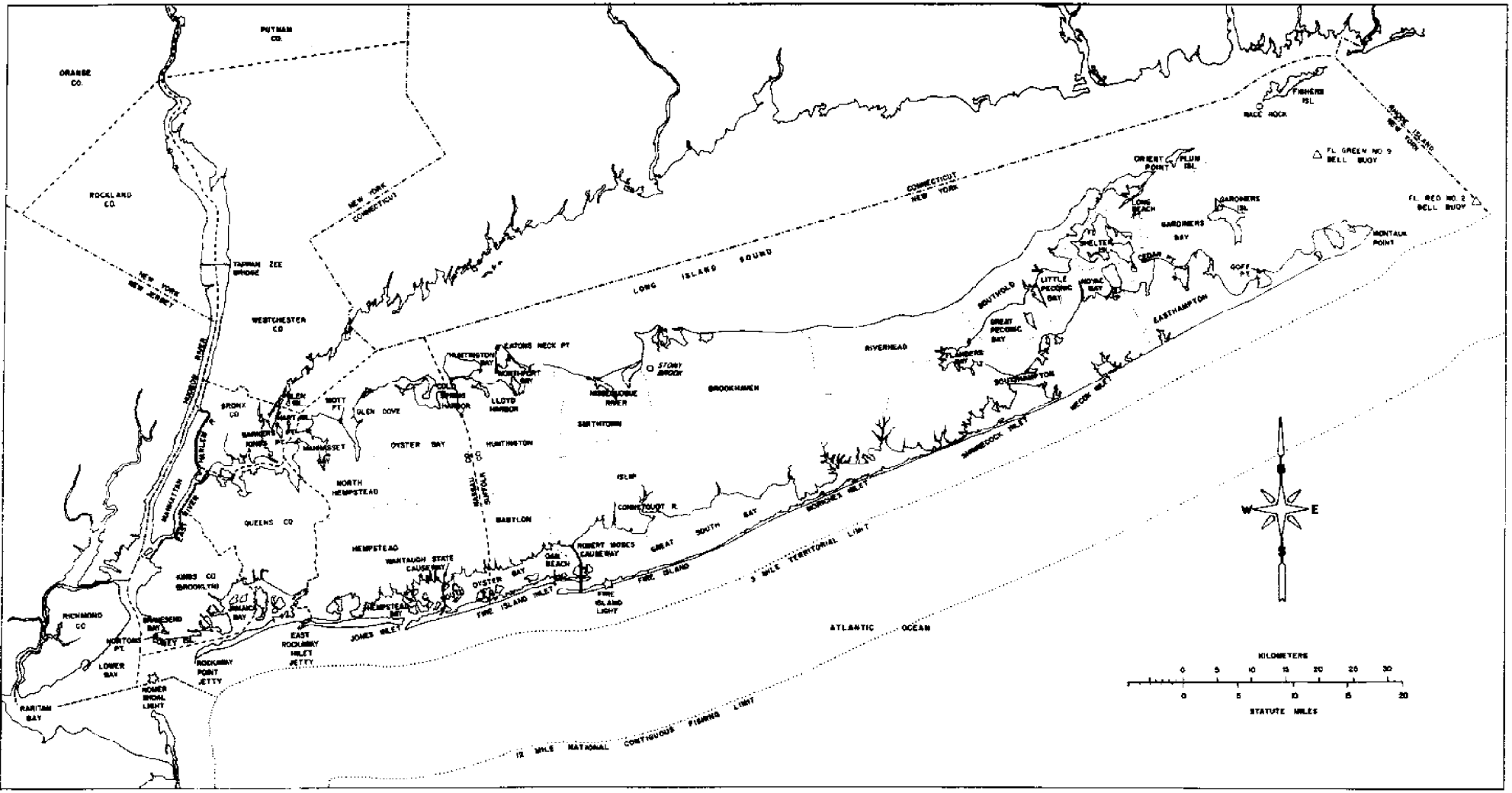
Abstract

Review of New York State law and administrative arrangements for the conservation of marine fishery resources shows that, for practical purposes, the state has no cohesive fishery management policy which presents long-range objectives. Instead, marine fishery regulations have been established piecemeal. Introduced legislation is usually based on popular solutions and is without benefit of sufficient scientific background information. Increasing popularity in the recreational fisheries has resulted in increased efforts to restrict the commercial fisheries. Moreover, rational decision-making has been hindered by a lack of fundamental information on the total amount of commercial and recreational fishing catch and effort, and on the abundance and distribution of the resources. New York State cannot manage its living marine resources without a management plan, adequate information on all fishing activities, and adequate cooperation from other states in managing migratory species.

FIGURE 1 *Long Island and the Marine District of New York State*



Conclusions and Recommendations

CONCLUSIONS

1. There is no clear statement of policy and objectives for marine fisheries management by which the Department of Environmental Conservation can plan research goals and priorities.

2. There is no long-range marine fisheries management plan in New York State.

3. The Environmental Conservation Law is generally dominated by controls on environmental pollution, while establishing adequate controls on harvesting of state-owned marine resources has been secondary.

4. State law pertaining to regulation of marine fisheries, including recent legislation, is not based on adequate scientific information and is designed more for short-term expediency rather than for long-range management goals.

5. State law pertaining to regulation of marine fisheries, including recent legislation, restricts commercial fisheries more than recreational fisheries. Departmental attitude as expressed in the Environmental Plan favors allocation of living marine resources primarily for recreational use.

6. The recreational fisheries are virtually unregulated and the amount of their catch and fishing effort is largely unknown.

7. New York State cannot effectively manage its living marine resources without first recognizing, monitoring, and, if necessary, regulating all fishing activities.

8. New York State cannot effectively manage fisheries based on migratory species without adequate interstate and international management schemes.

9. The only marine fisheries which New York State can manage unilaterally are those based on endemic species, which currently include the state's most economically valuable resource, the hard clam.

RECOMMENDATIONS

1. A marine resources policy should be formulated with clearly stated objectives for marine fisheries management.

2. A management plan including research goals and priorities should be formulated, so that information and monitoring needs can be met within prevailing financial limitations.

3. Basic information on state fishery resources and the total effect of commercial and recreational fishing should be collected and analyzed for the benefit of legislative decision-making.

4. In lieu of effective interstate management of migratory species, endemic resources should be given top management priority.

5. Interstate mechanisms for marine fisheries management, such as the Atlantic States Marine Fisheries Commission, should be strengthened.

6. Recreational fishing should be recognized as having a significant impact on state fishery resources and an investigation should be made to determine how the recreational fisheries can best be managed.

7. The social and economic value of each of the state's living marine resources must be determined as a guide to establishing management priorities.

8. Out-of-state fishery management experts should be consulted to suggest specific areas for institutional improvement and model state legislation.

9. The three New York State representatives on the Atlantic States Marine Fisheries Commission should submit a written report annually to the governor, speaker of the assembly, and senate majority leader of New York State on the problems and progress of interstate cooperation in fishery management.

Introduction

CONSERVATION RESPONSIBILITY AND OBJECTIVE

From the beginning, man's responsibility for conserving living resources in the sea has been neither well defined nor well executed. A basic problem is the classification of natural resources as common property. Common property resources are open to all users and there is often no mechanism, legal or moral, for controlling the quantity of such resources taken by each user. In spite of the fact that future abundance and productivity of a common property resource may depend on conservative harvesting principles, there is no incentive for users to practice conservation, when each new user and each new increase in harvesting effort can stand to benefit at least temporarily. Any conservation attempts by one user can easily be rendered ineffective through increased harvesting by other users. Hence, conservation of common property resources should be everyone's responsibility. Some higher authority or government which presides over individual resource users must assume trusteeship for the natural resources and responsibility for their conservation.

Economically valuable marine fish, shellfish, crustacea, and plants are examples of living resources which are, in many instances, considered common property. The industries harvesting these resources are broadly referred to as the marine fisheries. Attempts at conservation of living marine resources through regulation of the marine fisheries have been based on either unilateral jurisdiction by government or multilateral agreement among the primary users of the resource. Efforts to regulate high seas fisheries beyond the jurisdiction of any one government are usually made through multilateral international arrangements. Conservation of marine resources within jurisdictional claims of a particular country is the responsibility of that nation's government. In the United States marine conservation in general is entrusted to the individual state governments which have conservation authority over the marine waters adjacent to their state and seaward to the three-mile territorial limit. The federal government claims jurisdiction over fisheries beyond three miles in a nine-mile-wide contiguous fisheries zone. Thus, conservation of living marine resources within twelve miles of the New York State shoreline is a matter of unilateral jurisdiction by state and federal governments in their respective areas (see Fig. 1).

The marine environment where New York State has conservation responsibility for fishery resources is known as the marine district. In addition to that part of the Atlantic Ocean within three nautical miles of Long Island, the marine district includes waters within the nine southernmost counties and the Hudson River south of the Tappan Zee Bridge. The total area of the marine district is approximately 1,900 square statute miles (see Table 1).

TABLE 1 *Marine Area in Square Miles (Statute) by County in New York State*

Bronx	20
Kings	31
Nassau	92
New York	10
Queens	73
Richmond	46
Rockland	5
Suffolk	1176
Westchester	32
Ocean Area from the south shore seaward to three nautical miles	415
TOTAL	1900

The conservation responsibility for New York State's living marine resources is geographically defined by arbitrary political boundaries. However, the question is whether or not this responsibility is meeting conservation objectives. Although the state is committed to a policy of conserving its natural resources, a clear conservation objective is absent from basic policy statements.[1]

Simply stated, conservation should prevent overharvesting and other adverse effects so that a continuous and sustained yield can be maintained. The same objective is sought in agriculture and forestry and any natural resource for which the harvester must rely on natural growth to replace that which was harvested. The difference between terrestrial and marine living resources, however, is that the latter frequently cannot be contained within political boundaries. Thus, the conservation actions of one government over one area of the marine environment cannot conserve migratory resources without the cooperation of the other government jurisdictions through which the resource may move. Conservation of migratory resources is morally the responsibility of every government, but practically the responsibility of no one government.

The conservation goals for New York are, first, to ensure continuous production of marine fish resources that stay within state boundaries and, second, to join with neighboring states to work for the same objective for migratory fish resources. These goals can be attained by rational management of all harvesting and other activities that may deleteriously affect the natural growth and replacement of marine fish resources.

MEANING OF MANAGEMENT

Management of marine fisheries means controlling exploitation of marine fish resources. The conservation objective is to maintain exploitation of a living resource within its natural reproductive limits. However, managing a fishery also involves making decisions based on the social and economic values of the resource. Political decision-making alone may not lead to effective management because the information a legislator receives from his fishing constituency may be based on emotion or faulty reasoning rather than fact. Full use of scientific information as a basis for political decision-making is an integral part of rational management. Rational management bridges the gap between the conservation needs of the resource and the social and economic needs of fishermen. Management decision-making must also be enforcible and enforced to be effective. Thus, rational fisheries management consists of three important functions: research, decision-making or lawmaking, and enforcement.

New York State can go a long way toward achieving its conservation objective through the efficient functioning of these three elements. But faultless conservation of living marine resources is not an easy management task. In addition to problems of overharvesting, management must deal with water pollution, changes in the coastal environment, and natural fluctuations in resource abundance which may or may not be influenced by human activities. Monitoring and maintaining environmental standards important for healthy fish resources is a significant management concern. There are intricate social problems involving conflicts of interests among commercial fisheries in different states, between commercial and recreational fisheries, and between domestic and foreign fisheries. Decision-makers must accept the challenge of instituting unpopular controls on resource consumption, if needed.

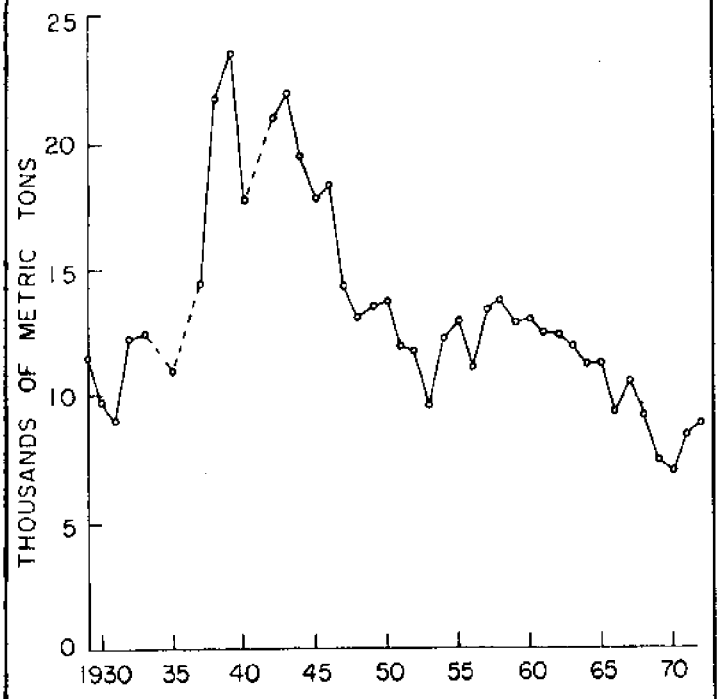
LACK OF MANAGEMENT

Lack of management for any number of biologic, economic, or social reasons is manifested in the long run by a general decline in fish landed in spite of a steady or increasing market for the resource. Lack of management results when political pressures to resolve a conflict produce ad hoc legislation which treats only the symptom and not the cause of the problem. Legislators pressed for popular solutions are then forced to consider frequently unsubstantiated and emotional information. Inadequate information on the life history of a particular resource, for example, may lead to faulty management by producing regulations that do not allow for natural fluctuations in abundance.

Fishermen tend to shift from a resource that is declining or depleted to resources that are relatively underutilized or otherwise abundant. Historical records of commercial fish landings show a trend of growing fishing intensity on a resource and then a shift to another resource as the first loses its economic appeal, because either the market is flooded or the resource is so scarce that it costs too much in time and money to catch.

A recent historical review of commercial marine fisheries in New York State suggests that these characteristics (general decline in landings and successive shifting from one resource to another) are the symptoms of lack of management in New York.[2] Figure 2 documents the general decline in total food fish landings from a peak in 1939, as compared to the fairly constant average landed value of the resource. Figure 3 documents the landings of separate groups of New York's marine fish resources in chronological order of their successive rise and decline. The species for Figure 3 were chosen because their dominance in the fishery landings statistics occurred at approximately the same time. Significantly, each resource or group of resources reached a relative peak of exploitation and then declined to extremely low levels as they were depleted and fishing attention was turned to other resources. If history continues to repeat itself, New York can expect the same fate for its shellfish resources, the most commercially valuable today, supporting a multimillion-dollar industry (see Fig. 4 and Table 6).

FIGURE 2 *Total Food Finfish Landings in New York State 1929-1972*



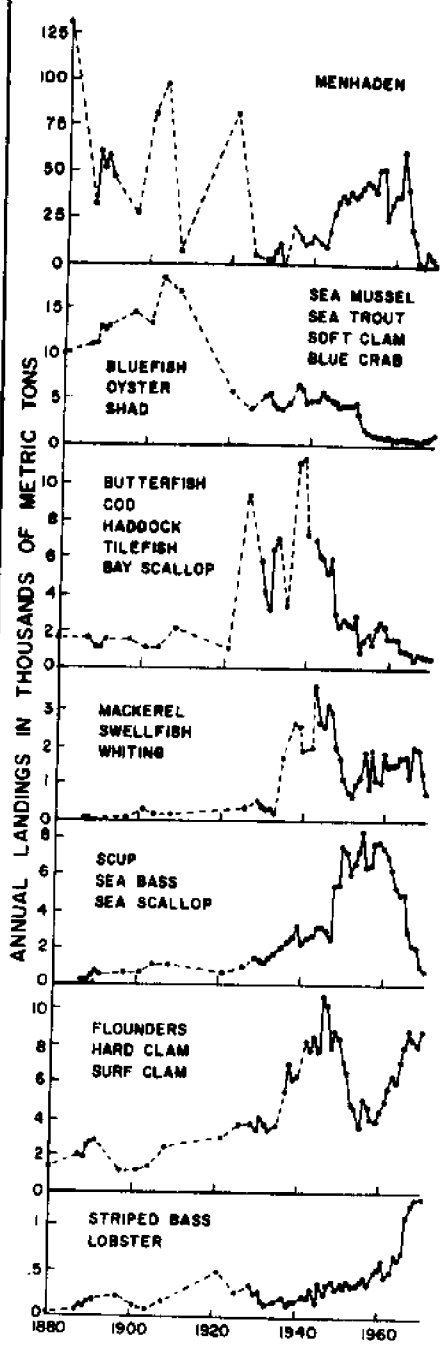
This total does not include shellfish, crustacea, and finfish used for industrial purposes.

In this and following figures, dotted lines indicate data not available for interim years.

From McHugh, 1974. Biological consequences of alternative regimes. In Problems of fishery jurisdiction and enforcement: the case of the North Atlantic region. Law of the Sea Institute, University of Rhode Island.

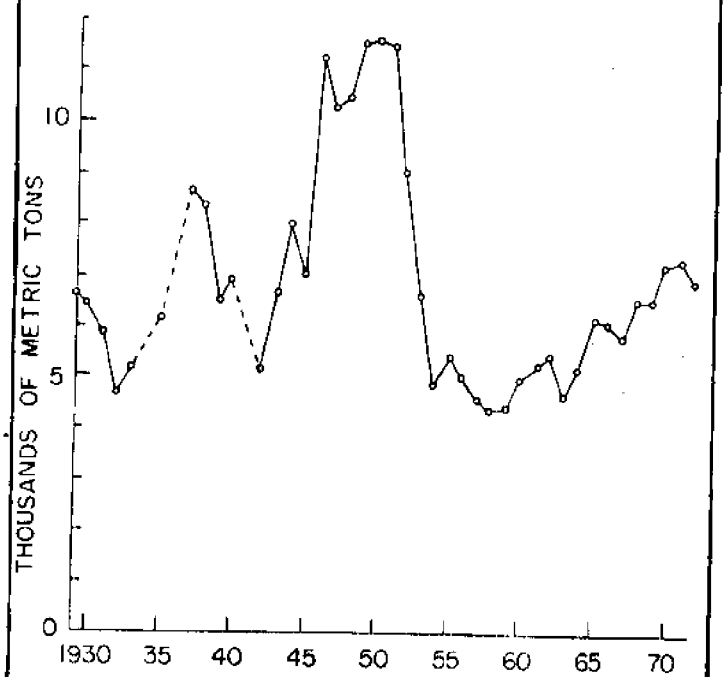
Employment in the fisheries is directly related to the availability of fish resources and their market value. Figure 5 illustrates data comparing regular (full-time) fishermen, casual fishermen (those who gain less than 50 per cent of their annual income from fishing), and fishermen on vessels (boats weighing more than five net tons). The postwar increase in fishermen employed in New York fisheries did little to sustain the peak production of food finfish (see Fig. 2). In

FIGURE 3 *Annual Commercial Landings of Fish and Shellfish in New York State 1880-1970*



From McHugh, 1972*b*. Marine fisheries of New York State, p.606.

FIGURE 4 *Total Edible Shellfish Landings in New York State 1929-1972*

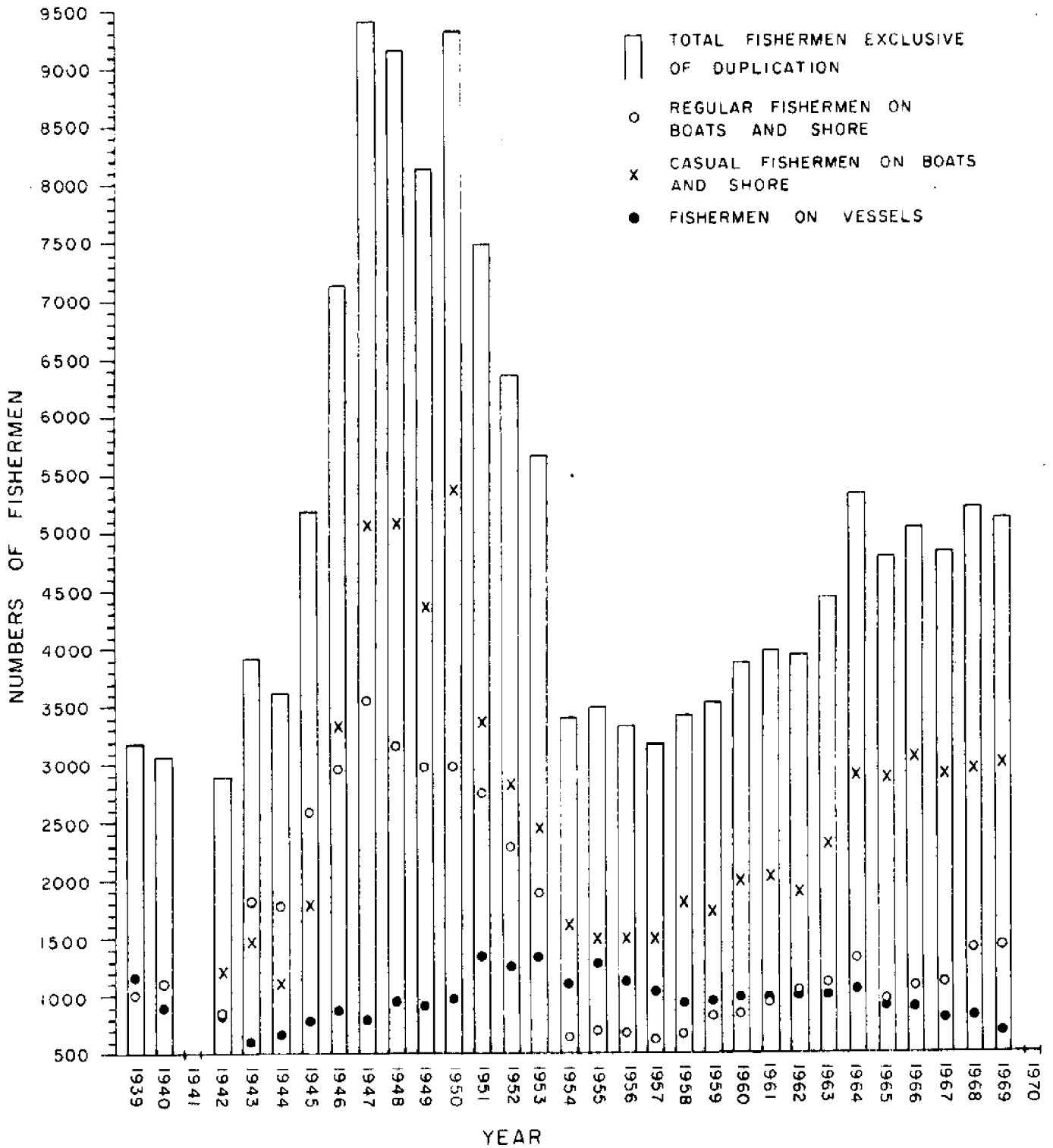


From McHugh, 1974.

fact, food finfish started to decline well before peak employment in the commercial fisheries. Most of the fishing effort was being directed toward the shellfish resources (see Fig. 4). The sharp decline in fisheries employment during the early 1950s, especially among fishermen on boats and on shore, was matched by the decline in shellfish landings during the same period. Employment on vessels remained relatively high and constant from 1951 through 1955, reflecting only moderate decline in food finfish landings during the same period. Since that time, however, the number of fishermen on vessels has declined while the number of fishermen on boats and on shore has increased, reflecting a gradual increase in shellfish landings.

These fishery trends indicate the antithesis of good resource management. Ideally, fisheries management should stabilize population and harvest levels by controlling exploitation. The important question is, where has management failed in research, decision-making, and enforcement?

FIGURE 5 *Numbers of Fishermen Employed in New York Commercial Fisheries, 1939-1969*



Source: National Marine Fisheries Service.

The Marine Fishery Law

State authority for the conservation of living marine resources is contained in the Environmental Conservation Law (ECL), Chapter 664, section 2 of the Laws of 1972. The purpose of this act was to recodify the the previous ECL of 1970[3] and to place all relevant portions of the statutes of New York State under the administration of the Department of Environmental Conservation (EnCon). Included in this revision were certain parts of the Conservation Law, Public Health Law, Agriculture and Markets Law, Executive Law, Navigation Law, and Unconsolidated Law. The 1972 ECL revision constitutes Chapter 43B of the Consolidated Laws. Provisions for the management of marine fisheries are contained in Title 3 of Article 13. Articles 11 ("Fish and Wildlife") and 13 ("Marine and Coastal Resources") are collectively known as the Fish and Wildlife Law.[4]

Prior to 1970, statutes regulating marine fisheries were in part IX of Article IV, known as the Fish and Game Law, Chapter 647 of the Laws of 1911. Article IV was generally revised (except for part IX relating to marine fisheries) in 1913, 1928, and again in 1938. Part IX was revised and recodified as Chapter 105 of the Laws of 1942 and again in 1959 as Chapter 544.[5] This part then became Article 13 in the 1972 recodification.

MARINE AND COASTAL DISTRICT DEFINED

Sections of Article 13 relate to the governing of living resources in the marine and coastal district. This district is defined in the law as comprising the waters of the Atlantic Ocean within three nautical miles from the coastline and all other tidal waters within the state, including the Hudson River up to the Tappan Zee Bridge.[6]

BASIC CONSERVATION POLICY

State conservation policy is contained in section 1-0101. Living marine resources are not specifically mentioned but implied under the general term "natural resources." Primary emphasis is placed on preserving high standards of environmental quality. Rational use of the state's renewable resources is not a declared policy objective in the law. However, economic and social criteria are an important part in the conservation policy background of statutes affecting the management of natural resources. Subdivision 1 of section 1-0101, in which the basics of the conservation policy are declared, states:

> The quality of our environment is fundamental to our concern for the quality of life. It is hereby declared to be the policy of the State of New York to conserve, improve and protect its natural resources and environment and control water, land and air pollution, in order to enhance the health, safety and welfare of the people of the state and their overall economic and social well being.

State environmental conservation policy is further extended by pledging cooperation with federal and local governments, public and private organizations, and individuals to "develop and manage the basic resources of water, land and air to the end that the state may fulfill its responsibility as trustee of the environment for the present and future generations."[7] No mention is made of the living resources over which the state also assumes trusteeship and which are also a fundamental part of the environment. This is partly recognized in the third subdivision:

> It shall further be the policy of the state to foster, promote, create and maintain conditions under which man and nature can

thrive in harmony with each other, and achieve social, economic and technological progress for present and future generations.

Surely, something other than only inanimate resources was implied here as the nature with which man is intended to thrive in harmony. The declaration of policy in toto concentrates the official conservation objectives of the state on the quality of the physical environment. It does not specifically recognize that even if our land, air, and water are clean, our living resources may still be seriously mismanaged.

MARINE FISHERY MANAGEMENT LAW

Conservation policy of the state's marine fishery resources as given in Article 13 of the Environmental Conservation Law is reviewed under five management method categories. Twenty-six species of marine organisms are included in the regulations which are mostly concerned with the taking and processing of shellfish. Only two statutes are specifically designed to protect the quality of the environment of shellfish and marine life in general:

> 1. Sludge, acid or refuse from oil works, sugar houses or other manufactories, sewage or any substance injurious to shellfish culture or fish, or which shall in any manner affect the flavor, odor, color, or sanitary condition of such shellfish so as to injuriously affect the sale thereof, or which shall cause any injury to the public and private shell fisheries of this state, shall not be placed or allowed to run into the waters of the state in the marine district.
>
> 2. Garbage, cinders, ashes, oils, acids, sludge or refuse of any kind shall not be thrown, dumped or permitted to run, from any vessel or building on land or water into the waters of the marine district.[8]

No comment need be made vis-à-vis the almost continuous closings of shellfish grounds due to pollution in the western parts of Great South Bay. Otherwise, marine fishery management policy as it appears in the ECL deals directly with certain marine species and certain types of fishing gear.

A. Regulations on Size of Species

One method of protecting the future productivity of a living resource is to limit harvesting to older individuals which have had a chance to spawn at least once. Basic criteria for age and fertility are size and whether or not the individual is carrying eggs. The taking of several species of shellfish, crustacea, and finfish is regulated in this manner. Lobsters and blueclaw crabs *(Callinectes sapidus)* are protected by law while they are carrying eggs. However, there is no size limitation on crabs in New York State waters. Like crabs, lobsters grow in stages, at molting times when the exoskeleton is rejected and the animal grows to fill a new, larger one. The size limit for lobsters is thus determined by averaging the lengths of the carapace at time of molting for individuals at sexual maturity. This then assures the average lobster of at least one chance to spawn before it becomes vulnerable to legal exploitation.

Thus, the reasons for size limits are predominantly biological, based on the reproductive potential of older fish, for example, as opposed to recruits to the adult population. Unfortunately, size is not always the best indication of age. A sampling of weakfish in 1954 taken from Virginia pound nets showed that the median size of nine inches was the same as the minimum legal size in that state, and further, that "there seemed to be no distinct division into size groups that would represent fish of different ages."[9] Age determination by examining scales showed that

most of these eight- and nine-inch fish were one or two years old. The recommended policy change was either to increase the size limit so that a greater number of fish would be allowed to grow larger, or to decrease the size limit so that then-current fishery practices would be legalized. Table 2 is a complete listing of species with size limit regulations in New York.

Size limit policy is not always employed to protect marine species from exploitation until after sexual maturity. There may also be economic reasons. Fish under a certain size may be too small for efficient processing, or there may be no market for small fish of a certain species.[10] The striped bass size limit was apparently set when New York markets were being flooded with smaller bass from Chesapeake Bay. The limit effectively stopped importation of undersized fish so that higher market prices could be maintained.[11]

Size limits on kingfish and fluke are other examples of changes in legal sizes for reasons other than protection of potential fertility. Limitations on kingfish were abolished after it was learned that the lifespan of the species was so short that natural mortality was high before or very soon after they reached the legal size.[12] Further, it was found that undersized individuals were not likely to survive after being caught and released. Hence, there was no biological reason to attempt managing the fishery with a size limit regulation. The fluke sport fishery in Great South Bay was studied early in the 1960s to determine why the catch per unit effort was very high in the early summer and very low by the end of summer.[13] It was found that fluke grow rapidly in summer, often increasing in size by several inches. Catches in the early summer were predominantly in the 12-13 inch range; 12 inches was the legal size limit at that time. By increasing the limit to 14 inches, catches were balanced more evenly over the duration of the summer, giving early summer 12-inch individuals a chance to increase in size and enter the fishery late in the summer. Moreover, the fluke is a hardy species, and undersized fish can usually sustain the handling associated with being caught and returned to the water.

B. Regulations on Amount of Catch

Limitations on amount of catch (bag limits) exist only for shellfish, oysters, bay scallops, and lobsters from public grounds. More than one-half bushel, or two pecks, of any kind of shellfish cannot be taken from public grounds without a commercial digger's permit.[14] In effect, the state considers the taking of more than two pecks a day a commercial operation requiring licensing. Commercial limitation on oysters allows a maximum of one bushel per day per boat only if the boat is moved by propeller.[15] There are no bag limits for a boat sailed or rowed or any boat with its mechanical propeller removed. The regulation may be overly strict on mariculture production of oysters.

Commercial bag limits on bay scallops are ten bushels per licensed person per day.[16] Rationale for this limit is based on market considerations: when the species is in high abundance, the limit prevents an oversupply on the market and consequent low prices. It also prevents scallopers from overfishing during peak abundance periods in an attempt to make up for low market prices.[17] There is no commercial limit on lobstering, but non-licensed persons are allowed a maximum of six lobsters per day for family consumption.[18] Shellfish and lobster non-commercial bag limits seem based on arbitrary estimates of how much a family can use per day for its own food purposes. The limits are liberal enough, however, to allow part-time operators to sell shellfish and lobster in their neighborhoods. This, of course, constitutes a commercial activity which is not expressly prohibited in the law. Whether or not selling is involved, if enough people take advantage of

TABLE 2 *Minimum Legal Size Limits for Taking of Certain Marine Species in New York Waters*

Name of Species	*Size Limit Not Less Than:*	
Hard clam (*Venus mercenaria*)[a]	1 inch in thickness	
Soft clam (*Mya arenaria*)	1 1/2 inches in longest diameter	
Surf clam (*Mactra solidissima* or *Spisula solidissima*)	3 inches in longest diameter	
Bay scallop (*Pecten irradians*)[b]	2 1/4 inches from middle of hinge to middle of bill	
Lobster (*Homarus americanus*)	3 3/16 inches from rear end of eye socket to rear end of carapace	
Striped bass (*Roccus saxatilis*)[c]	16 inches to fork of tail	
Summer flounder (*Paralichthys dentatus*)	14 inches	applicable to commercial fishing only
Bluefish (*Pomatomus saltatrix*)	9 inches	
Porgy[d] (*Stenotomus versicolor*)[e]	7 inches	
Weakfish (*Cynoscion regalis*)	9 inches	
Mackerel[d] (*Scomber scombrus*)	7 inches	
Sea bass[d] (*Centropristis striata*)	8 inches	
Cod fish[d] (*Gadus callarias*)[f]	10 inches	
Blackfish[d] (*Tautoga onitis*)	7 inches	
Winter flounder (*Pseudopleuronectes americanus*)	8 inches	

[a] [*Sic*]ECL sec. 13-0325, should probably be *Mercenaria mercenaria*.

[b] [*Sic*]ECL sec. 13-0327, should probably be *Aequipecten irradians*.

[c] [*Sic*]ECL sec. 13-0329, should probably be *Morone saxatilis*.

[d] Although given in the law as such, the preferred vernacular name for Porgy is Scup, for Mackerel is Atlantic mackerel, for Sea bass is Black sea bass, for Cod fish is Atlantic cod, and for Blackfish is Tautog.

[e] [*Sic*]ECL sec. 13-0329, should probably be *Stenotomus chrysops*.

[f] [*Sic*]ECL sec. 13-0329, should probably be *Gadus morhua*.

Source: McKinney's Consolidated Laws of New York Annotated. 1972.

the unlicensed entry allowed under the bag limit provisions, landings may be seriously underestimated, and management for maximum yields may be misdirected.

Often a management agency will place a maximum catch limit on a particular species whose resilience or future productivity would be considerably harmed by overharvesting. In fishery management, such a quota is different from a bag limit, which stipulates the maximum for an individual fisherman or vessel, and different from a seasonal limit, which is dependent only on time. Bag and seasonal limitations are static, but quotas are dynamic, coming into effect whenever the maximum allowable catch is attained regardless of effort or time, and should allow for year-to-year changes in a fish population.

New York does not have any provisions in the law for regulation of fisheries by quota limitation. However, this kind of regulation would not be effective for migratory species without cooperation from other states. In fisheries that extend more than 12 miles from shore, international cooperation would have to be arranged through the federal government. Setting of quotas also depends heavily on good catch and fishing effort statistics for making population estimates. A continuous monitoring and research effort is required to obtain and analyze the necessary data on different fish populations. The Department of Environmental Conservation (EnCon) is not currently equipped for this kind of work, nor is the sport fishery adequately monitored at the present time.

C. Regulations on Time, Season, and Area

New York State marine fishery statutes have two regulations that limit hours for fishing. The first prevents taking of shellfish, except surf clams and sea scallops, from any shellfish lands of the state, public or private, during the hours of darkness.[19] Safety and enforcement reasons can be cited for this statute. The second regulation prohibits the use of haul seines from midnight Thursday to 6:00 P.M. Sunday in waters of the Peconic bays and around Shelter Island.[20] The intention of this stipulation is to reduce commercial fishing pressure on the resource. However, it is precisely during the weekend that sport fishing pressure increases, and it is hard to say whether the resource enjoys a significant respite from human predation. Actually, the prohibition may be more effective in protecting the resource from the double pressures of commercial and sport effort and in pacifying sport fishermen who usually contend that commercial fishermen are overfishing the resource. In any event, neither of these laws is based on adequate scientific information.

Seasonal limitations exist only for bay scallops and specified kinds of nets. The season for taking bay scallops is from the third Monday in September to March 31,[21] and is reinforced by prohibiting possession for sale from April 1 through September 15.[22] This regulation is designed to protect the species during its spawning season, which begins in the spring when bay waters begin to warm.[23] Seasonal regulations on beam and otter trawls cover basically the same season in two different areas. Such trawls may not be operated from April 15 to October 1 in the waters of Suffolk County west of Gardiners Island, including the waters around Shelter Island, the Peconic Bays, Flanders, Noyac, and Gardiners bays.[24] Essentially, this includes all the marine waters between the north and south forks at the eastern end of Long Island. The use of such trawls is also prohibited from April 1 to November 1 in the waters of Long Island Sound west of a line from Eatons Neck Point to the New York-Connecticut boundary line on the mainland.

The official reason for these seasonal gear limitations is to protect the weakfish resource. However, there seems to be little biological evidence that such protection is needed.[25] The seasonal prohibition on trawling in the given areas was probably

designed to reserve the resource for the summertime recreational anglers rather than to protect it from overfishing, for adequate scientific data are not available to determine what controls are necessary. Indeed, because sportfishing data are so imcomplete depletion of the resource due to overfishing would be more difficult to detect in a sport fishery than in a commercial fishery.

Area limitations on fishing in New York seek to guarantee the sanitary quality of shellfish, provide special areas for nonresident crabbing and lobstering, and specify areas for operation of certain kinds of gear.

EnCon's authority and responsibility to certify acceptable areas for taking shellfish and to close areas for sanitary reasons is provided for in section 13-0307. Its authority extends to making rules and regulations governing every aspect of shellfishing, processing, and shipping so as to "provide adequate sanitary control over all shellfish offered for sale and distribution in the state."[26] Such sanitation regulations are ostensibly health measures which affect management of the resource only as they influence importation of shellfish from other states[27] and transplanting from uncertified areas.[28]

Nonresident lobstering is permitted in the marine district except in the northeast corner around Fishers Island.[29] A nonresident lobstering permit may be issued to a person if his home state provides reciprocal privileges to New York State residents.[30] In the previous version of this statute, which expired January 1, 1973, the area closed to nonresident lobstering was north and east of a line from Flashing Red Light Number 2 Bell Buoy east of Montauk Point to Race Rock, and then north to the New York-Connecticut boundary. The reason for this statute becomes obvious when one looks at the area on a chart (see map of marine district, Fig. 1). Most nonresident permit applications come from Connecticut lobstermen, which would place Fishers Island lobstermen in competition with outsiders for living resources in New York waters. Apparently, the competition was strong enough in the Montauk vicinity to warrant enlarging the closed area. In 1973 the authority of the statute was renewed until January 1, 1976 and reworded. The present version prevents nonresident lobstering north and east of a line from Flashing Green Light Number 9 Bell Buoy to Race Rock and then north to the New York-Connecticut boundary. This significantly increases the closed area to nonresident lobstering.

Permits for nonresident commercial crabbing are allowed only in the area of Lower New York Bay and Raritan Bay south of a line from Point Fort Wadsworth on Staten Island to Norton Point on Coney Island.[31] Like the nonresident lobstering prohibition, this is a deterrent to competition from New Jersey residents.

In addition to the seasonal limitations mentioned above on beam and otter trawls in eastern Long Island waters, the same gear is prohibited at all times in specified areas in the western district.[32] Briefly, this includes all marine waters in Queens, Kings, and Richmond counties; within one-half mile of the Atlantic Ocean coastline; in all tidal waters inshore of the coastline; in all south shore inlets; in Manhasset Bay, Hempstead Harbor, and the Nissequogue River; in the Harlem River and between the Triborough Bridge and Kings Point. Section 13-0343 gives other area restrictions on the use of different kinds of nets. Purse seines are prohibited for taking food fish from all areas of the marine district. Other area regulations affect the operation of hand nets for bait, gill nets, pound nets, etc., in certain bays. In general, the almost consistent association of area and gear regulations in the law seems to indicate that this kind of regulation is generated by social conflict rather than by demonstrated scientific need.

D. Regulations on Fishing Gear

Regulations which limit operation of certain kinds of fishing gear are usually intended to limit the harvesting capacity or efficiency of any given unit of labor. Gear efficiency can be regulated by limiting extent of use and catching ability. For example, with the same manpower, trawling is a more efficient way of catching fish than angling, but fishing with a trawl may be limited by law to certain areas and/or seasons. The catching efficiency of the trawl can be further manipulated by regulating the mesh size of the net. If only economics were considered, fishing gear would be used and maintained at the highest level of efficiency within rational limitation of total catch. However, a social question, namely, who should get the fish, is usually the reason for gear limitation. Essentially, by limiting gear efficiency, the management authority guarantees work for a larger number of people.

This makes no economic sense, but it does make legislative sense in New York State. It seems socially more important, in other words, to assure all citizens who want to use the resource that they will have this opportunity. Since most citizens participating in the marine fisheries are more interested in catching fish than in making money (there are more sport fishermen than commercial fishermen), it becomes reasonable for the state to trade off relatively efficient commercial harvesting of a public resource in favor of policy that allows for the greatest number of participants. Such socially responsive limitations, nevertheless, may be economically and scientifically irrational.

Gear limitations in New York State affect the use of mechanized shellfish and crab harvesting equipment, purse seines, beam and otter trawls, and various other nets. Shellfishing on public or unleased lands cannot be done with dredges, scrapes, or any mechanical device operated by motor-driven boats.[33] Exceptions to this rule include sea scallops and surf clams, which may be taken from the Atlantic Ocean in any manner. Soft clams below low tide may be taken by churning with a propeller. Bay scallops may also be taken with a power boat towing a dredge or scrape, but efficiency is limited by a 36-inch maximum mouth width and a requirement that the dredge be retrieved by hand, without any mechanical assistance (levers, pulleys, etc.).

Another curious gear limitation regulates the taking of oysters. More than one bushel of oysters taken from unleased lands in the marine district cannot be transported by boat unless it has no propeller or its propeller is removed.[34]

Dredging for blue-claw crabs is prohibited in the waters of Hempstead Bay and South Oyster Bay, and in the waters west of the Captree Bridge (Robert Moses Causeway) in Great South Bay.[35] This limitation is intended more to relieve congestion, primarily from pleasure boaters, sport and shellfishermen, than to curb crabbing efficiency.[36] However, commercially significant numbers of crabs have been found in areas at least as heavily populated. The regulation most likely satisfies the special interests of local shellfishermen who feel the dredgers would pick up quantities of shellfish other than crabs in these areas, for it has no demonstrated conservation impact on the state's blue crab resource.

Most gear limitations regulate the use of various types of nets: beam and otter trawls, seines, pound, trap, and gill nets. Almost all of these gear restrictions pertain only to specified areas of the marine district. In addition to various area and season restrictions on beam and otter trawls discussed above, all kinds of nets are prohibited by section 13-0343 subds. 9-13 and 15 from the following areas:

1. Jones Inlet.
2. Fire Island Inlet.
3. Moriches, Shinnecock, and Mecox Inlets and in the ocean within

one-half mile of the seaward shores of these inlets.

4. Connetquoit River.
5. Long Island Sound west of a line from Eatons Neck Point northwest to the interstate boundary April 1 to November 1.
6. Within 1,000 feet of the beach between Jones Inlet and Oak Beach.

Many other areas are named in this section in which only special kinds of nets with specified size limits are permitted. Only hand-operated nets no more than 10 feet long may be used to take minnows and shrimp for bait in the marine waters of Richmond County, for example. In the Nissequogue River, the size limit for the same kind of net is 20 feet by 4 feet deep. The size limit is increased to 40 feet by 4 feet deep for catching bait fish in Hempstead west of the Wantagh State Causeway, in Jamaica Bay, in Gravesend Bay, and within a half-mile of Coney Island.[37]

Mesh size limitations are prescribed in two cases. In Suffolk County, haul seines are restricted to 150 fathoms long with an equal length limit for the two wings. The stretched mesh size including knot cannot be less than 3 1/4 inches in one wing and 3 1/2 inches in the other.[38] There seems to be no scientific rationale for having two different mesh size limits in the same net. This regulation probably started as a compromise between opposing interests. Beam and otter trawls used to take flounder in Long Island Sound cannot have a stretched mesh of less than 4 inches.[39]

Many restrictions on fishing gear in New York are not designed simply to limit catching efficiency but rather to limit competition among users. Competition may develop between fishermen and boaters or bathers. More frequently, restrictive legislation results from competition between sport fishermen and commercial fishermen or between domestic fishermen and out-of-state fishermen. A good example of this resident versus nonresident competition is the statute prohibiting the use of purse nets by nonresidents for catching menhaden in the ocean within three miles of shore from the Fire Island Lighthouse to the Romer Shoal Lighthouse.[40] Another reason for this restriction may be to protect bathers on the nearby beaches from the slurry waste usually associated with a menhaden operation. However, bathers would be inconvenienced just as much by a domestic menhaden fishery in that area. A complete ban on the use of purse nets for catching food fish in any waters of the marine district[41] may be interpreted as favoring the sport fishermen, since it is only food fish that recreational anglers pursue. Other regulations of this kind include the ban on beam and otter trawls in the waters between the north and south forks and in the western part of Long Island Sound during the principal recreational fishing season.[42] Prohibiting the use of all nets in and near all south shore inlets [43] could be argued to benefit the sport fishermen who congregate in these areas and also to relieve congestion of marine traffic. Bathers and surf fishermen are no doubt the beneficiaries of the ban on nets within 1,000 feet of the beach between Jones Inlet and Oak Beach.[44]

The piecemeal nature of statutes regulating the operation of various types of gear is indicative of the way most fishery policy has developed. In few statutes is there any hint of objectives that would maximize the catch, minimize the cost, or get the most protein from the sea without jeopardizing future productivity. Instead, the individual needs of local areas have taken precedence, and social issues may preclude rational conservation. The result is a patchwork policy of conserving special interests in the name of resource management.

E. Regulations on Entry - Statutes Affecting Licenses, Leases and Permits

One of the most effective ways of limiting fishing pressure is to regulate entry of fishermen into the fishery. This can be done by issuing licenses to recreational and commercial users, and stopping issuance

when a predetermined maximum number of participants has been reached. The rationale for this method is based on the state's common-law ownership of all fish and wildlife within its boundaries, and its constitutional mandate to hold these resources in trust for the people of the state. A license essentially gives the state's permission to an individual to hunt or fish on the public resource in accordance with the various rules and regulations of the Fish and Wildlife Law. A license to fish implies that the resource is not free and open to all users, but has a commercial, recreational or ecological value to the state. The fisherman's license fee is, in effect, a rent paid to the people of the state for the right to participate in the fishery.

New York State law does not require licenses of marine sport fishermen for the legal taking of any species of shellfish, crustacea, or finfish, nor does it require licensing of state residents for the commercial taking of food fish in the marine district within prescribed season, gear, and size limitations. Licenses are required of out-of-state commercial finfishermen and of all commercial fishermen taking shellfish, lobsters, crabs, and menhaden. There is no limit on the number of licenses issued.

Licensing provisions for commercial shellfishing are prescribed by section 13-0311. A shellfish digger's permit costs the applicant $7.50 annually and expires the last day of the year issued.[45] A licensed digger is required to carry his permit at all times while shellfishing,[46] and is allowed to sell his harvest only to authorized shellfish shippers in the township from which the shellfish were taken.[47] Nearly 6,000 digger's permits have been issued annually over the past three years (see Tables 4 and 5), but it is estimated that approximately 10 percent are full-time professional shellfishermen. A shellfish grower must be a state resident at least one year before qualifying for a shellfish grower's bed permit.[48] The bed permit fee is $0.25 per acre, but the minimum fee is $5.00.[49] Moreover, a shellfish grower is subject to all other regulations regarding sanitary surveys, uncertified areas, and shipping. There are no limits on the amount of shellfish which may be taken under commercial permits or on the kinds of harvesting gear employed. EnCon may suspend or cancel

TABLE 3 *License Fees Required for the Commercial Harvesting of Certain Species*

Fishery	*Fee*	*Authority (Section)*
Shellfish, digger	$7.50	13-0311
Shellfish, grower (bed permit)	$0.25/acre ($5.00 min.)	13-0313
Shellfish, grower (off-bottom culture)	$50.00	13-0316
Marine hatchery	$100.00	13-0316
Lobster, resident	$5.00	13-0329
Lobster, nonresident	$50.00	13-0329
Crab, resident	$15.00	13-0331
Crab, nonresident	$25.00	13-0331
Menhaden and other industrial fish	$200.00/vessel 60 tons or more	13-0333
	$25.00/vessel less than 60 tons	13-0333
Food fish, resident	no license required	13-0335
Food fish, nonresident	$4.00/foot of vessel	13-0335

Source: McKinney's Consolidated Laws of New York Annotated. 1972.

TABLE 4 *Number of Permits Issued 1970-1973 for Commercial Fisheries as Required by Law*

	1970	*1971*	*1972*	*1973*
Shellfish digger's permit	5,547	6,026	5,832	6,462
Shellfish grower's bed permit	12	13	17	18
Lobster, resident	508	626	660	618
Lobster, nonresident	71	83	66	72
Crab, resident	4*	4*	3	8
Crab, nonresident			11	21
Menhaden	10	24	18	26
Food Fish, nonresident	6	5	6	26
TOTALS	6,146	6,768	6,596	7,251

* Crabbing permits for residents and nonresidents were grouped together in 1970 and 1971.

Source: New York State Department of Environmental Conservation, Div. of Marine & Coastal Resources, Office of Permits.

TABLE 5 *Shellfish Digger's Permits Issued 1970-1973 by Town and County*

Town and County	*1970*	*1971*	*1972*	*1973*
Manhattan County	4	1	1	4
Richmond County	1	*	*	2
Kings County (Brooklyn)	14	10	7	6
Queens County	18	14	15	18
Town of Hempstead	148	172	104	98
Town of Oyster Bay	69	92	80	80
Town of Babylon	901	1,064	957	1,130
Town of Islip	1,973	2,235	2,326	2,384
Town of Brookhaven	1,025	1,218	1,251	1,282
Town of Southampton	468	386	368	463
Town of East Hampton	263	228	193	362
Town of Shelter Island	94	66	83	95
Town of Southold	306	268	207	322
Town of Riverhead	82	67	60	64
Town of Smithtown	32	30	47	45
Town of Huntington	137	164	114	89
Town of North Hempstead	3	6	9	7
Bronx County	3	2	5	3
Westchester County	2	3	4	7
Upstate	4	*	1	1
TOTALS	5,547	6,026	5,832	6,462

* No data available

Source: New York State Department of Environmental Conservation, Division of Marine and Coastal Resources, Office of Permits.

both digger and bed permits if this appears in the public interest.

Commercial harvesting of lobsters and crabs in the marine district is governed by sections 13-0329 and 13-0331 respectively and requires a valid license or permit for each fishery. The conditions for obtaining a lobstering permit are residency in the state for at least six months prior to application and a fee of $5.00.[50] Nonresidents may also be granted a permit to take lobster from specified areas of the marine district if they are residents of a state granting reciprocal privileges to New York lobstermen and if they pay a fee of $50.00 per boat.[51] Resident and nonresident permits are required to take blue-claw crabs for commercial purposes; nonresidents are again limited to harvesting only in designated areas.[52] Fees for such permits are $15.00 for resident and $25.00 for nonresident crabbing. Like the commercial shellfish permits, all licenses are non-transferable, expire on the last day of the year issued, and may be suspended without prior notice if the public interest so dictates.

All industrial fisheries must have a license to operate in New York marine waters. The menhaden fishery is the primary industrial fishery, but the law includes any other fish from which oil or fertilizer is produced.[53] (Other industrial fish are the sea herring and alewife.) Licenses are issued for each vessel in the name of the owner or operator; license fees are based on the registered gross tonnage of the vessel (see Table 3). Twenty-six menhaden licenses were issued in 1973. This is the largest number of licenses issued since 1970; it included eleven $25 licenses and thirteen $200 licenses issued to state residents. Three $200 licenses were issued to nonresidents.

Although these figures indicate that a small menhaden fishery operates in state waters, the industry is not actually located in New York. In fact, the last processing plant on Long Island, located at Amagansett, has been closed, and operations have been moved to New Jersey. The land is still owned by the company, and this accounts for the majority of the large menhaden vessels (over 60 gross tons) licensed by New York "residents". This is important, since the law restricts purse seining for menhaden by nonresidents within three miles of shore from Fire Island Lighthouse to Romer Shoal Light house.[54] Most of the menhaden are found in waters less than 20 fathoms deep in the summer[55] and the industry has found that 80 percent are within one mile of shore.

Since the major menhaden industry is being operated out of New Jersey and other states, the landings statistics are not being recorded for New York. This state is not realizing the full benefits of its industrial fish resources which are being caught, landed, processed, and sold by an out-of-state industry. The decline of this potentially important New York fishery was well documented by McHugh,[56] who states that "the industrial fishing and processing industry of New York State has been virtually non-existent since 1966." Overfishing in Chesapeake Bay is cited as the reason for the initial decline of the fishery.

Another use of menhaden, as bait fish, brings a much higher price per pound. A small fishery has developed the use of drifting gill nets or snag hooks instead of the large purse nets used in the industrial menhaden fishery. Incidental catches of menhaden in pound nets may also be sold as bait. Under the present wording of the law, this bait fishery does not seem to require a license, since the law specifically refers only to "fish from which oil or fertilizer is made."[57] Although never tested in the courts, the strict interpretation is currently being used for enforcement purposes. No estimate of the size of this commercial bait fish operation is possible at this time, but because of the well-known use of menhaden as bait fish and the much higher price in the bait market

than in the processing market, it may be easily assumed that most menhaden sold and used as bait are not taken under license.

The only real entry controls in state management policy relate to private cultivation of shellfish. Private cultivation can be done only on privately owned or leased underwater lands which are of limited acreage. Once the lands are leased, the general public may no longer have access to the area until the end of the lease term. Shellfish growers may lease state-owned underwater lands for shellfish cultivation in accordance with sections 13-0301, 13-0303, and 13-0313. Lands not leased by the state are those which:

a) are within 500 feet of high water mark

b) are within 1,000 feet of high water mark along the shores of Gardiners and Peconic bays west of a line from the easterly end of Plum Island to Goff Point;

c) have an indicated presence of shellfish of sufficient quantity and quality to support significant harvesting by handraking and/or tonging;

d) are producing bay scallops regularly on a commercial basis.

Ten-year leases are issued to the highest bidder at a public auction. The minimum size of leased areas for on-bottom shellfish cultivation is 50 acres and the annual rental can be no less than $1.00 per acre. An initial population survey and marking of the grounds to be leased is required of EnCon. Tax on leased lands is $1.00 per acre, payable as prescribed in section 13-0303. All growers must have a bed permit before working their leased grounds.

The state has produced, not necessarily by design, an effective limited entry scheme for shellfish management. A distinct jurisprudence relating to property rights in beds has developed, owing to the immobile nature of shellfish and their long history as one of the most valuable marine resources of the state. Like all aquatic life in the state, shellfish on lands under public waters are the property of the state, except those legally acquired and held in private ownership.[58] Other than the lessee or EnCon, no person is permitted to mark out or enclose in any manner underwater state-owned lands.[59] Thus, although state citizens have the inherent right of open access to a fishery in navigable waters of the state, this right does not extend to the taking of shellfish in navigable water where such underlying land is privately owned or leased.[60] An important distinction is made between ordinary fishing and the taking of shellfish which is based on the natural immobility of shellfish such as clams and oysters. Hence, "they may properly be deemed to belong with the land and to be within the dominion of the owner of the bed... so as for practical purposes to be his property and removed from the sphere of public fishing rights."[61]

One further distinction can be made between submerged lands owned by virtue of colonial grants and lands leased from the state. The law treats sedentary shellfish as inanimate objects, but the state lease conveys no real interest in the land itself. A colonial grant includes submerged lands around Long Island, but a lease gives an exclusive right only to the taking of shellfish from the leased bed, so long as the lessee complies in good faith with the terms of the lease.[62] This is only a right to occupy for the express purpose of cultivating shellfish. Theoretically, mineral rights remain with the state.

Originally, one could acquire a property right in shellfish by planting and cultivating on public grounds where no shellfish existed naturally before.[63] Under common law, a bed so planted is recognized as a basis for gaining exclusive harvesting rights in such bed and has, by court decision, never been considered as usurping the common right of the fishery.[64] Other cases relating to oyster planting have been explained as follows:

> By the common law, oysters planted by an individual in a bed clearly marked out and defined in the tidewaters of a bay or arm of the sea, which is a common fishery to all the inhabitants of the state, where the bay or arm of the sea is situated, and where there are no oysters growing spontaneously at the time, are the property of the person who plants them, and the taking of them by another person is a trespass for which an action lies.[65]

It should be noted, however, that in the case of exclusive shellfish rights, two resources are actually being utilized. One is the living resource of the shellfish and their natural regeneration, limited by the environmental capacity to support their populations. The second is the non-living resource of suitable bed space, limited by the number of growers and by bed size. The court decisions underwrite the public's common right to the living resource, but they do not seem to recognize the limits of suitable bed space.

Legislative recognition of these limits is important for proper management of both resources. Conflict over concurrent use will not arise as long as there is open bottom space for new entrants to the fishery. However, once a space is filled, there is disagreement on boundary lines between beds, especially when heavy storms move marker stakes. And since there seems to be no check on human consumption, where do new entrants go for bed space? Apparently, there was a greater need to end such disputes than to recognize the limits of the resources,

TABLE 6 *1971 New York Shellfish Landings*

Species	*Value*	*Landing (Lbs)**
Hard Clam	$10,756,939	8,549,196
Lobster	2,053,784	1,790,518
Oyster	1,681,811	778,464
Sea Scallops	609,225	402,200
Surf Clam	437,977	3,687,997
Bay Scallops	233,700	144,008
Mussels	96,271	317,590
Squid	55,880	310,445
Soft Clam	55,725	153,664
Conch	6,445	31,860
Razor Clam	3,743	10,208
Total Shellfish	$15,991,500	16,176,150
Total Finfish	2,552,933	20,067,422
GRAND TOTAL	$18,544,433	36,243,572

* Weights: Lobster and squid--live weight landed
Scallops--edible meats
All other shellfish--meats

Source: U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 1972. *New York landings, annual summary 1971*, current fisheries statistics no. 5913.

and the state legislature passed a statute requiring the granting of leases for shellfish cultivation, and official survey and record of such leases by EnCon.[66] The regulation of not granting leases where there is an "indicated presence" of naturally existing shellfish is probably a holdover from the original common law.

Almost by accident, the state has responded to a resource management problem (open entry in a fishery with superimposed space limitations) by instituting a limited entry scheme. This is significant to the present clam fishery, by far the most productive commercial marine fishery in the state (see Table 6 for recent shellfish landings and value).

Private cultivation of shellfish does not have to be done on bay bottom. A much more efficient method of shellfish mariculture is using trays or ropes which can be suspended in the water column. This practice increases the available area to which shellfish can attach, protects them from bottombound predators, and generally increases productivity per acre. In 1973 a statute relating to aquaculture provided for exempting off-bottom shellfish culture from certain restrictive sections and granting permits for the operation of marine hatcheries.[67] The act changed the minimum size of leased areas from fifty acres to five acres and changed the illegal status of off-bottom culture of shellfish under subdivision 6 of section 13-0309. The act also created section 13-0316, which allows EnCon to issue permits to marine hatcheries for raising shellfish, lobster, crab, shrimp, and food fish. A separate permit is issued solely for off-bottom culture of shellfish at half the annual fee of a marine hatchery permit (see Table 3). A shellfish grower operating an off-bottom culture would have to lease five acres or more of water space from the state.[68] The statute also gives the off-bottom grower permission to purchase and possess shellfish, lobster, crab, etc., of less than legal market size. These provisions will greatly encourage mariculture. Moreover, they enlarge the limited entry aspects of shellfish management by granting private ownership, or exclusive property rights, over the resource.

ENFORCEMENT POLICY

Enforcement of laws regulating marine and coastal resources in New York State are provided for in Article 71 of the Consolidated Laws of New York (McKinney's Book 17 1/2). Title 9 contains all sections under this article which apply to the Fish and Wildlife Law (Article 11) generally, and to the Marine and Coastal Resources Law (Article 13) in particular, where specific marine species are concerned. Those parts of Title 9 that bear on the enforcement of Article 13 can be divided into: a) powers of enforcement officers; and b) violations and penalties.[69]

A. Powers of Enforcement Officers

EnCon law enforcement officers and members of the state police are obliged to enforce all state laws relating to fish, crustacea, and shellfish.[70] Conservation officers and state police have equal authority and status in enforcing the provisions of Article 13, with additional powers to search and seize as evidence without warrant. This special authority is enumerated in subdivision 4 of section 71-0907 as the power to search without search warrant any boat or vehicle, box, locker, basket, creel, crate, game bag, package, or container of any nature, and the contents of any building other than a dwelling, using force if necessary, wherever there is cause to believe that any provision of this article is being violated. Power to seize as evidence without warrant includes any fish, shellfish, or crustacea believed to be taken illegally, and any net, trap, firearm, rake, tongs, dredge. or device, other than a boat, believed to be used illegally or to constitute a nuisance

as defined in section 71-0915. The constitutional rights of individuals are protected, in that all peace officers are required to have a warrant to search any dwelling and its contents. These special powers of search and seizure for conservation enforcement purposes have occasionally been extended to the Suffolk and Nassau County Police, marine divisions, by making deputy conservation officers of policemen. This effectively increases the EnCon enforcement staff and augments the authority of the county law enforcement agencies.[71] Power to search without warrant does not diminish the power to search with a warrant; such warrants can be issued by any criminal court having jurisdiction in accordance with the provisions of Article 690 of the Criminal Procedure Law.[72]

A reciprocal enforcement section covering violations in boundary waters gives New York conservation officers the power and authority to make arrests for violations of New York fish laws in any waters between the shores of New York and Rhode Island, Connecticut, or New Jersey.[73] It also provides for the enforcement of a boundary state's fish laws in New York waters where the laws are similar to New York laws, and for the enforcement by boundary state conservation officers of either state's fish laws in the waters between the shores of that state and New York. Thus, state boundary lines which define the marine district of New York have little significance to an officer of New York (or of an adjacent marine state) who is in pursuit for violations of marine fishery laws of either state under this section. Furthermore, it is provided that the arresting officer can take the alleged violator for trial to the state in which the violation was committed and prosecute according to the laws of that state.[74] In spite of its cooperative nature, this law does not effectively remove the inconsistencies in the marine fishery laws of the different states. In practice, it has meant the right of any officer to pursue a violator out of strictly domestic domain, but it does not allow enforcement of New York fishery law in another state's waters (or vice versa) unless the laws of each state are the same.

Conservation officers are granted statutory powers of presumption by section 71-0917. Under this section, officers may presume that any fish, shellfish, or crustacea possessed was taken by its possessor, and that possession during any time when there is no open season anywhere in the state for the species possessed is evidence that it was taken unlawfully. Therefore, an officer does not actually have to see a marine species being taken illegally in order to make an arrest for illegal possession.

B. Violations and Penalties

Violations of the Marine and Coastal Resources Law are classified as either misdemeanors or infractions. Misdemeanors and punishments are specified in section 71-0921 of the Environmental Conservation Law. Any other violation not mentioned is an infraction and punishable as provided in section 71-0923. Anyone committing a violation of either kind is liable to certain civil penalties, listed in section 71-0925.

Fines and imprisonments for the committing of misdemeanors can be imposed only by a court of record.[75] However, the jurisdiction of courts of special sessions and police courts is extended in some areas. Except for violations in the taking and transporting of shellfish, courts of special sessions and police courts have original and exclusive jurisdiction over misdemeanors, subject to the power of removal provided in the Criminal Procedure Law.[76] They also have exclusive jurisdiction over all infractions.[77]

The following acts are defined as misdemeanors under ECL sec. 71-0921:

1) taking fish protected by law; taking shellfish or crustacea before the first day of open season;
2) taking in excess of bag limit;

3) buying, selling, or offering for sale fish which are prohibited;

4) any violation relating to the pollution of waters (sec. 13-0345);

5) taking fish without license when one is required for the particular species or gear being caught or used;

6) taking fish by use of hands, or by device not permitted, or not permitted in the waters used, or not permitted for species taken;

7) possessing on water or shore any fish in excess of number which may legally be taken by one person in one day;

8) any violation of the following sections:

a) 13-0305 relating to marking out-of-state owned underwater lands;

b) 13-0309 relating to the taking, handling, and importation of shellfish;

c) 13-0317 relating to shipping tags on shellfish;

d) 13-0321 relating to taking and importation of shellfish for transplanting purposes;

e) 13-0323 relating to oysters (except for subd. 1 relating to sale of oysters labeled blue point oysters);

f) 13-0325 relating to clams;

g) 13-0327 relating to scallops;

h) 13-0329 relating to lobsters;

i) 13-0331 relating to crabs and permits to take;

j) 13-0333 relating to menhaden and licenses to take;

k) 13-0335 relating to licensing food fish taken by nonresidents;

l) 13-0337 relating to the return of unintentionally taken fish to the water and the killing of pest species;

m) 13-0339 relating to size limits of marine species;

n) 13-0341 relating to beam trawls and otter trawls;

o) 13-0343 relating to nets other than beam and otter trawls;

9. violation of section 71-0907 subdivision 7, or refusal to comply with lawful order or directive of any conservation officer;

10. violation of section 13-0301 subdivision 10 requiring prompt notification of the department when specified buoys or markers are destroyed;

11. any other violation not described above when committed by a person who was previously (within the past five years) convicted of two or more violations of the Fish and Wildlife Law.

Punishment for these misdemeanors generally requires fines that range from $25 to $200, depending on the number of previous convictions within five years of the first conviction. Imprisonment is specified as punishment for three or more convictions within a five-year period and cannot exceed a three-month term nor be less than a 30-day term.[78] In general, misdemeanors committed under the Fish and Wildlife Law are punishable as follows:

1) for a first conviction, by a fine of not less than $25 nor more than $100;

2) for a second conviction within five years of a previous conviction, by a fine of not less than $50 nor more than $150;

3) for a third or subsequent conviction within five years of the first of two or more previous convictions, by a fine of not less than $100 nor more than $200, or by imprisonment for not less than 30 days nor more than three months.[79]

More severe fines are made in cases involving violations of certain shellfish regulations. Five such shellfish violations are mentioned and punishments specified in section 71-0921 subdivision 3:

1) for violation of section 13-0345 relating to pollution of waters, a fine of not more than $500 and/or imprisonment for not more than one year;

2) for violations of section 13-0323 or section 13-0327 relating to oysters and scallops respectively, a fine for the first conviction of not less than $50 nor more than $200, for the second conviction a fine of not less than $200, and for

third or subsequent convictions a fine of not less than $400 and/or imprisonment for not less than three nor more than six months;

3) for the taking of shellfish at night in violation of subdivision 2 of section 13-0309, a fine of not less than $100 nor more than $500 and/or imprisonment for not more than one year;

4) for the taking of undersized or "berried" lobster in violation of subdivision 5 of section 13-0329, a fine of not less than $100 nor more than $500 for a first offense, and for a second offense within five years, a fine of not less than $300 nor more than $1,000 and/or imprisonment for not more than a year;

5) for violations of subdivision 1 of section 13-0309 involving the taking of shellfish from uncertified areas of this state or any other state, a first conviction fine of a person holding a valid digger's permit of not less than $250 nor more than $1,000 and/or imprisonment for not more than a year, a first conviction of a person not holding a valid digger's permit or for any subsequent convictions of anyone, a fine of not less than $500 nor more than $1,000 and/or imprisonment for not more than a year.

The enforcement branch responsible for the marine district employs 28 conservation officers. In addition to laws relating to the marine fisheries, they must enforce air and water pollution regulations. Cooperation with county police departments enables this small force to cover the marine district area effectively. Approximately 30 members of the Suffolk County Police Marine Division are deputized conservation officers. This increases the strength of state enforcement and extends the privileges of search and seizure without warrant to the deputized members of the county police. There is little interaction with town bay constables, since the local officials are mostly concerned with their own narrowly defined ordinances against nonresidents. Moreover, town jurisdiction primarily covers well-defined areas of bay bottom and wetland and is exclusive of state jurisdiction over natural resources in cases where there are colonial grants.

Conservation officers have the same police officer status as the state police. They receive identical training at the State Police Academy in Albany, except that conservation officers receive specialized training in conservation law. Mobility is a major factor for effective surveillance of a large area with a small enforcement staff. Each officer is supplied with a state car having radio contact with the Marine and Coastal Division headquarters in Stony Brook. The force is further equipped with five inboard cruiser-type boats and eleven skiffs with trailers. Management of fleet and manpower comes from the chief of enforcement for marine and coastal resources. Three lieutenants, one assigned to north shore and two to south shore operations, supervise the field officers. In general, about 30 percent of the force is assigned to the north shore, 25 percent to the Peconics and east end of the south shore, and 45 percent to the west end of the south shore. However, these ratios are not rigidly maintained, and flexibility appears to be a major asset of the force.

Commercial fish landings are frequently monitored by conservation officers at dockside. Sport landings, often monitored the same way, are harder to monitor, since the number of beaches and marinas where sport fish could be landed is much greater than the number of commercial ports. Spot checks can be made on the water by boarding and inspecting fishing craft. The only other way violations can be detected is if they are committed in the presence of an officer. One technique occasionally used is placing plainclothes officers on party boats. If a violation occurs, both the fisherman and the party boat captain are arrested. The long-run effect is to make party boat captains more responsive to fishery regulations.

The major enforcement efforts, however, are in shellfish regulations, with particular emphasis on patrolling shellfish beds closed due to pollution and on enforcing clam size limitations. Almost half the force is assigned to the western end of the south shore, where a larger population and a higher incidence of uncertified areas would most likely cause infringement of these regulations.

Lobster poaching is another area requiring particular enforcement attention. Serious poachers are difficult to catch, and many accidental lobster violations are caused by pleasure boaters when their boats become fouled in the buoy lines.

One of the major problems facing the enforcement branch of fisheries management in New York is the relatively small staff of conservation officers. With approximately 1,900 square miles of open water, bays, and wetlands, a force of 28 officers gives a very small officer-to-area ratio. In fact, with two officers per boat, this force could not occupy all its vessels at the same time. Even if the conservation officers worked full-time enforcing marine fishery regulations, a doubled staff would be closer to an optimum force. This would allow greater coverage of the area, more efficient 24-hour surveillance, and more flexible administration without the need for additional boats and equipment. Compared to conditions upstate, the basis for regulations is less seasonal in the marine district. Thus, enforcement around Long Island requires a high year-round capacity.

A second problem is achieving coordinated interstate regulations and enforcement. The Atlantic States Marine Fisheries Commission has been working toward this goal for 32 years, with limited success. The importance of a cooperative interstate management scheme, including enforcement provisions, will increase greatly if national sovereignty over living marine resources is extended beyond the current 12-mile boundary. If the state's fisheries management jurisdiction is also extended by such action, as is mandated in a 1958 New York law,[80] enforcement problems of every variety will multiply.

Marine Fishery Legislation

Marine fisheries legislation is only a small part of the total legislation introduced in the New York State Senate and Assembly each year. In the last six years an average of 14,830 bills has been introduced annually in both houses, ranging from 12,913 in 1969 to 18,237 in 1972 (Bills relating to marine fisheries management during this period have made up 0.2 to 0.3 percent of the total bills introduced). In 1973 nearly 0.4 percent of the total bills introduced related to the marine fisheries.

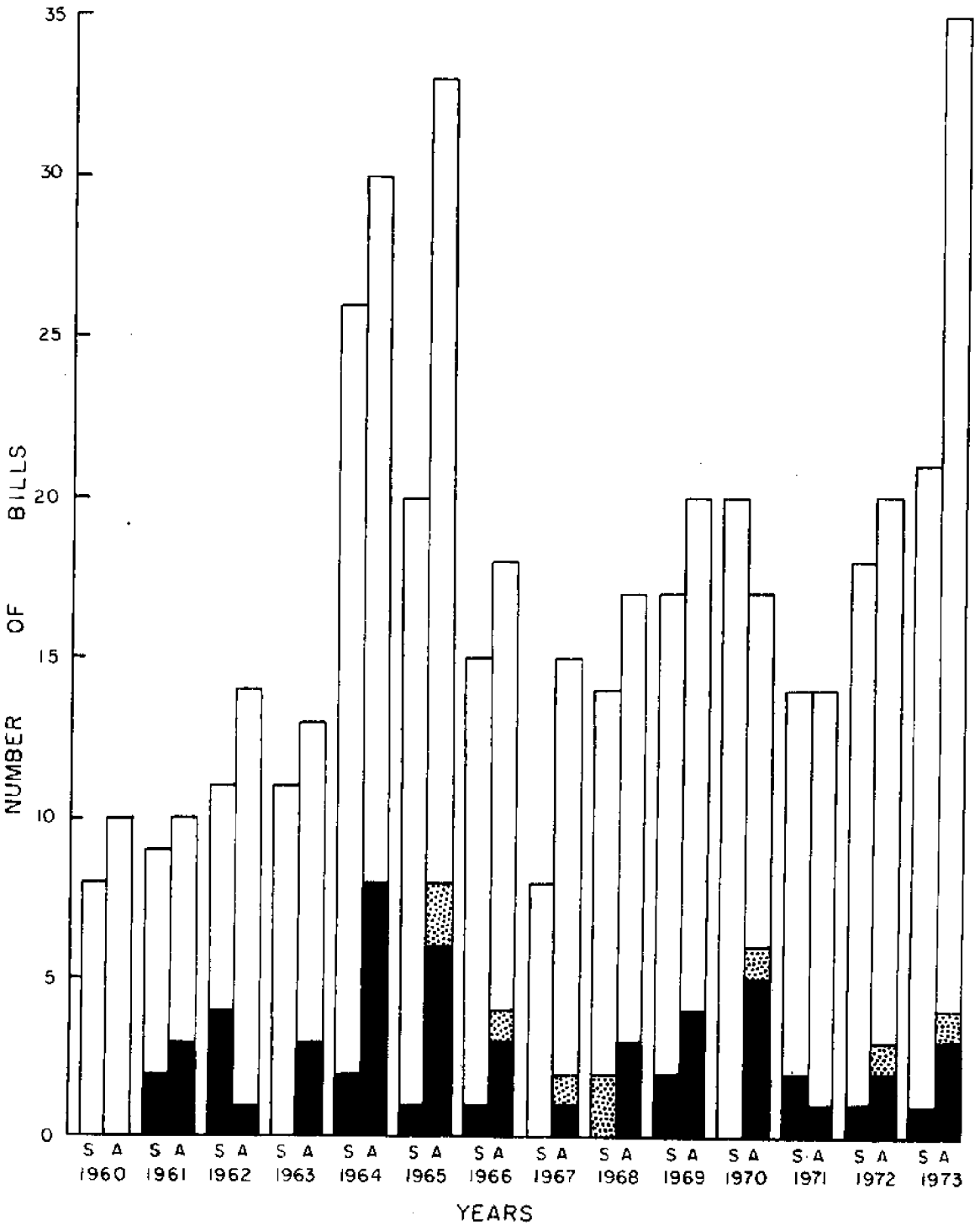
It is quite common for most bills never to be passed by both houses. From 1968 to 1973 less than 10 percent of all bills introduced were sent to the governor for approval. Marine fishery bills had slightly better success passing the legislature during the same period. A yearly average of five out of thirty-eight was sent to the governor. Fishery bills sent to the governor seem to have greater chances of being signed into law than most other kinds of bills. In 1970, for example, of the total 14,718 bills introduced in the legislature, 1,340 were sent to the governor, and 1,048 were signed into law. Fishery bills the same year were 0.25 percent of the total number of bills introduced, 0.45 percent of those were sent to the governor, and 0.48 percent of these were eventually signed into law. The relative probability that fishery bills will be signed into law, once passed by both houses, is indicated in Figure 6. Between 1960 and 1973, 478 marine fishery bills were introduced. Sixty-eight of these were sent to the governor and only nine were vetoed.

Legislative proposals are a fairly accurate index of popular attitudes on what needs to be done to conserve our marine fishery resources. However, policy trends in New York State fisheries management over the study period 1960-1973 are not readily discernible from a review of the numbers of bills introduced each year on certain subjects (see Figs. 7 and 8). Popular fisheries management attitudes as reflected in the annual legislation suggest a prevailing view that commercial operations must be restricted to preserve our fishery resources. The popularity of this kind of legislation may be attributed to the facts that commercial fisheries are easier to regulate than recreational fisheries, and that there is a larger recreational electorate. Another general trend suggests an increased awareness of deteriorating environmental conditions and the need for comprehensive coastal zone planning.

The overall pattern in marine fishery conservation policy is ultimately determined by the responsibility of the state's decision-making institution to represent the majority interest. As the limits of sustainable yield of a particular resource are approached with expanding consumption or use, the resource becomes increasingly valuable at a rate inversely proportional to its apparent future availability.[81] When the value becomes high enough to attract legislative attention, the decision-making institution is usually put under pressure to allocate the resource for the largest number of people. Legislation is rarely designed to control the root problem of unrestricted and sometimes wasteful consumption. Hence, fishery management appears to be primarily effected by popular decisions. Scientific and economic reason are secondary in the current legislative system.

The best examples of marine fishery legislation based on popular mandate are bills that seek to resolve conflict between commercial and recreational fishermen. Such conflicts are usually brought to the attention of the legislature by the sportsmen. Striped bass and menhaden bills are good examples of this kind of legislation. Since 1960, more bills have been introduced on

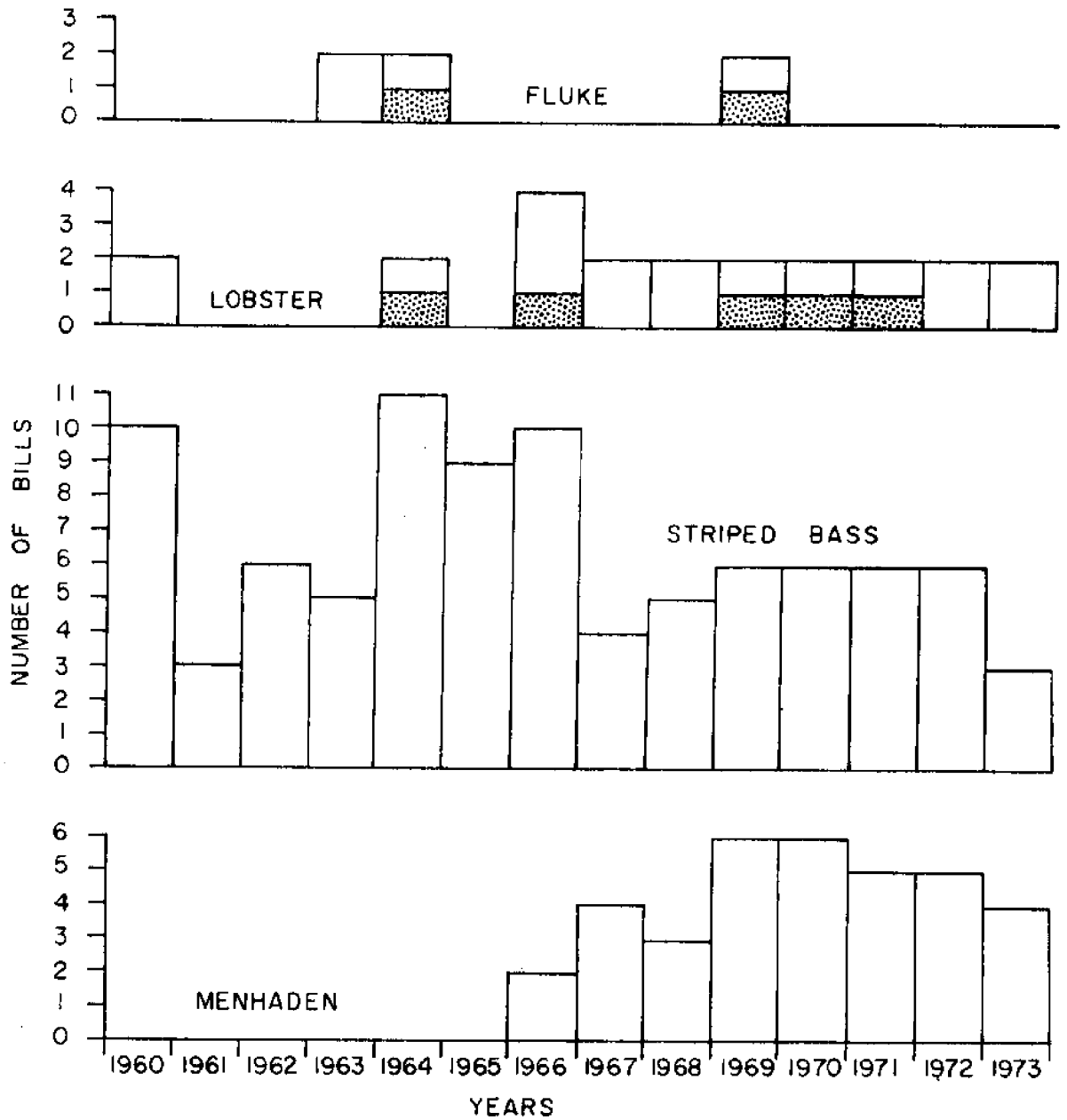
FIGURE 6 *Marine Fishery Bills Introduced, Passed, and Signed into Law in New York State, 1960-1973*



Indicated according to house of origin by S for senate and A for assembly. The entire bar indicates total number of bills introduced; black plus stippled bar, bills passed; black bar, bills signed into law.

Source: Legislative Reference and Index.

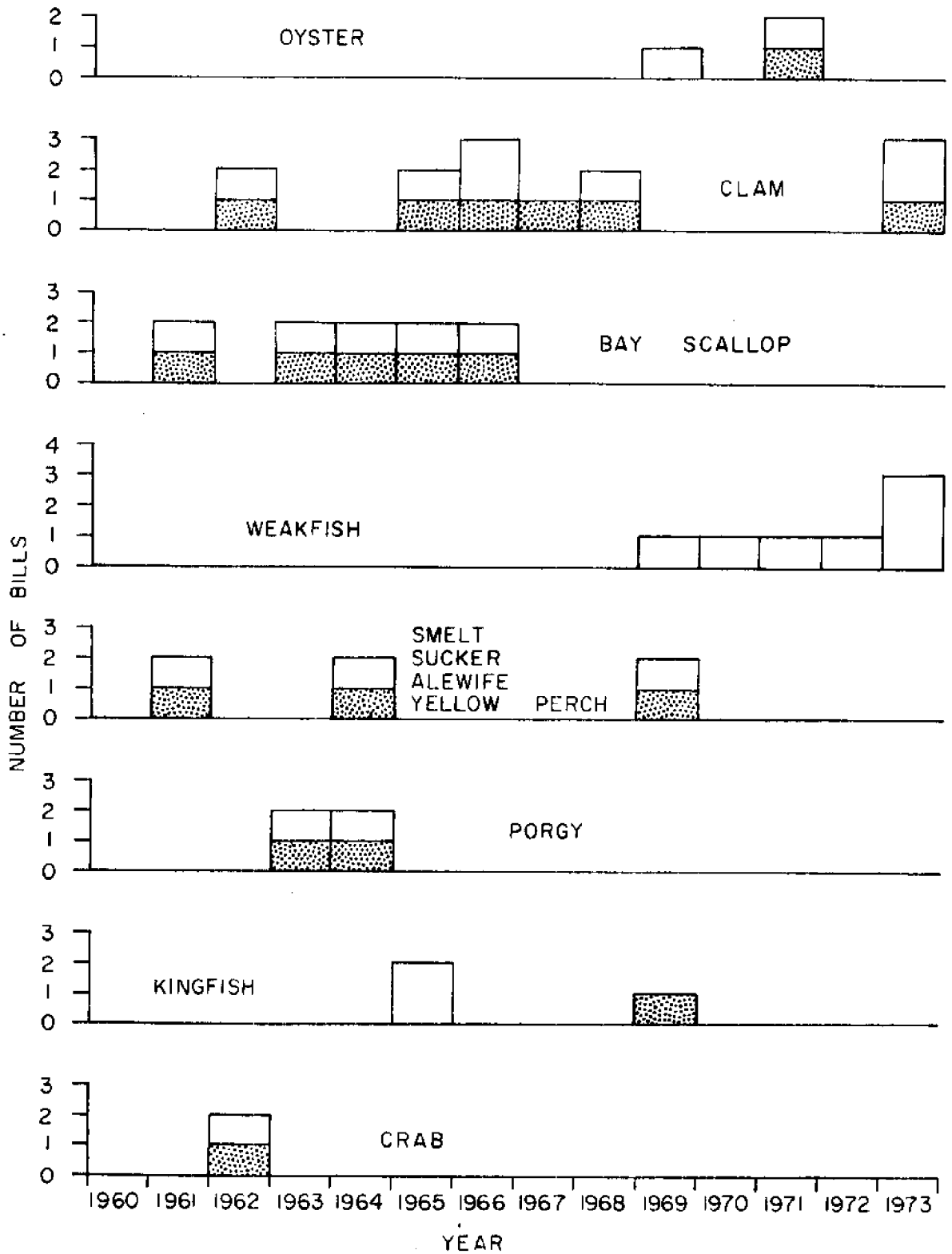
FIGURE 7 *Number of Bills Introduced and Passed on Certain Marine Fish*



Bar indicates total number of bills introduced; stippled bar indicates number of bills passed and signed into law.

Source: Legislative Reference and Index.

FIGURE 8 *Number of Bills Introduced and Passed on Certain Marine Finfish and Shellfish*



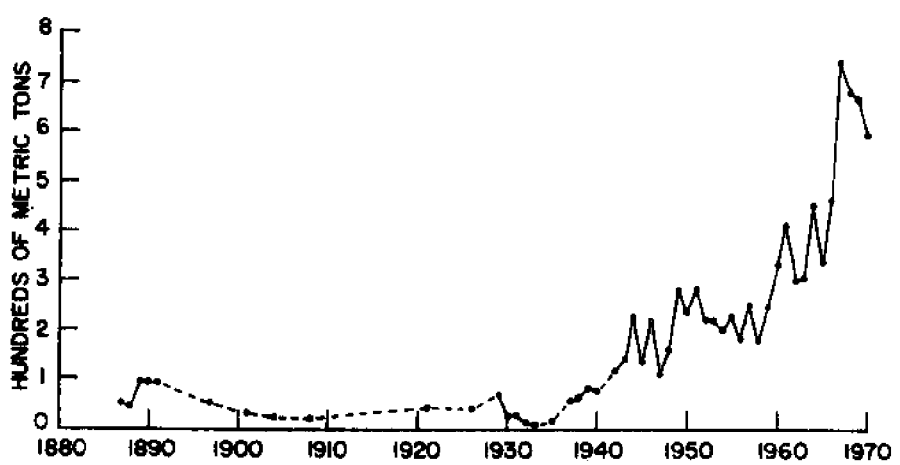
Bar indicates total number of bills introduced; stippled bar indicates number of bills passed and signed into law.

Source: Legislative Reference and Index.

the striped bass fishery than on any other marine fishery issue (see Fig. 7). All together, 90 striped bass legislative proposals were introduced during the fourteen-year period--an average of 6 per year. Only a few of these bills were reported out of committee. Only one passed both houses, and it was not signed into law.[82] Most of these bills seek to limit or prevent all commercial fishing for striped bass by increasing the size limits to 16 inches, restricting use of nets, creating bag limits, requiring commercial licenses, or by allowing harvesting by hook and line only. Popular support and encouragement for such legislation comes predictably from the recreational fishermen who contend that striped bass should be reserved for use as a sport fish. Although undocumented in the scientific fisheries literature, the casual sale of an otherwise sport catch to fish markets and restaurants is a well-known local phenomenon. It is also important to note that there is no evidence that the striped bass is being overfished by commercial interests.

A recent review of landings data shows a general increase in commercial landings of striped bass in New York since the mid 1930s.[83] (see Fig. 9), and available statistics show that this is true for the entire Middle Atlantic Bight. The same report points out that the estimated total sport catch for the Atlantic Coast in 1965 was five to six times the weight of the commercial catch in 1970. There is no reason to believe the sportfishing effort has decreased since that time. The increase in landings has been partly affected by an increased effort in both the commercial and sport fisheries and almost certainly by an increase in population. As an anadromous species (spawning in fresh water but living most of its life in the ocean) that prefers inshore coastal waters, striped bass may be taking advantage of higher primary productivity due to increased nutrient loads in their estuarine and river nursery areas. This hypothesis has been made for the Chesapeake Bay area,[84] although the influence of estuarine eutrophication on increased yield cannot be accurately forecast. The sharp decline in striped bass commercial landings since 1967 may be no more significant to the overall increasing trend than any of the previous temporal declines. In any case, legislation based on scientific information and directed toward all participants of the fishery is the only way to achieve good management.

FIGURE 9 *Annual Commercial Landings of Striped Bass in New York State, 1887-1970*



From McHugh, 1972*b*. Marine fisheries of New York State, p.602.

Legislative efforts to change the law as it relates to the menhaden fishery are also largely instigated by sportfishing interests, seeking to restrict the productivity of the industry. They have not been successful to date (see Fig. 7). A total of 35 menhaden bills were introduced between 1960 and 1973, all of which died in committee. Only one menhaden bill passed in the house where it was introduced.[85]

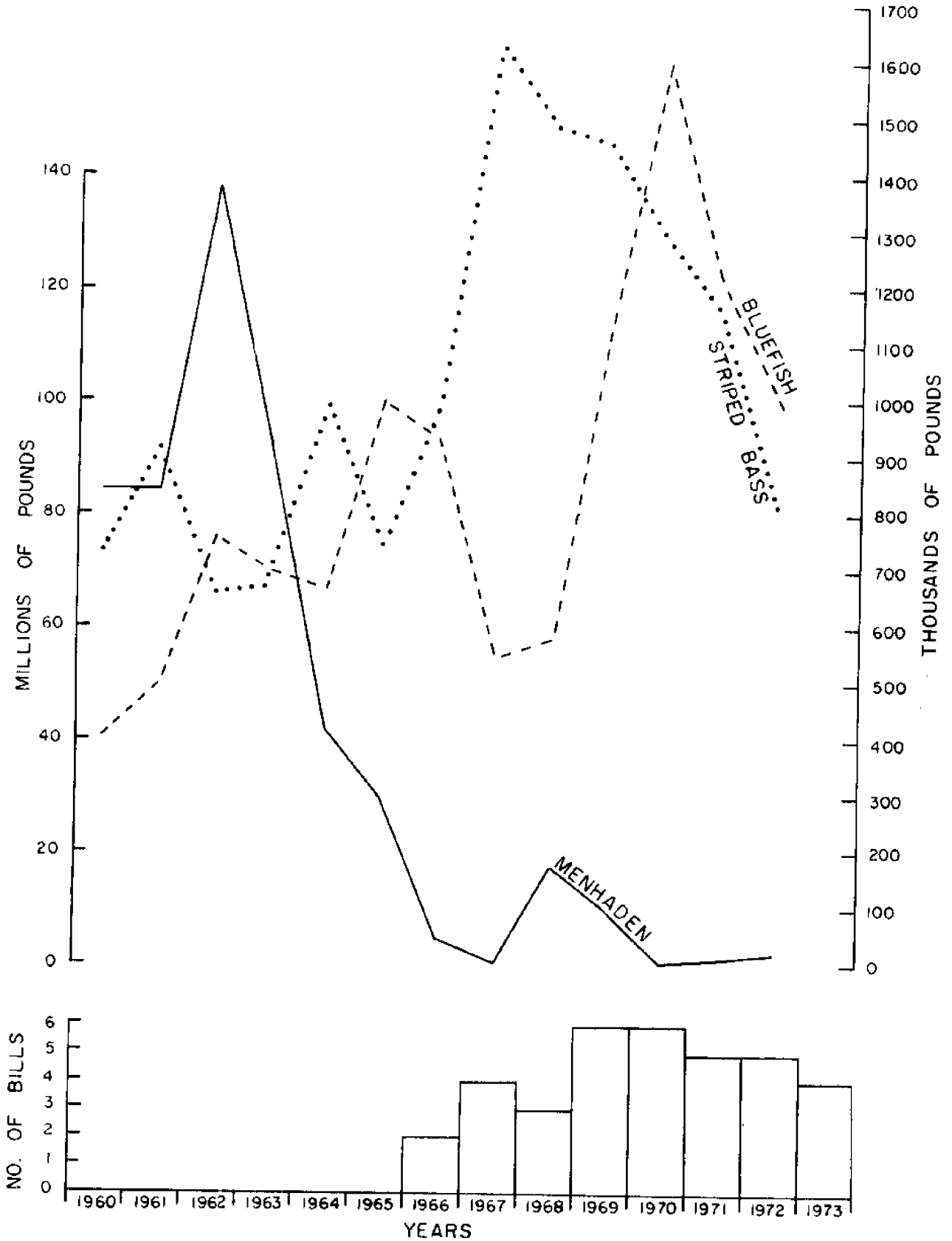
Menhaden bills since 1960 can be divided into three groups. Bills of the first group were intended to amend ECL section 13-0343 subdivision 15b allowing licensed vessels to fish menhaden in Long Island Sound west of Eatons Neck Point. This proposal was introduced in the senate and assembly in consecutive years 1966-1969, and in the senate in 1970, with the same sponsorship each year. The second group of bills were intended to amend ECL section 13-0333 by adding a provision designating the area of Long Island Sound west of Eatons Neck Point a "sanctuary" area for menhaden." This is essentially the same as the first group but in more environmentally appealing language. Bills of the second group were introduced consistently in both houses since 1967 and, like the first group, were almost identical in wording, sponsorship, and lack of success. The third group of bills was introduced only in the senate, except for one,[86] in consecutive years from 1969 through 1972, but these, too, were nearly identical in wording, sponsorship, and success. These bills also sought to amend section 13-1343 to prevent menhaden fishing in Huntington Bay, Lloyd Harbor, Northport Bay, and Cold Spring Harbor.

Unlike marine fishery legislation in general, menhaden legislation (see Fig. 10) has had nothing to do with the productivity of the fishery. The expected pattern is that as abundance of a species declines, as indicated by a decrease in commercial landings, public concern stimulates legislative efforts to restrict the fishery. In New York State, however, restrictive menhaden legislation is not aimed at rejuvenating the fishery (in spite of the use of preservationist terminology such as "sanctuary" in various bills). Indeed, there has been virtually no menhaden processing industry in the state since 1966.[87]

Menhaden legislation was stimulated not because of declining abundance but because of an artificial conflict of interests between the sport and industrial fisheries. This conflict developed from false assumptions that menhaden are the only food source for game species such as bluefish and striped bass, and that harvesting menhaden will either drive away the sport species, destroy their food supply, or catch them unintentionally. Actually, catches of food fish in menhaden nets are minimal.[88] Moreover, bluefish and striped bass are aggressive predators and will eat other species if there are no menhaden. Stomach analyses have shown they also feed on flounder, cunner, scup, and small tautog. The supposed conflict in use of New York's menhaden resource is unsubstantiated.

Industrial landings of menhaden in New York have dropped to zero since 1966 because the processing plants have been relocated out of the state. However, commercial landings of striped bass and bluefish in New York have generally increased in recent years (see Fig. 10). It is important that Figure 10 does not include sport landings of striped bass and bluefish. Statistical data for sportfish landings in New York are not available. However, a reasonable estimate is that recreational catches of striped bass and bluefish have also increased along with the popularity of the sport and possibly the abundance of the two species. It is also important that the curve for menhaden landings in the state probably does not resemble the curve for menhaden taken from state waters. Again, this is due to a statistical malady: fish are commonly recorded in the state where they are landed. Thus, an abundant menhaden resource in New York waters will not be evident from the state's landings statistics,

FIGURE 10 *Comparison of Menhaden Legislation to Commercial Landings of Menhaden (in Millions of Pounds) and Striped Bass and Bluefish (in Thousands of Pounds), 1960-1972*



Sources: National Marine Fisheries Service; Legislative Reference and Index.

nor will the state benefit if the resource is being landed in another state.

The menhaden fishery along the East and Gulf coasts is the largest U.S. commercial fishery in terms of weight; its dollar value, excluding shellfish and crustaceans, ranks next to the tuna and salmon fisheries. In 1968 menhaden were 34 percent by weight of the total U.S. catch of all species.[89] One New Jersey-based company reports netting approximately 180 million pounds in 1972, of which one-third to one-half was taken from Long Island Sound.[90] Thus, New York's menhaden resource is larger than the state landings data imply. The reason is that menhaden caught in New York waters are now being landed and processed in New England and New Jersey. The natural decline in abundance since the 1960s now seems to be reversing locally. Northeastern fishermen are reporting record catches for the 1973 season as far north as Maine.[91]

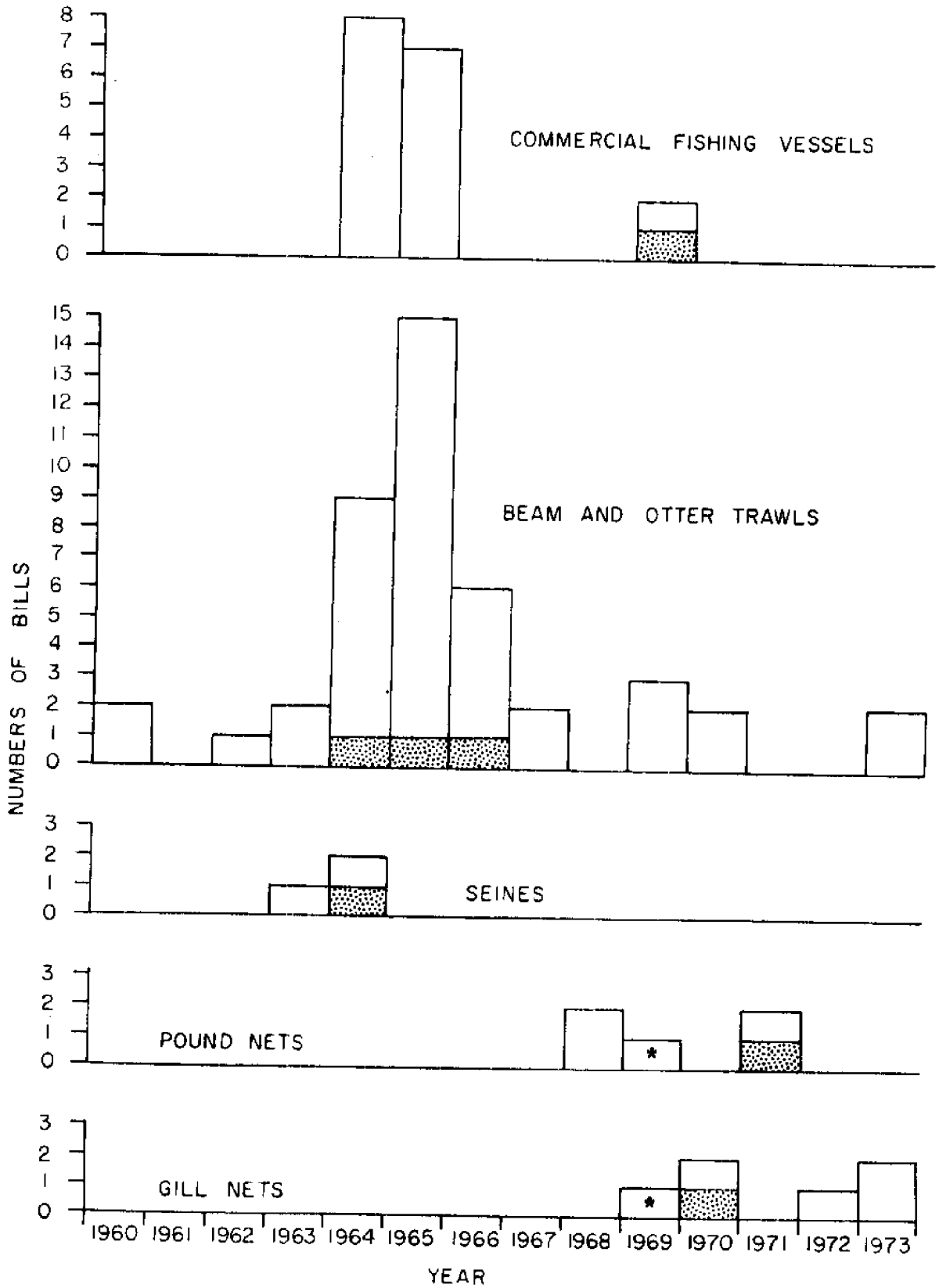
Hence, the surge of restrictive legislation on the menhaden fishery in New York waters which coincided with a decline in landings could have wasted a valuable resource if the bills had been signed into law. Moreover, it would have been totally ineffective at controlling the natural stocks of either menhaden or the game species, concern over which prompted the legislation in the first place. An important point often overlooked in such situations is that coastal, estuarine, and especially second trophic level species such as menhaden typically undergo wide fluctuations in abundance for purely biological and environmental reasons. When the resource is economically important, like menhaden, the fluctuations are usually blamed on man. The legislative machinery is then put to work, the resource often swings back to former levels of abundance, and an abiding faith in the wisdom of the legislature to solve ecological problems is reinforced. This pattern has been noted by McHugh in the Chesapeake blue crab fishery[92] and is probably common in other estuarine fisheries. More recently, McHugh observed:

> [Natural] fluctuations in themselves have aggravated the social-political situation because they create serious economic problems at times for the industry, and because they are not distinguished by most people from the effects of fishing or other human activity....The principal effect of Jeffersonian philosophies...has been an abiding faith in the power of legislation, and inadequate and uneven support of scientific and socio-economic research. Each major dip in the catch...has stimulated restrictive legislation of one form or another. The resource recovered each time, therefore restrictive laws must be good![93]

The menhaden resource that migrates into the New York marine district in the summer each year could be valuable to the state if it were properly managed. It is important as a bait fish for anglers and the lobster fishery, as well as for industrial processing into meal and oil. Proper management would include not only greater surveillance and control over its use, but also research on the population dynamics and breeding requirements of the fish, so that natural fluctuations in abundance can be better understood. Effective management would also require cooperation with other states.

Legislation on fishing gears is usually similar to legislation on species, in that it tends to be restrictive and based on popular solutions to management problems. Marine fishery legislation introduced since 1960 included 75 bills proposing various controls over beam and otter trawls, seines, pound and gill nets, and restrictions on the operation of commercial fishing vessels (see Fig. 11). Most legislative effort was directed at the beam and otter trawl fisheries in 1964, 1965, and 1966. Bills during this time, and after 1960 generally, have concentrated on issues of inshore

FIGURE 11 *Number of Bills Introduced and Passed on Certain Fishing Gear*



Bar indicates total number of bills introduced; stippled bar indicates number of bills passed and signed into law.

* Bill refers to both pound nets and gill nets.

Source: Legislative Reference and Index.

trawling, privileges of out-of-state operators, and fines for trawling violations.

In 1960, one bill in each house was introduced to prohibit use of trawls in the Atlantic Ocean within one mile of shore between Rockaway Inlet and the Rockaway Point Jetty in lieu of one-half mile as provided in the law at that time.[94] The identical bills did not progress beyond their respective committees. Four years later there was a surge of legislative effort to move the prohibited trawling area to two miles offshore from any shoreline of the state.[95] None of these bills passed out of the standing committees, but later in the year two more bills were introduced,[96] one in each house by the rules committees, which sought only to extend the existing half-mile-wide no-trawling area off the Rockaways to the Fire Island Inlet. Both of these bills were reported, and the assembly bill was eventually passed, sent to the governor, and signed into law.[97] In the following year, 1965, another effort was made to increase the width of the prohibited trawling area. Three assembly bills and one senate bill proposed establishing a no-trawling area within one mile of any marine district shoreline instead of the half-mile zone instituted the year before.[98] To illustrate the arbitrary nature of this legislation, the same sponsors almost immediately introduced legislation that would create a two-mile-wide no-trawling zone.[99] None of these bills was successful in committee.[100] In 1966 another effort was made to establish a prohibited trawling area two miles wide from all shorelines in the marine district.[101] These four bills were also unsuccessful in committee. Enthusiasm for anti-trawling legislation seemed to lose momentum after the mid-1960s. Only two bills in 1967, three in 1969, and two in 1970 attempted to outlaw trawling within two miles of shore but again failed.

Prohibited trawling bills were the bulk of the beam and otter trawl legislation introduced since 1960. Of a total 44 beam and otter trawl bills during this period, 30 proposed to extend or increase the area in which trawls could not be used. Other bills sought to increase fines for trawling violations, provide licenses for taking fluke with trawls, and specify terms of reciprocal privileges for nonresident trawl fishermen. Only three of the 44 bills introduced were passed into law. They were: a) the 1964 extension of the half-mile-wide prohibited trawling area from Rockaway Inlet to Fire Island Inlet mentioned above, b) a 1965 provision for nonresidents to take marine food fish with beam and otter trawls,[102] c) a 1966 bill to prohibit use of nets, beam trawls, and otter trawls in Huntington Bay, Lloyd Harbor, Northport Bay, and Cold Spring Harbor.[103]

Legislation on commercial fishing vessels was the number-two issue in fishing gear bills introduced (see Fig. 11). However, in only two years was legislative activity on this issue notable. There were only two kinds of bills on fishing vessels during this two-year period. The first kind proposed registration with EnCon of commercial fishing vessels making home port in New York State. In 1964, one senate and one assembly bill[104] proposed this requirement of only nonresident operations making home port within the state. In the same year two other bills,[105] and in 1965 four more bills,[106] reworded the same proposal to include all commercial fishing vessels making home port in the state. These bills all required vessel registration, regardless of where the fishing was done. None of these bills progressed beyond the committee stage in either house. The second kind of fishing vessel legislation was to restrict the number of commercial fishing vessels using nets to no more than two in any one square mile of water within the marine district. Two bills in each house proposed this legislation in 1964[107] and another three bills were introduced the following year.[108] Again, none of these bills passed out of committee.

Fishing vessel bills were suddenly absent from the roster of marine fishery bills introduced in 1966. The major surge of beam and otter trawl legislation in 1964 and 1965 greatly diminished in 1966. The reason probably lies in the sudden decline of the industrial fisheries as documented by McHugh.[109] Figure 12 illustrates an increasing trend in menhaden landings from 1930 to 1957. The sharp decline in 1958 landings stimulated the use of otter trawls in the industrial fishery to supplement purse seine landings. In the late 1950s and early 1960s, landings of menhaden increased due to a real rise in abundance of the species. However, by 1962 the trawl fishery was making a significant contribution to the total landings of all industrial species and other unsorted industrial fish. The trawl fishery for industrial species was short-lived, but its impact was probably great enough to stimulate a rash of legislation against commercial fishing vessels and otter trawls in 1964 and 1965. It seems unlikely that the large increase in bills aimed at restricting the industrial trawl fishery and the concurrent increase in the trawl catch were purely coincidental. Although little of this legislation became law, by 1966 the bottom had fallen out of the State's industrial fishery, the local processing plants had closed, and the need for legislating control had suddenly ceased.

This account of the decline and fall of New York State's industrial fishery illustrates two classic features of lack of management:

1) The initial extravagant exploitation of a suddenly abundant resource, and the rise of new fishery, in this case the trawl fishery, without regard for future abundance or the effects on other fisheries.

2) The political action, coming only as "the problem" reaches critical proportions.

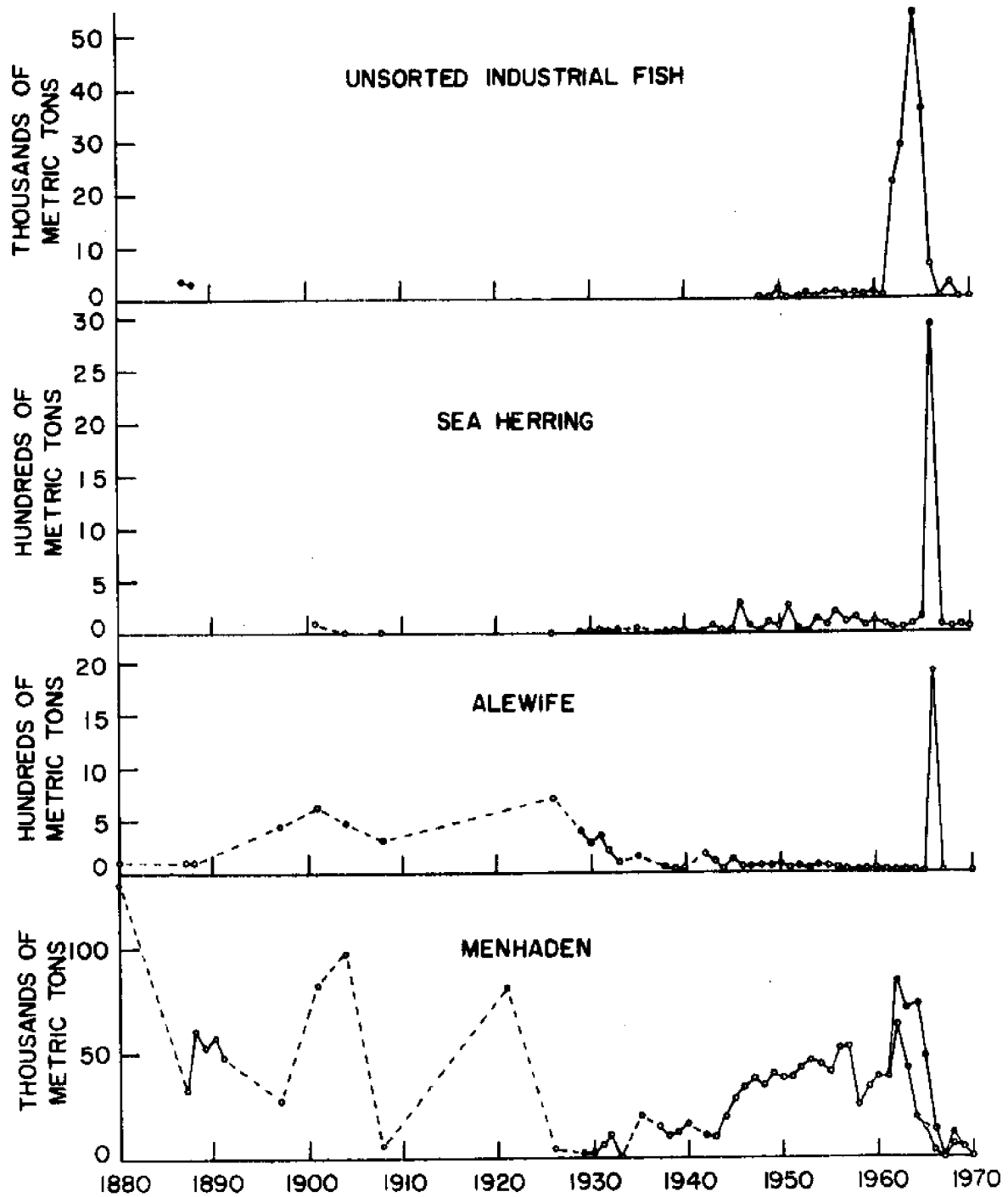
But action quickly dies with the fishery, indicating that resource management is frequently crisis-oriented. Indeed, usually no one cares about management when the resource is abundant. But when economic or social values are built on the existence of a resource and then the resource suddenly declines, everyone cares and demands that government do something about "the problem."

Review of the recent legislative history of marine fishery bills demonstrates several factors in the legislative process that affect fisheries management. First, it is apparent that popular demands on the regulation of marine fisheries (particularly of game species) are reflected in the volume of bills introduced on any one issue at any one time. The striped bass and menhaden legislation introduced since 1960 is a good example. It is obvious in fishery legislation, as in other types of legislation, that the more politically active the public, the more bills are introduced. In New York State there are more recreational fishermen than full-time commercial fishermen, so it is not surprising to find that most legislation seeks to restrict commercial fishing operations and further the aims of the sport fishermen.

The second factor in marine fishery legislation is that more bills do not necessarily mean more legislative alternatives. It is not uncommon to find one proposal repeated several times in several different bills introduced in the same house during the same year and sometimes by the same sponsor. This is especially true of the most popular issues. When there was a believed need to regulate commercial fishing vessels in 1964 and 1965, 15 bills were introduced, but there were essentially only two proposals.

Success of certain bills seems to be in no way related to the number of times they are introduced. This indicates that something other than the majority voice of the people determines fishery management policy. Thus, the third factor is that regardless of the apparent or real management needs of living marine resources, success or failure of

FIGURE 12 *Annual Commercial Landings of Industrial Fishes in New York State, 1880-1970*



From McHugh, 1972*b*, p.588.

a policy change is determined by a political force other than popular majority opinion. It may not be surprising to find such a force residing in a relatively small number of lawmakers and administrators. This force is a conservative factor which tends to buffer radical and fluctuating public opinion.

Although not in keeping with the principles of a pure democracy, control of fisheries policy by a few should not be considered undesirable or even unusual in environmental management. Frequently the policy that is best for conservation of the resource is not the most popular policy. Legislation based on government or university research may be entirely without popular support. In fishery affairs, the public most often directly in contact with the marine fish is "too close to the trees to see the forest" and too vocal about its personal interests to recognize the real exploitation limits of the resource. Hence, resource users usually have conflicting opinions. As the late Wilbert M. Chapman recently wrote:

> If there is anything that can be said definitely about the fish business, it is that every citizen above the age of about six is expert in it. No molecular biologist, mathematician, or nuclear physicist is deemed too abstruse or theoretical in his training to be barred from a presidential scientific advisory committee panel advising the president and the government at large on how to harvest the ocean. No fisherman on the dock hesitates to declare how ignorant scientists are of fish and the ocean. In between, there are few dentists, doctors, truck drivers, lawyers, or common laborers who will not admit to a modest knowledge of fish and the ocean and how they should be managed.[110]

Instituting rational management will require a balance of the special interests in the resource, together with the best possible scientific information on the nature of the resource and the harvesting capacity of all the users. This can probably best be achieved by a small group of experts in fisheries science and government.

Legislative Information Base

The practice of marine fishery conservation through rational management of fishing is dependent on adequate information on the life history of the resource, stock size, catch, and fishing effort. The management method used is dependent on the value the state's living marine resources have to its people. The political process may direct management to assure maximum economic return for commercial operations, maximum sustainable catch, or maximum participation for recreational interests. In any case, management policy decisions require a statement of objectives, a political function; and comprehensive information on the fish and fishery, a scientific function. When these two functions do not work together, management becomes ineffective, as McHugh observed:

> When fishery legislation can be promoted or enacted without prior benefit of scientific knowledge and without provision to obtain it, fishery research and management go their separate directions and progress is slow at best.[111]

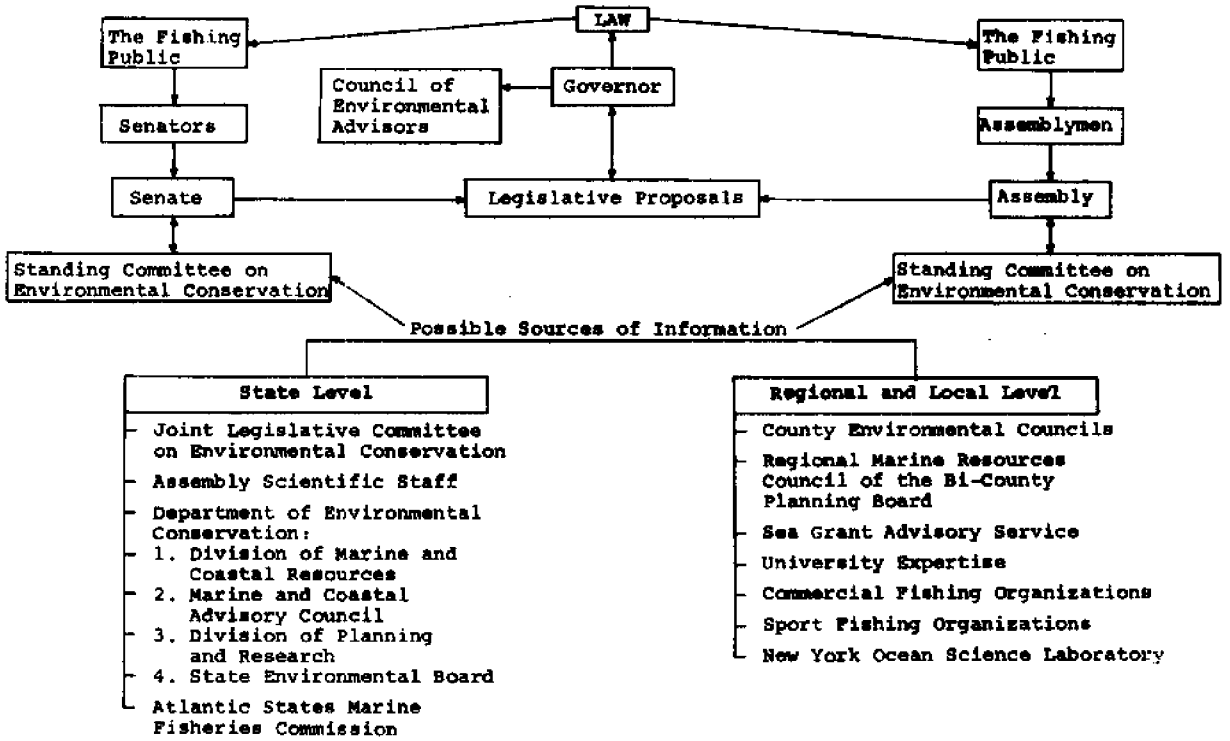
The information base for fishery legislation in New York State is derived basically from two sources. First, the legislative structure may obtain scientific and other information on particular issues by authorizing special studies or simply by soliciting opinions from the general public. Second, the executive branch of government administers formal research on marine resource problems and collects basic fishery data from which scientific information can be derived and applied to the lawmaking process.

LEGISLATIVE STRUCTURE

The New York State Legislature considers marine fishery legislation in much the same way as any other bicameral government in the United States. Scientific information can be entered in any of three different places along the policy-making pathway (see Fig. 13). Information, technical or otherwise, can be presented to the assemblymen or senators from the public, or introduced directly into the standing committees as background on specific bills under consideration, or entered at the governor's level as an aid in determining which bills should be signed.

Information that the individual legislators receive from their fishing constituency will frequently be biased according to the special interests of the fishermen in the legislator's district. Thus, legislators from districts containing major commercial fishing ports may be more responsive to the needs of the commercial fishermen than recreational fishermen and vice versa. It is only natural that legislators represent the majority interests of their district. However, it should be helpful to each legislator to have available the most up-to-date and objective information on the particular issues raised by the fishermen. Once a fishery bill is introduced in either house, it is referred to the respective standing committees on environmental conservation. The conservation and environmental protection merits of the various proposals are considered in these committees, so this is the place where technical information on marine fisheries is most likely to be useful. When a bill is passed by both houses it may be signed or vetoed by the governor. Objective background information may again be used here to insure that the bill would actually further state conservation aims. For this information the governor may rely on his Council of Environmental Advisors, the commissioner of the Department of Environmental Conservation, and/or various members of the legislature. However, the governor will probably base his decision on the practicalities of administering the proposed law and on its

FIGURE 13 *Policy-Making Structure and Information Base Flowchart*



political ramifications.[112] If the governor signs the bill, it becomes law, which will have a direct effect on the fishing public; the legislative circuit is completed.

Technical data and background information on marine fisheries is most important in the legislative process at the level of the house committees. The diverse professional backgrounds and regional interests of the standing committee members (see Table 7) show a need for extensive information from persons familiar with marine fishery problems. Within the legislative branch there are several sources of information to guide decision-making on fishing and other conservation issues:

1) the Joint Conservation Public Hearing held by the environmental conservation committees of both houses to discuss the various conservation bills before the committees;

2) the Joint Legislative Committee on Environmental Conservation (JLC)[113] which also holds public hearings on particular issues that are brought to its attention, publishes an annual report,[114] and collects information from government agencies, industry, and universities;

3) the New York State Assembly Scientific Staff, which serves as collector of scientific and technical information (not limited to the field of conservation) to be used in the legislative process.

These three organizations are frequently limited in their capacity to study marine fishery problems by the large number of other conservation issues that demand the attention of their small staffs. The staff of the Senate Committee on Environmental Conservation includes only a counsel to the chairman. The corresponding body in the assembly has a two-man staff who must work for two other standing committees.[115] The JLC has a staff of nine, including a director of

TABLE 7 *Members of the Assembly Standing Committee on Environmental Conservation - 1973*

	Name	*Party*	*District by County*	*Residence*	*Occupation*
1.	Chairman, Clarence D. Lane	R	Columbia-Greene-Albany	Windham	Resort owner
2.	L. Richard Marshall	R	Chemung-Tioga	Elmira	Feed manufacturer
*3.	Peter J. Costigan	R	Suffolk	Setauket	Attorney
4.	William R. Sears	R	Oneida	Woodgate	Insurance agent
5.	Glenn H. Harris	R	Hamilton-Fulton-Franklin-Montgomery	Town of Arietta	Hotel and restaurant owner
6.	Frank A. Carroll	R	Monroe	Rochester	Treasurer and office manager
7.	Fred Droms, Jr.	R	Saratoga	Rexford	Assemblyman
8.	Neil W. Kelleher	R	Albany-Rensselaer	Troy	Automobile sales executive
9.	John W. Beckman	R	Chautauqua	Westfield	Insurance agent
10.	Andrew W. Ryan, Jr.	R	Clinton-Essex-Warren	Plattsburgh	Attorney
11.	William M. Steinfeldt	R	Monroe	Rochester	Engineer
*12.	Philip B. Healey	R	Nassau	Massapequa	Management/ insurance agent
*13.	Stuart R. Levine	R	Nassau-Suffolk	Plainview	Ecology teacher
14.	Peter A. A. Berle	D	New York	New York City	Attorney
15.	Herbert A. Posner	D	Queens	Rockaway	CPA, Attorney
16.	K. Daniel Haley	D	St. Lawrence-Franklin	Waddington	Real estate developer
17.	Antonio G. Olivieri	D	New York	New York City	Attorney
*18.	Icilio W. Bianchi, Jr.	D	Suffolk	Bellport	Wholesale orchid grower
19.	Thomas R. Frey	D	Monroe	Rochester	Attorney

*Nassau and Suffolk County representatives

research, a program analyst, an environmental engineer, two counsels, a director, and three administrative personnel.[116] The JLC interest in living marine resources has been slight, however. Out of 55 legislative proposals recommended by the JLC during the 1971-72 session, only one related to fish resource management.[117] Prior to that, the group spent two days in 1969 on a marine resources field trip to Long Island and another day at coastal zone hearings from which no recommendations or legislative action developed.[118] The New York State Assembly Scientific Staff consists of two scientists and three administrative personnel who compile and analyze technical and scientific information relevant to current or potential legislation. The effectiveness of this small group has been increased by arranging for special study projects at universities in cooperation with the Sea Grant Program and the National Science Foundation. Although this is a new procedure in state government, other special studies on marine fisheries have been sponsored by the New York State Legislature.[119] In general, however, legislative factfinding has relied principally on public response to specific issues or problems.

Various other sources at state and local levels would be likely to have background information on the marine fisheries or know where it could be found (see Fig. 13). In addition to the opinions of the fishermen, there is a resident expertise in marine sciences on Long Island at several colleges and

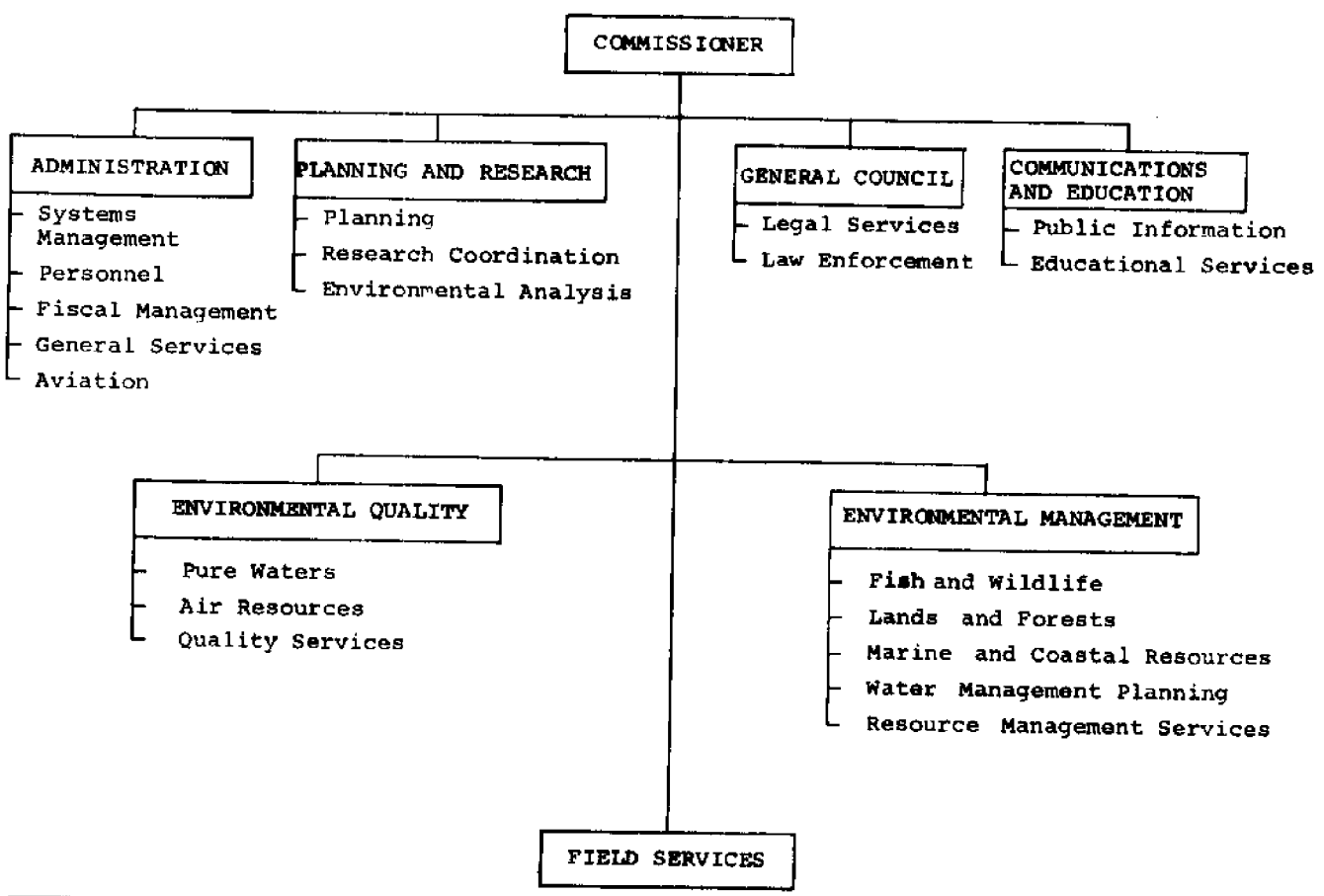
universities, private industries, and laboratories. The organization most concerned with marine resources planning and management is the Regional Marine Resources Council of the Nassau-Suffolk County Regional Planning Board. The council was established in 1967, following the recommendations of the Oceanographic Committee.[120] It has been instrumental in identifying problems and collecting information on the development of all marine resources in relation to bi-county planning efforts on Long Island.[121] The New York State Sea Grant Program is also developing useful technical data on marine and Great Lakes fisheries by sponsoring applied scientific and interdisciplinary research. Through its Advisory Service, Sea Grant is contributing to general public awareness of living marine resources, which could encourage rational fishery legislation in the long run.

It should be noted, however, that all information sources discussed so far deal with a large variety of environmental and technical information in addition to that which pertains to the marine fisheries. The only organization that works exclusively on the problems of New York's living marine resources is the Division of Marine and Coastal Resources of the New York Department of Environmental Conservation. The division does most of the basic fishery research in New York and is the most-used source of legislative information.[122]

EXECUTIVE STRUCTURE

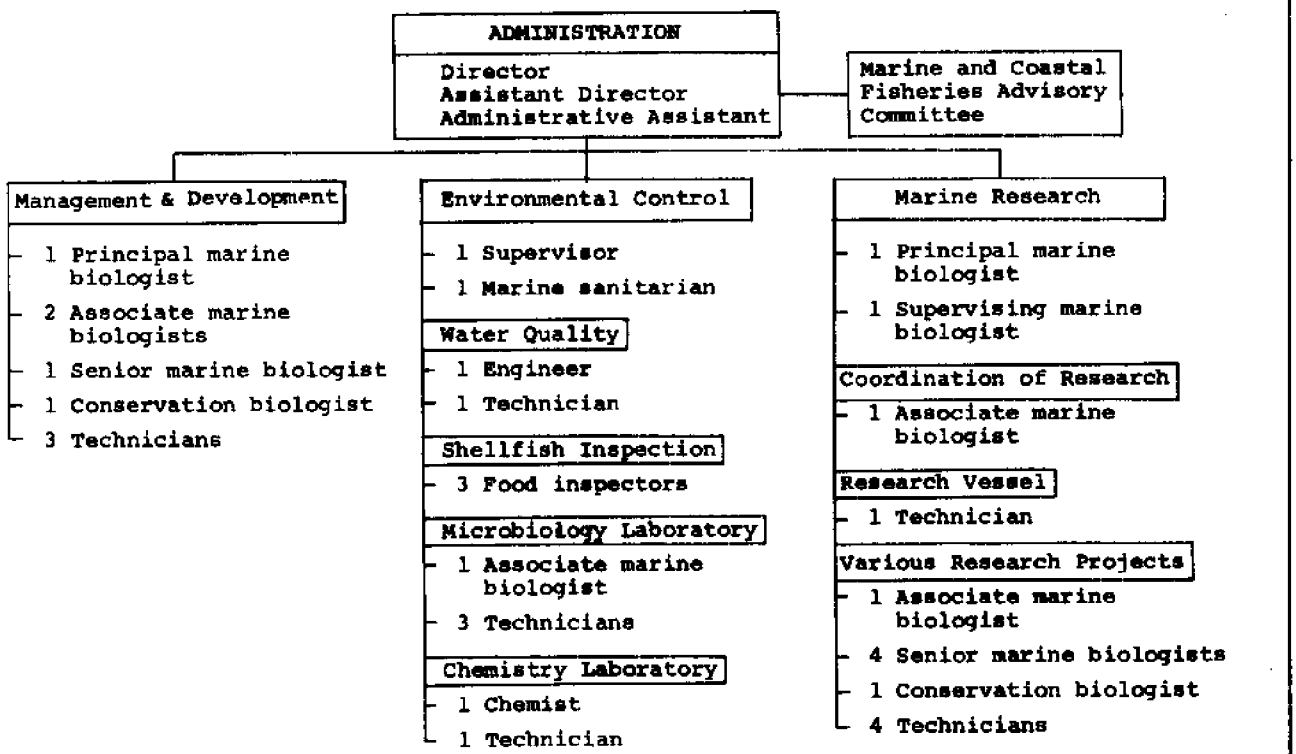
The Division of Marine and Coastal Resources is one of eight divisions composing the two EnCon branches of environmental quality and management (see Fig. 14). Each division

FIGURE 14 *Department of Environmental Conservation Organizational Chart*



Source: New York State Department of Environmental Conservation. 1973. Environmental plan for New York State, preliminary edition.

FIGURE 15 *Division of Marine and Coastal Resources Organizational Chart*



(except for Marine and Coastal Resources) provides field services through EnCon's nine regional offices. Most of Long Island and the marine district are in Region One, which has headquarters on the State University campus at Stony Brook (see Fig. 1). Unlike other divisions, Marine and Coastal Resources is entirely within Region One and also directed from the regional offices in Stony Brook. There is necessary interaction between Region One and division operations. For example, although the division is charged with management, research, and shellfish sanitation functions, enforcement of marine fishery regulations is a Region One law enforcement responsibility. Wetlands management, which may be very important to the survival of certain species of marine fish, is also the responsibility of Region One, Division of Fish and Wildlife personnel.

The Division of Marine and Coastal Resources is organized into three sections employing a professional staff of about 38 scientists and technicians (see Fig. 15). In addition to this technical expertise, the director of the division receives information from the Marine and Coastal Fisheries Advisory Committee. This committee of 10 includes representatives of the shellfish farmers, baymen, commercial fishermen, and saltwater anglers[1,2,3] (see Table 8). Members of the committee are nominated by the division and, if approved by the commissioner of the department, serve for three years. Although they produce no official reports or special studies, their function as a citizens' advisory group is important to fishery management policy. They review proposed legislation and administrative functions and may generally act as spokesmen for all users of living

TABLE 8 *Members of the Marine and Coastal Fisheries Advisory Committee - 1973*

Name	*Representing*
George Vanderborgh, Jr. (*Chairman*)	shellfish farmers
John L. Plock	shellfish farmers
Fred Schieferstein	baymen
Stuart B. Vorpahl, Jr.	commercial fishermen
Richard Miller	commercial fishermen
Lawrence I. Clarke	commercial fishermen
Captain Howard Berlin	party boat operators
John A. Binner	sport fishermen
Harry Kilthau	sport fishermen
David Knickerbacher	sport fishermen

marine resources. As such, their experience and opinions to the legislative and administrative branches of government are significant.[124]

A. Research

Research facilities, in addition to the main headquarters at Stony Brook, include a laboratory at nearby Flax Pond and various boats equipped to work in any part of the marine district. Much of the work, however, is currently oriented toward the shellfisheries. The Management and Development section has an oyster seed and transplantation project which removes shellfish from uncertified to certified areas. The Environmental Control section works almost exclusively on determining the sanitary quality of marketed shellfish and the water quality in the shellfish growing areas. This section has the authority to close shellfish growing areas that do not meet water quality certification standards. The section also issues all permits and licenses required for any harvesting in the waters of the marine district. The research section has various projects under way on reef populations, marine algae, bay scallop growth, and striped bass.[125]

The reef populations work deals with improving various fish stocks through the construction of offshore artificial reefs. It is generally conceded that such reefs effectively increase the populations of game fish either by concentration of the ambient regional populations at the reef site or by providing for an actual increase in numbers. An important management question that remains, however, is "who gets the fish?" Even with a real increase in a resource population due to an improvement in the habitat, the fundamental problem of establishing equitable controls on exploitation remains with the management agency.

The marine algae project is investigating the problem of excessive algal growth, which is causing objectionable odors, impeding navigation, and decreasing esthetic and real estate values. Of course, there would be no problem if the people who crowd onto the waterfront properties were more careful in their waste disposal which has added nutrients to the water and has led to excessive algal growth. Research on this problem is no doubt in response to public demand, but it does not treat the more fundamental management problem of controlling resource overuse. (In this case the resource is the marine environment and it is used as a sink for waste.) However, the public seems satisfied with the investigations of only the symptoms; therefore, this limited research is all that is needed politically for the time being.

Studies of scallop growth include applications to warm-water aquaculture. This work could be important for the efficient use of thermal wastes from fossil fuel and nuclear power generating stations. Although warm-water aquaculture could boost state shellfish production, it will not apply to management, since rights to thermal effluents will probably be leased or privately owned. The sanitary quality of the shellfish so produced will remain the primary concern of the state.

It is unfortunate that few of the research projects and surveys undertaken by the division produce the information required for comprehensive and rational management of New York's marine fish resources. Most of the division's effort is directed at the shellfish resource, probably because it is the most valuable of the state's living marine resources. Although water quality studies are important to protect the public from polluted shellfish, little or no work is being done on reversing the spread of uncertified growing areas. Moreover, there seems to be no unified direction within or among the three division sections. There is apparently no plan to integrate environmental monitoring with research on marine resources to produce management policy recommendations to the legislature. There is little significant effort to investigate stock sizes, total amount of fishing effort, and environmental quality requirements, all of which are fundamental to the maintenance and management of healthy fish populations.[126]

B. Funding

Another aspect of management is the influence of funding on basic long-term fisheries management research. Federal aid in support of such research has encouraged states to respond to research needs. The Federal Aid in Fish Restoration Act of 1950, commonly known as the Dingell-Johnson Act (Public Law 81-681),[127] and the Commercial Fisheries Research and Development Act of 1964 (Public Law 88-309)[128] and the Anadromous Fish Conservation Act of 1965 (Public Law 89-304)[129] have been important in assisting New York's marine fisheries research.[130] These sources work only by matching federal funds with state funds according to certain predetermined percentages.

Money appropriated to the state under the Dingell-Johnson Act is specifically "designed for the restoration and management of all species of fish which have material value in connection with sport or recreation in the marine and/or fresh waters."[131] Thus, increase in research and management efforts on game fish is due, at least in part, to this funding incentive. The amount given each state is determined by the size of the recreational fishery and the relative size of the state's water area. According to section three of the Dingell-Johnson Act, federal support to the state is given equal to the revenue accruing from tax on fishing rods, creels, reels, artificial lures, baits, and flies during the preceding fiscal year.[132] Section four further stipulates that after an amount not to exceed eight percent of the total annual appropriation is deducted for the administrative expenses of the secretary of the interior, the remainder will be apportioned for each fiscal year among the states in the following manner:

> 1) 40 percent in the ratio which the area of each state including coastal and Great Lakes waters bears to the total area of all the states;
>
> 2) 60 percent in the ratio which the number of persons holding paid licenses to fish for sport or recreation in the state ... bears to the number of such persons in all the states: provided... that no state shall receive less than one percent nor more than five percent of the total amount apportioned to all the states.[133]

The rationale is that a state with a larger water area and a larger fishing public needs proportionately greater research support. It would appear that a state could enhance its claim to Dingell-Johnson funds through broadening its license base by including saltwater anglers. However, EnCon has decided to use this funding source exclusively for freshwater game fish research.[134] Federal assistance for marine fisheries management and research is derived entirely from the two other authorities, the Commercial Fisheries Research and Development Act of 1964 (P.L. 88-309) and the Anadromous Fish Act of 1965 (P.L. 89-304).

The Commercial Fisheries Research and Development Act is designed to provide federal financial assistance to state research and development projects for commercial fisheries resources. The act provides a total of $5,750,000 to be apportioned by the secretary of the interior to the states, with preference to states which are determined to be suffering "commercial fishery failure due to resource disaster arising from natural or undetermined causes."[135] However, apportionment to the states of these funds is more specifically mandated:

> ...on a basis determined by the ratio which the average of the value of raw fish harvested by domestic commercial fishermen and received within the state (regardless where caught) for the three most recent calendar years... plus the average of the value to the manufacturer of manufactured and processed fishery merchandise manufactured within each state for the three most recent calendar years ..., bears to the total average value of all raw fish harvested by domestic commercial fishermen and received within the states (regardless where caught) and fishery merchandise manufactured and processed within the states for the three most recent calendar years.... However, no state may receive an apportionment for any fiscal year of less than one-half of 1 per centum of funds or more than 6 per centum of funds.[136]

Except in the case of "resource disaster," as the average landings of commercial food fish and industrial fish increase, the amount of federal funds available for research and development also increases. It would therefore benefit the management efforts of New York State to maximize commercial and industrial landings. It has already been noted, however, that the industry utilizing New York's menhaden resource lands and processes the catch in other states. This represents an economic loss to New York of not only the catch and the processing plant, but also potential research funds; the nominal licensing fees for menhaden vessels in no way compensate for the income and management funding the state could realize from this resource. Institution of menhaden moratoria in New York waters in the name of conservation does nothing to further understanding and rational management of the resource which could be achieved with the assistance of P.L. 88-309 funds.

The Commercial Fisheries Act provides for up to 75 percent reimbursement to the state for work of broad interest and up to 50 percent for projects that benefit New York only. Under the apportionment provisions, New York State is eligible for approximately $159,000.[137] Of this amount the state is using about $100,000 on various marine research and support activities which include the scallop growth study, shellfish transplantation study,[138] primary productivity study of two south shore bays, and operation and maintenance of a shellfish sanitation mobile laboratory, the Flax Pond Laboratory,[139] and the Office of Research Coordination (see Fig. 15). In spite of the heavy load of support and service activities, a conservative estimate is that at least an additional $50,000 of matching funds (a total of at least $100,000) should be made available each year for commercial marine fisheries management research in New York.

Another federal assistance source is provided by the Anadromous Fish Act (P.L. 89-304), which authorizes the federal government to grant money to a state (or group of states acting in concert) for the purpose of conserving and developing anadromous fish resources. Similar to other federal assistance programs, the federal share is not to exceed 50 percent of total costs of work done with this aid in any one fiscal year. Further, individual states are limited to not more than $1 million of these

funds in any one fiscal year. However, it is provided that:

> Whenever two or more States having a common interest in any basin jointly enter into a co-operative agreement...to carry out a research and development program to conserve, develop, and enhance anadromous fishery resources..., the Federal share of the program shall be increased to a maximum of 60 per centum.[140]

This provision should be no small incentive for states to work cooperatively on problems of managing fish resources that migrate across political boundaries.

Authorized federal appropriations under P.L. 89-304 for the first five-year period ending June 30, 1970 amounted to $25 million. A graduated yearly increase is also specified in the law, which brings the amount authorized for fiscal year 1974 to $10 million. New York State's current allocation of P.L. 89-304 funds is approximately $107,000.[141] About $30,000 of this is currently being used to offset the costs of marine fishery research, principally on striped bass.[142] One of the most important features of P.L. 89-304 is that appropriated funds are allowed to remain available until expended. (Under P.L. 88-309 unspent funds remain available only until the end of the succeeding fiscal year.) This permits time for the states' management agencies to effect matching fund legislation and develop programs, staff, and facilities before losing the federal aid. If state funds are not appropriated for fishery research, the available federal allocation remains unused and may be carried over to the next fiscal year or returned to the federal treasury. A general inability to make full use of this federal aid is widespread. Nationally, nearly $1 million of federal money for fishery research was not used by the states in 1973.[143] The northeastern region, which includes New York, had the largest portion of the national carryover balance, with approximately $682,000 of P.L. 88-309 money and $56,000 of P.L. 89-304 money unused.[144] New York State's 1973 fiscal year carryover of P.L. 88-309 funds was $156,000; this balance of potential research money has been generally increasing in the past several years.[145]

The large carryover balances of uncommitted federal aid to state fishery research, particularly among the northeastern states, create problems on the national and state level. The National Marine Fisheries Service is hard put to justify maintaining or increasing congressional funding to the federal aid programs if the states cannot demonstrate effective use of the funds. Moreover, New York State cannot make effective use of its federal allocations if the legislature does not appropriate matching funds. In effect, by not approving x dollars for commercial fishery research, they may be losing $2x$ dollars' worth of information on which to base management decisions. However, it is important for funding authorities in state and federal government to realize that money in itself does not necessarily produce well-managed fisheries. Indeed, without well-planned research goals and priorities, competent staff, and cooperation with other states, increased funding will have little effect on improving management of living marine resources.

INSTITUTIONAL NEEDS

Rational marine fisheries management is built on a firm understanding of the objectives of management, the biology of the resource, and the socioeconomics of the fishery. Any improvement of management policy in New York State will depend on improving the information base in these areas. Biologic and socioeconomic research on the state's fisheries can and should be a function of the agency charged with administering conservation policy. Information

derived from such research should then be presented to the legislature with specific recommendations for designing management policy. This is the basic function of the conservation agency.

Institutional arrangements for managing New York's marine fisheries need revision in several broad areas. Recognition of the following needs will be the first step toward improving management:

1. *Clearly stated objectives, goals, and priorities are needed to formulate a research and management plan.* New York, like most other states, has confronted its resource management obligations with very general policy objectives. The Environmental Conservation Law declares that it is:

> ...the policy of the State of New York to conserve, improve and protect its natural resources and environment and control water, land and air pollution, in order to enhance the health, safety and welfare of the people of the state and their overall economic and social well being.[146]

It is also EnCon's function to develop marine fisheries management policies and planning to achieve the objectives of state environmental policy.[147] To date, no detailed plan exists which specifically states the objective of living marine resource management and lays out priorities.

A general statewide environmental plan with periodic revisions is mandated by the law,[148] and a preliminary edition has been produced.[149] Although this preliminary plan does not include a separate management plan for marine fisheries, it gives several indications of EnCon's attitude toward the marine fisheries. For example, it states that EnCon is cooperating with the U. S. Department of the Interior in preparing a fish and wildlife management plan.[150] But the federal agency responsible for marine fisheries is the National Marine Fisheries Service in the Department of Commerce. Thus, a state plan developed without consulting this latter agency would probably say little about the marine fisheries. There is also a notable emphasis in the plan on managing fish resources for recreational users in preference to commercial users:

> In the environmental equation fish and wildlife are natural resources which provide recreational fishing and hunting, passive recreation for observation and photography, and some limited commercial supply.[151]
>
> 'Sustained yield' means that sufficient base species populations are maintained to produce an annual surplus for recreational hunting and fishing and where compatible, commercial use.[152]

Recognition of New York as a major Atlantic Coast fishing state is conspicuously absent throughout the plan, despite the 1972 commercial production of fish and shellfish in the state which approximated $22 million landed value[153] and well over $100 million retail.[154] A plan which considers commercial fisheries an inconsequential industry cannot recognize their economic potential or their great decline up to now.[155] It is also important for environmental planners to understand the distinction between deciding how much a resource can be harvested and deciding who gets the resource. These two decisions cannot be made as one. It is clear that the only existing environmental plan is inadequate for management of New York's marine fisheries.

2. *Complete and comprehensive data are needed on all fishing activities to allow adequate monitoring of resource abundance and exploitation rates.* The most basic information to have on a fishery is (a) stock size, distribution, and life history of the species, and (b) catch and fishing effort on the stock.

At the present time, the state and federal governments collect catch statistics and effort data from nine statistical areas in the marine district. However, the catch data are frequently misleading because fish catches are recorded in the area where they are landed, not necessarily where they are caught. Thus, the most recent landings data for menhaden in New York do not represent the actual catch of the species in state waters, since most of this resource is landed in other states.

Incomplete fishing effort data are another limitation on the usefulness of current statistics for management purposes. There is no provision under the present system for obtaining information on the impact of recreational exploitation on various fish resources. Although some excellent studies of sport fishery have been done for limited areas of the state,[156] there are only rough estimates of the size of the saltwater sport fisheries and no known published report on their fishing capacity. This is not a situation unique to New York, however. Few coastal states have established adequate statistical systems, probably because the cost is high and for most species other than molluscan shellfish, useful statistics cannot be obtained without cooperation from other states. The effects on a migratory resource of fishing in a neighboring state are as important to New York as they are to that state.

None of the public fisheries in New York is currently being managed for maximum sustainable biological or economic yield. Fishing regulations in state management policy have historically concentrated on limiting commercial fishing efficiency, while the sport fisheries have been virtually uncontrolled. The catch and fishing effort in the sport fisheries probably make up a substantial portion of the total catch and effort in the marine district. However, there are currently no good statistics on the sport fisheries. And it will be impossible to protect the state's marine fishery resources unless there are management controls on all fisheries. One method of instituting such control is to require licenses of all participants. Universal licensing would provide a way to improve the statistical information base and enforcement capabilities, and a source of revenue to defray management costs. But the state tends to favor recreational over commercial fishing. If, through political decision, this preference becomes a stated objective and policy, as has been implied in the preliminary Environmental Plan, EnCon will be faced with managing fisheries which are now unregulated and have little statistical background.

Since the question of value is so much a part of the management problem, socioeconomic information on the fisheries should also be included in a comprehensive data base. In fact, the law specifically states that it shall be the responsibility of the department to:

> Formulate guides for measuring presently unquantified environmental values and relationships so they may be given appropriate consideration along with social, economic, and technical considerations in decision making.[157]

Review of the organizational structure of EnCon's Division of Marine and Coastal Resources (see Fig. 15) indicates that this responsibility is probably not being met in regard to marine fishery resources.

3. *Most of New York State's marine fisheries require interstate cooperation for truly effective management.* Large expenditures of state money on research programs without concurrent interstate cooperation will do little to attain effective and rational management. The marine district is not a closed system. Migratory species move freely between jurisdictional areas of other states and sometimes out to sea where they are subject to the fisheries of other countries.

The decline of the menhaden resource, for example, can be attributed to overfishing in areas south of New York.[158] Thus, fishery resources within New York's jurisdiction cannot be managed by the state unilaterally unless they are endemic to the state's marine district. A primary requirement for effective fishery control is management by ecological rather than political boundaries.

Unfortunately, there is no effective mechanism for managing migratory species at the present time. The Atlantic States Marine Fisheries Commission[159] could be a valuable instrument for promoting coordination of interstate marine fisheries management. With a membership of all Atlantic coastal states (and Pennsylvania) the commission has the potential for instituting cooperative management of migratory species. The commission has sponsored useful research programs, but so far it has been unsuccessful in translating research findings into effective management programs. The commission meets annually and makes recommendations for state legislation. Each state is represented by three commissioners--the executive officer of the state agency administering marine fishery policy, a state legislator, and a citizen familiar with marine fishery problems.[160] An advisory committee is also provided for, and the federal agency responsible for fisheries management is designated as the primary research agency for the commission.[161] However, the commission has no regulatory powers and, in its 32-year history, has been unable to convince the member states that they cannot manage their migratory fish resources individually.

A second mechanism for managing interstate fisheries which may be useful in the future is the State-Federal Fisheries Management Program, inaugurated in 1971.[162] A major priority of the program is the establishment of rational systems for marine fisheries management rather than systems based on short-term expediency. The program openly recognizes two important problem areas of current fisheries management concerning federal and state authorities: a) how to limit entry to increase commercial efficiency and provide more effective control over exploitation; and b) how to demonstrate full utilization and effective conservation methods to improve the U.S. international position on questions of access to fisheries beyond the national 12-mile zone. At present the United States is hard put to claim extended fisheries jurisdiction on the basis of conservation, when the states have not been able to demonstrate effective management or full use of domestic resources. Therefore, it will be important for New York State to participate in this new cooperative effort.[163]

In lieu of adequate arrangements for managing interstate fisheries, the state should give top priority to managing fisheries which remain essentially within the bounds of state jurisdiction. Such fisheries include those for various molluscan shellfish and a few species of finfish. Of these, the hard clam resource accounts for over half of the landed value of all commercial marine landings.[164] Hard clam landings now dominate all other shellfish in weight and value (see Table 6) and have been steadily increasing since the early 1960s.[165] New York has a program to monitor water quality in the shellfish growing areas, and the hard clam fishery is one of the few in the state that is partially managed by a kind of limited entry. (The leasing of shellfish growing areas may be considered a form of limited entry, since it effectively removes the resource from common property status and free entry of the general public.) However, at the present time there is little reason to believe the hard clam resource will not follow the traditional course of successive rise and decline that has characterized the other fisheries in the state. Until the state can demonstrate effective management of its endemic resources, there is little chance for successful management of interstate fisheries.

Notes

1. Article XIV section 4, Protection of Natural Resources, Constitution of the State of New York, as revised by the Constitutional Convention of 1938; Environmental Conservation Law (ECL) section 1-0101, Declaration of Policy.

2. J. L. McHugh. 1972*b* Marine fisheries of New York State, *Fish Bull.* 70(3):585-610.

3. Laws of 1970, Chapter 140, sec. 2.

4. ECL sec. 13-0101.

5. New York State Fish and Game Law, 1971, Note, p. 1.

6. ECL sec. 13-0103.

7. ECL sec. 1-0101 subd. 2.

8. ECL sec. 13-0345.

9. 56th and 57th Annual Reports of the Commission of Fisheries of Virginia, Richmond, Va. 1955, p. 41.

10. W. S. Miller, personal communication.

11. P. T. Briggs, personal communication.

12. R. H. Schaefer, 1965. Age and growth of the northern kingfish in New York waters, *N.Y. Fish & Game J.* 12(2)L191-216.

13. J. C. Poole, 1961. Age and growth of the fluke in Great South Bay, *N.Y. Fish & Game J.* 8(1):2-18; 1962, The fluke population in Great South Bay in relation to the sport fishery, *N.Y. Fish & Game J.* 9(2):93-117; 1964, Feeding habits of the summer flounder of Great South Bay, *N.Y. Fish & Game J.* 11(1):28-34.

14. ECL sec. 13-0311.

15. ECL sec. 13-0323.

16. ECL sec. 13-0327.

17. W. S. Miller, personal communication.

18. ECL sec. 13-0329.

19. ECL sec. 13-0309 subd. 2.

20. ECL sec. 13-0343 subd. 14a.

21. ECL sec. 13-0327 subd. 1.

22. *Ibid.*, subd. 3.

23. Donald Zacchea, personal communication.

24. ECL sec. 13-0341 subds. 6 and 7.

25. Stuart J. Wilk, 1973. The weakfish (*Cynoscion regalis*): a review of its biology and present research, National Marine Fisheries Service, Sandy Hook Lab. report prepared for the Atlantic States Marine Fisheries Commission.

26. ECL sec. 13-0319.

27. ECL sec. 13-0309 subd. 1.

28. ECL sec. 13-0321.

29. ECL sec. 13-0329 subd. 2.

30. Nonresident lobster permits are not issued to residents of Rhode Island under this provision.

31. ECL sec. 13-0331 subd. 3.

32. ECL sec. 13-0341 subds. 1-5.

33. ECL sec. 13-0309 subd. 3.

34. ECL sec. 13-0323 subd. 3.

35. ECL sec. 13-0331 subd. 6.

36. W. S. Miller, personal communication.

37. ECL sec. 13-0343 subds. 2, 4-7.

38. *Ibid.*, subd. 14a.

39. *Ibid.*, subd. 15a.

40. ECL sec. 13-0333 subd. 4.

41. ECL sec. 13-0343 subd. 17.

42. ECL sec. 13-0341.

43. ECL sec. 13-0343 subds. 9-11.

44. *Ibid.*, subd. 13.

45. ECL sec. 13-0311 subd. 3.

46. *Ibid.*, subd. 6.

47. *Ibid.*, subd. 4.

48. ECL sec. 13-0313.

49. *Ibid.*, subd. 3.

50. ECL sec. 13-0329 subd. 1.

51. *Ibid.*, subd. 2.

52. ECL sec. 13-0331 subds. 2 & 3.

53. ECL sec. 13-0333.

54. *Ibid.*, subd. 4.

55. Kenneth A. Henry, 1971. *Atlantic menhaden (Brevoortia tyrannus) resource and fishery - analysis of decline*, NOAA Tech. Rept., Natl. Mar. Fish. Serv., Spec. Sci. Rep. Fish. - 642, 32 p.

56. McHugh, 1972*b*.

57. ECL sec. 13-0333 subd. 1.

58. ECL sec. 11-0105.

59 ECL sec. 13-0305.

60. *23 NY Journ. Fish & Game*, sec. 83.

61. *Ibid.*, p. 86.

62. *23 NY Journ. Fish & Game*, sec. 85.

63. *Ibid.*, sec. 84.

64. *Bevelander* v. *Islip*, 17 Misc. 2d 819, 185 NYS 2d 508.

65. *Post* v. *Kreischer*, 103 NY 110, 8 NE 365; *Fleet* v. *Hegeman*, 14 Wend 42.

66. Laws of 1887, Chapter 584; ECL sec. 13-0301.

67. Laws of 1973, Chapter 253; ECL sec. 13-0316.

68. Leasing of underwater lands or bottom space was removed from the new section by Chapter 632, Laws of 1973.

69. An historical account of enforcement jurisprudence and review of the kinds of violations most often committed is not attempted here and apparently has never been published. However, such information would be useful in reviewing the effectiveness of conservation enforcement in the marine district.

70. ECL sec. 71-0907 subd. 1.

71. George W. Thilberg, personal communication.

72. ECL sec. 71-0911.

73. ECL sec. 71-0913.

74. *Ibid.*

75. ECL sec. 71-0919 subd. 3a.

76. *23 N.Y. Journ. Fish and Game*, sec. 94.

77. ECL sec. 71-0919 subd. 3c.

78. ECL sec. 71-0921 subd. 2.

79. *Ibid.*

80. Report of the Legal Committee to the 17th annual meeting of the Atlantic States Marine Fisheries Commission, Appendix 5 of the 17th Annual Report of the ASMFC, 1959, pp. 85-87.

81. A resource's value can be economic, social or ecological as determined by political decision, not by scientific research. This paper does not intend to imply what the value of any marine fishery in New York is or should be.

82. Assembly Bill 6413 of 1970, making certain provisions as to taking of striped bass for commercial purposes, was vetoed by the governor (Memo 285).

83. McHugh, 1972*b*.

84. R. J. Mansueti, 1961. Effects of civilization on striped bass and other estuarine biota in Chesapeake Bay and tributaries, *Proc. Gulf Caribb. Fish. Inst., 14th Annual Session;* C. F. Tsai, 1970. Changes in fish populations and migration in relation to increased sewage pollution in Little Patuxent River, Maryland, *Chesapeake Science* 11:34-41.

85. Assembly Bill 5734 of 1969, prohibiting taking of menhaden in five north shore bays, passed but died in the Senate Conservation Committee.

86. 1969 Assembly Bill 5734.

87. McHugh, 1972*b*. p. 589.

88. Gordon Gunter. 1963. The Gulf of Mexico menhaden fishery in relation to the sports fisheries, *Proc. Gulf Carib. Fish. Inst. 16th Annual Sess.*, pp. 99-108.

89. Henry, 1971.

90. Arthur Glowka reporting in the Nov. 1973 issue of *National Fisherman* on the 1973 menhaden season in Long Island Sound. He identified the largest U.S. menhaden operation as Seacoast Products Company of Port Monmouth, N.J.

91. William B. Walker reporting in the Nov. 1973 issue of *National Fisherman* on reactions to the unusual New England pogy (menhaden) run.

92. McHugh, 1969. Fisheries of Chesapeake Bay, *Proceedings of governor's conference on Chesapeake Bay*, Sept. 12-13, 1968, pp. II-135 - II-160.

93. McHugh, 1972. Jeffersonian democracy and the fisheries. In *World fisheries policy*, ed. B.J. Rothschild, U. of Washington Press, pp. 151-152.

94. Section 322 of the pre-1972 Conservation Law.

95. 1964 Assembly Bills 2743 and 4051 and Senate Bills 2485 and 2656.

96. 1964 Assembly Bill 5129 and Senate Bill 3619.

97. Chapter 590 of the Laws of 1964; ECL sec. 13-0341 subd. 2.

98. 1965 Assembly Bills 1947, 2007, 2028 and Senate Bill 1282.

99. 1965 Assembly Bills 1945, 2008, 2029 and Senate Bill 1283.

100. An interesting question is whether such legislative tactics are used as a sincere attempt to get the proposal passed, as a show of force against opposing interests, or to pacify the concerned constituency.

101. 1966 Assembly Bills 1759 and 2795; Senate Bills 1552 and 4006.

102. 1965 Assembly Bill 2680; Chapter 269 of the Laws of 1965.

103. 1966 Assembly Bill 2498; Chapter 878 of the Laws of 1966.

104. 1964 Assembly Bill 4053; Senate Bill 2654.

105. 1964 Assembly Bill 2745; Senate Bill 2481.

106. 1965 Assembly Bills 1946, 2009, 2026; Senate Bill 1234.

107. 1964 Assembly Bills 2742, 4052; Senate Bills 2482, 2655.

108. 1965 Assembly Bills 1742, 2027; Senate Bill 1235.

109. McHugh, 1972*b*.

110. W. M. Chapman, 1973. Food from the sea and public policy. In *Ocean resources and public policy*, U. Wash. Press., p. 64.

111. McHugh, 1959. Can we manage our Atlantic coastal fishery resource? *Trans. Am. Fish. Soc.* 88(2):105-110.

112. One of the aspects of fisheries and environmental management that needs more thorough study is the effects of the political process on conservation legislation, and the extent and condition of technical information from non-partisan sources employed in state-level decision-making.

113. The JLC on Environmental Management and Natural Resources was established in 1969 to study the conservation effectiveness of existing programs and feasibility of creating new ones. It is composed of six legislative members from each house, four non-legislative members, and a 14-member advisory panel. It cannot introduce bills as a body but considers and recommends legislative action.

114. Annual Report of the JLC (1972) Leg. Document No. 12; (1971) Leg. Document No. 12; (1970) Leg. Document No. 13.

115. John Dean and Curt Tucker are the staff for the Assembly Standing Committees on Agriculture, Labor, and Environmental Conservation.

116. Annual Report of the JLC (1972) Leg. Document No. 12, p. 7.

117. *Ibid.*, Appendix I.

118. Annual Report of the JLC (1970) Leg. Document No. 13.

119. Special study of the striped bass problems, *Report of Joint Legislative Committee on revision of the Conservation Law (1957)*, Leg. Document No. 11, pp. 31-39; The commercial shellfishes of Long Island, *Report of Joint Legislative Committee on revision of the Conservation Law (1958)*, Leg. Document No. 11, pp. 45-75.

120. Nassau-Suffolk Regional Planning Board, 1966. *The status and potential of the marine environment*, Report of the Oceanographic Committee Dec. 1966. Hauppauge, N.Y., Admiral E. C. Stephan, Committee Chairman.

121. F. A. Smith *et al*, 1970 *Fourteen selected marine resource problems of Long Island, New York: descriptive evaluations*. Prepared for the Marine Resources Council by the Travelers Research Corp., Hartford, Conn.:128pp.

122. It has been estimated that about 90 percent of legislative information on conservation matters comes from the Department of Environmental Conservation (John Dean and Curt Tucker, personal communication).

123. The committee and its mixture of special interests is mandated by Chapter 715, Article 4-A of the Laws of 1969.

124. The committee cannot be considered a lobby *per se* because it represents too broad a range of interests and is mandated by law. However, its significance in influencing legislation is increased by the absence of true marine fishery lobby organizations in Albany. The real effect of any special interest groups on partisan politics in New York State's marine resource affairs has not been researched.

125. Albert C. Jensen, personal communication.

126. One exception is EnCon's recently begun striped bass study which is investigating the distribution of the local stock(s) and the fishing effort on bass. The study is also attempting to confirm that Long Island bass are spawned in the Hudson River (Albert C. Jensen, personal communication).

127. 64 Stat. 430 Aug. 9, 1950; as amended 16 U.S.C. 777-777k.

128. 78 Stat. 197 May 30, 1964; 16 U.S.C. 779-779f.

129. 79 Stat. 1125 Oct. 30, 1965; 16 U.S.C. 757 *et seq.*

130. An historical account of the effects of federal funding on New York's marine fishery research has not been attempted here. Such an analysis apparently has not been published but would be important to any complete review of the political forces shaping conservation policy and practice in the state.

131. *Compilation of federal laws relating to the conservation and development of our nation's fish and wildlife resources*, U. S. Senate Committee on Commerce, 89th Congress, 1st Session, Warren G. Magnuson, Chairman, U. S. Government Printing Office, 1965. p. 36.

132. *Ibid.*, p. 37.

133. *Ibid.*, pp. 36, 37.

134. W. Mason Lawrence, personal communication.

135. *Compilation of federal laws*, p. 43. The authority to apportion the money was probably transferred from the secretary of the interior to the secretary of commerce when the National Oceanic and Atmospheric Administration was created.

136. *Compilation of federal laws*, pp. 43, 44.

137. Peter VanVolkenburgh, personal communication.

138. Reimbursement for this study comes 50 percent from towns which would otherwise be ineligible for 88-309 funds and 50 percent from 88-309 money (Peter VanVolkenburgh, personal communication).

139. Federal support for the Flax Pond Laboratory has been cut to less than 50 percent because research activities there have been determined not to be directed entirely toward the comercial fisheries (Peter VanVolkenburgh, personal communication).

140. 79 Stat. 1125, Sec. 1 subsection c.

141. W. Mason Lawrence, personal communication.

142. The two-year striped bass study is costing about $68,000 per year (Peter VanVolkenburgh, personal communication).

143. Richard H. Schaefer, Chief, Office of State-Federal Relationships, Natl. Mar. Fish. Serv., addressed the annual meeting of the Atlantic States Marine Fisheries Commission, Oct. 2-4, 1973 on "Funding and allocation problems in federal aid programs of the NMFS." He stated that the FY1973 carryover for the nation was about $805,000 of P.L. 88-309 funds, and about $132,000 of P.L. 89-304 funds; totaling $937,000 or 16 percent of the appropriations under both programs.

144. *Ibid.*

145. According to Donald Leedy, Office of State-Federal Relationships, most of these funds were made available to New York for FY1973 and therefore remain available until the end of FY1974. In personal communication he also stated there were no uncommitted funds under P.L. 89-304 for N.Y. in FY1973.

146. ECL sec. 1-0101 subd. 1.

147. ECL sec. 3-0301 subds. 1 a, c, and e.

148. ECL sec. 3-0303.

149. New York State Dept. of Environmental Conservation, 1973. *Environmental plan for New York State, preliminary edition.*

150. *Ibid.*, p. 6.

151. *Ibid.*, p. 66.

152. *Ibid.*, p. 73.

153. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, 1973. *New York landings annual summary 1972*, current fisheries statistics no. 6113.

154. McHugh, 1973. The hard clam industry of New York State, statement presented at hearings chaired by Assemblyman Robert C. Wertz at Hauppauge, N. Y., Dec. 13, 1973.

155. McHugh, 1972*b*.

156. Phillip T. Briggs 1962. The sport fisheries of Great South Bay and vicinity. *N.Y. Fish and Game Jour.* 9(1):1-36.

157. ECL sec. 3-0301 subd. 1 q.

158. McHugh, 1972*b*.

159. Approved by Congress May 4, 1942 by P.L. 77-539.

160. The Atlantic States Marine Fisheries Compace, Article III.

161. *Ibid.*, Article VII.

162. U. S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, 1973. *Report of the National Marine Fisheries Service for the calendar years 1970 and 1971*, Seattle, Wash., pp. 50-51.

163. The state is currently participating with the federal government and other states in surf clam and lobster research under the State-Federal Fisheries Management Program (Albert C. Jensen, personal communication).

164. Landed value is the price paid to the fishermen for their catch. There is reason to believe that hard clam landings in New York are underestimated in official statistics, but this aspect has never been thoroughly studied.

165. McHugh, 1972*b*.

Bibliography

This list is an incomplete survey of literature relevant to the conservation of living resources and management of fisheries. Included are references to documents ranging from population dynamics to politics, from ecology to economics. Publications on general concepts of conservation and some highly specific and technical reports are also included. Marine fisheries management literature necessarily embraces several disciplines. This is only a sampling of a vast source of information. For the convenience of the reader, specific literature citations in the text have been repeated here.

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