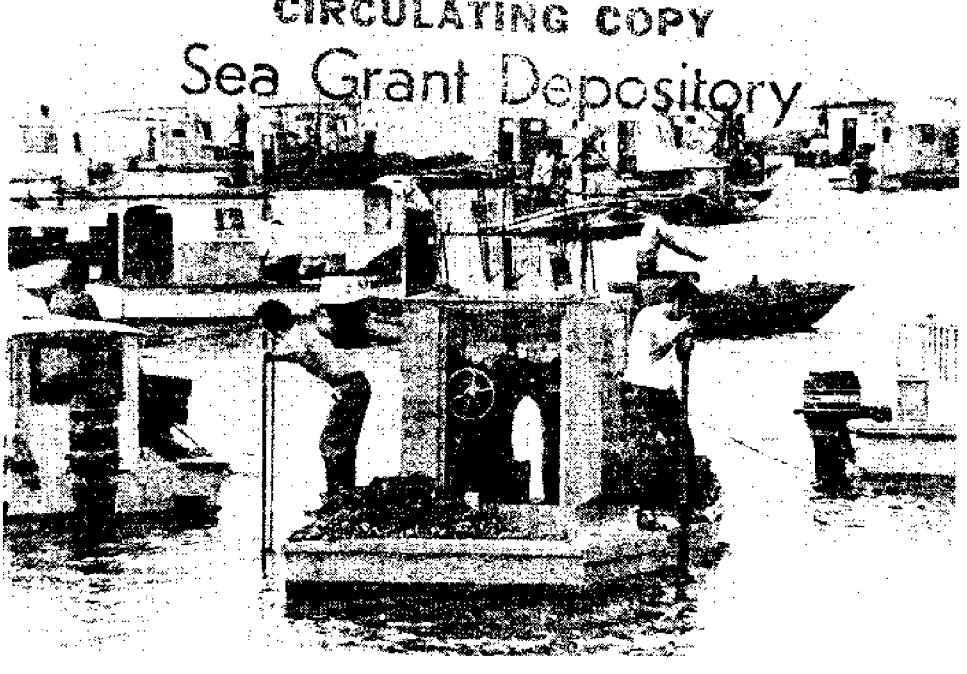
Proceedings of a Workshop on the Shellfish Management Program in New York State

NYS Department of Environmental Conservation and
New York Sea Grant Institute



Proceedings of a Workshop on the Shellfish Management Program in New York State

This workshop was hosted by the NYS Department of Environmental Conservation and the New York Sea Grant Institute. The workshop was held at Stony Brook, NY, on 28 March 1975.

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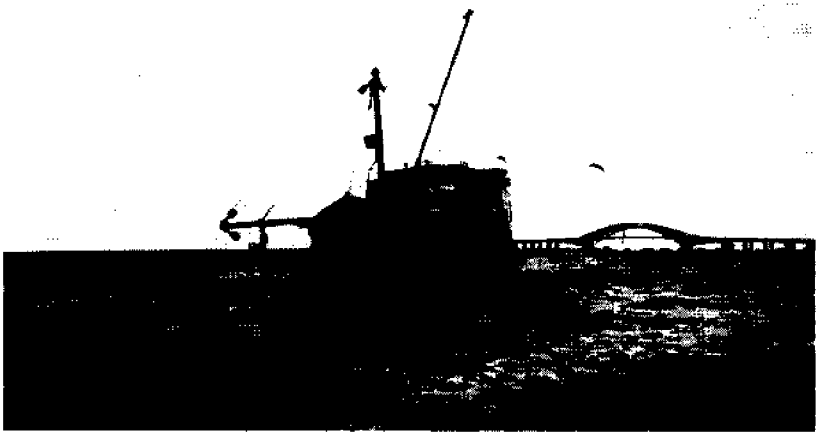

A shellfish dredge boat on station during a population survey of hard clams

Introduction

W.S. Walters

Since precolonial times, Long Island's estuarine and near-shore waters have provided perhaps the most varied and bountiful shellfish harvests in the country. Early settlers found a seemingly endless surplus of food--available for the taking.

Today, this Long Island tradition--free access to a teeming resource of shellfish--is being threatened. Pollution, gradual environmental degradation, and perhaps overharvesting now seriously endanger the future of our shellfishery. We are challenged with a mandate to manage, if we are to preserve this valuable industry.

Management of Long Island's shellfish resources is in many ways similar to a gemcutter's artistry. Each facet of the stone must be precisely planned and skillfully cut if a lasting and durable product is to result. Haste, or cutting without analyzing the structure of the stone, can shatter a potential fortune.

Our shellfish industry is similarly multi-faceted. These facets are composed of independent harvesters, dredge companies operating on their own or leased bottom, recreational harvesters, and governmental bodies from village to federal levels. All of these groups are being challenged to strike and polish their own cut so the ensuing industry will be of maximum value and durability.

In this document, we shall explore these management roles so we can develop a sounder base for cooperation and ensure the future of our industry.

This publication consists of short papers presented on 28 March 1975 at a shellfish management workshop sponsored jointly by the New York State Department of Environmental Conservation and the New York Sea Grant Advisory Service. The

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workshop was attended by governmental/agency representatives, independent shellfish harvesters, private shellfish companies, and the general public.

The intent of the workshop was to explore management roles and responsibilities to broaden the base of cooperation underlying state and local management agencies. The afternoon session provided a forum for the expression of serious concerns by various segments of the industry. We hope this document will serve as a stimulus toward solving some of these industry problems.

We wish to thank the State University of New York at Stony Brook for providing the excellent conference and dining facilities. We are especially grateful to the participants, who took an active role in industry panel presentations.

Overview of New York's Shellfish Resources

A.S. Taormina

"SEWANHAKA"--Island of Shells--was the name given to Long Island by the Algonquin Indians. Indeed, Long Island's molluscan shellfish resources are abundant, of excellent quality, and rank with the best to be found anywhere.

Among the bivalves are four commercially important *clams* -- hard, soft, surf, and razor; *oysters*, most of them raised aquaculturally, but with some wild stock still existent; *mussels*, blue for food and bank for bait; and bay and sea *scallops*. Among the snails or gastropods, only the *conch* is harvested in commercial quantities, although others such as the periwinkle and slippershell are edible and utilized to some degree. Last but not least among our mollusks is the *squid*, used for both food and bait.

It is difficult to determine the exact value of this bountiful and nourishing resource. The commercial landings in New York for 1973 and 1974 are listed in Table 1 of the Appendix, but give only a minimal value, since "landings" document only part of the worth. Not listed here are the spinoff values of the industry, which may actually be four or more times higher than its landed value--not to mention the recreational value in terms of "mess digging" for food and bait. The National Marine Fisheries Service estimates (Appendix Table 2) that of the 2,980,000 New Yorkers who participate in recreational saltwater fishing, one in four participates in recreational shellfishing. Those three-quarters of a million mess diggers harvest large numbers of shellfish that are not documented in charts. Furthermore, many species of shellfish are also valuable as food for fish and wildlife; thus, they are part of a vast and varied food chain.

How does one manage such a diverse resource? Article 13 of

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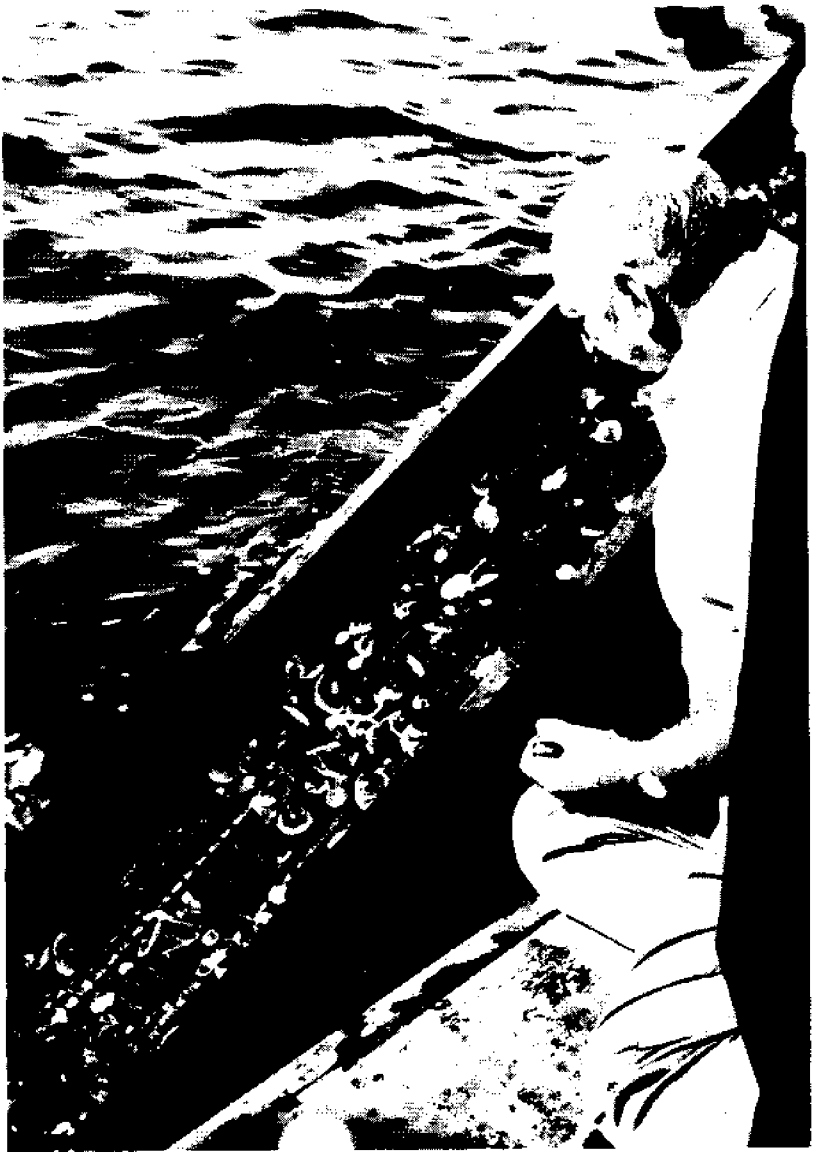

A biologist from the NYS Department of Environmental Conservation examining hard clams on an escalator dredge, part of population surveying

the Conservation Law has 15 sections pertaining to molluscan shellfish--most of them dealing with regulations on harvesting, handling, importation, and water quality. Two other sections deal with crustacean shellfish: lobster and crab. Also, there are regulations dealing with leasing state underwater lands for aquaculture. Obviously, shellfish prosper primarily where there is a productive environment. Consequently, it is imperative that all levels of government strive to maintain environmental quality.

Much of DEC's fish and wildlife management effort is in this direction, as follows: acquisition of key wetlands under an $18 million appropriation from the Environmental Bond Act of 1972. As an adjunct to this program, we work closely with county, town, and village governments, and with The Nature Conservancy, to put additional wetlands under protective jurisdiction.

Under provisions of the Tidal Wetlands Act of 1973, we carefully regulate activities in the marine zone that could be detrimental to the marine resource. Furthermore, under the Federal Coordination Act, we review and comment upon all public works projects in navigable waters. Our major effort goes to monitoring water quality, to determine from which waters shellfish may be safely taken, to protect the public health. Finally, we spend considerable effort on impact analysis, reviewing and evaluating potential impacts of such projects as sewers, power plants, bridges, roads, marinas, airports, and housing.

The shellfish resource is the foundation for an industry probably worth $100 million or more. Great South Bay is the finest hard clam factory in the world. Eastern Peconic Bay is one of the finest bay scallop factories in the world. We cannot take this resource for granted. We in DEC have the legislative mandate to manage the resource as well as we can for the best interests of all the people in the state.

The Legal Mandate to Manage

A.C. Jensen

Too many people believe the way to manage natural resources is found in the Bible. They take very literally the charge from God to Adam to "be fruitful and multiply, and fill the earth and subdue it; and have dominion over the fish of the sea . . . and over every living thing . . . ."[1] Other people, however, recognize the need to manage natural resources by conserving (i.e., using wisely). This need is supported by the mandate from the people of New York to the Department of Environmental Conservation--through the legal apparatus of the state--to manage the state's natural resources, including the shellfish.

The mandate is contained in a body of law that has a firm foundation based both on the Constitution of the State of New York and the Constitution of the United States.

CONSTITUTIONAL FOUNDATION

The settlers in colonial America saw little need to conserve the New World's natural resources. The abundance of the resources was considered to be without end and the fishes, especially the easily gathered shellfish, represented an important and sorely needed source of food. There were some early local laws, nevertheless, that dictated how certain fishes could be used. For example, the laws of Massachusetts Colony forbade using cod or striped bass as fertilizer. Generally, however, laws governing fishes were outstanding by their scarcity.

The framers of the Constitution of the United States were concerned mostly with precepts that would set forth the rights, privileges, and responsibilities of men dealing with

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men. Natural resources were of little matter to them at the time. The Preamble to the Constitution speaks of promoting the general welfare, and managing fisheries would serve that end, but the commerce clause[2] in the Constitution is more direct. It has been broadly interpreted in a number of important court decisions to give the federal government the right to regulate, among other activities, navigation on the sea and fisheries.

I do not suggest that fisheries were of no concern to the early republic. Indeed, they provided some of the first items of export for the colonies. Fishery products were among the valuable commodities that the young nation carried abroad in the beginnings of a lucrative international trade system.[3] And John Adams, as Minister Plenipotentiary to the Treaty of Paris meeting that ended the American Revolution, had been charged with securing for Americans the *right* to pursue fisheries on the high seas.

The common-property nature of fishery resources and the common right to fish in public waters are part of the legal tradition of the United States. However, a long series of court decisions has supported state jurisdiction over fisheries within the three-mile territorial sea. The powers of the federal government, under the Constitution, are included in these waters but certain powers of legislative regulation of fisheries have been granted to the coastal states.[4]

The Constitution of the State of New York grew out of the federal document but is more specific regarding conservation of natural resources for the benefit of all citizens of the state. In addition, to satisfy due process, any legislation must promote the health, safety, or welfare of the public in general and not give special benefit to any one class.[5] This is of particular importance in legislation dealing with natural resources. Furthermore, it is the policy of the state to conserve and protect its natural resources.[6]

STATE LAWS

A vast and detailed body of law concerning natural resources has been derived from the State Constitution. Titled the Environmental Conservation Law,[7] it concerns itself with the entire range of natural resources--living and nonliving--as well as the environment of which they are a part. It restates the policy of the state to conserve, improve, and protect its natural resources.[8] It grants power to the Commissioner of Environmental Conservation to provide for the protection and management of marine and coastal resources, encourage and undertake scientific research on the ecological process, and monitor the environment to make more effective and efficient control practices.[9]

Further sections of the law spell out in detail why and how the state, working through the Department of Environmental Conservation, shall manage its natural resources (Figure 1). The state owns all fish, game, wildlife, shellfish, crustacea, and protected insects in the state except those legally acquired and held in private ownership.[10] They are held in trust for all citizens of the state. To manage these resources, the Department has the power and duty (among other responsibilities) to issue licenses and permits, to control and manage shellfish and crustacea, and to enforce the laws.[11] Most of these activities take place within the state, particularly in the Marine and Coastal District (Figure 2),[12] but the state may also regulate the activities of its citizens in fishery activities beyond the territorial waters.[13] The courts have recognized great power in the state to regulate its fisheries.[14]

CONCLUSION

The people of the State of New York, represented in the legislature, have charged the state through the Department of Environmental Conservation with conservation and management of natural resources, including the shellfish resources, that belong to them. The people have mandated that the resources

TITLE 1

General Provisions

§13-0101. Short title. Article 13 together with article 11 of the Environmental Conservation Law shall be known as the Fish and Wildlife Law. Sections of article 13 or of article 11 may be cited either as sections of the Environmental Conservation Law or as sections of the Fish and Wildlife Law.

§ 13-0103. Marine and coastal district described. The marine and coastal district shall include the waters of the Atlantic Ocean within three nautical miles from the coast line and all other tidal waters within the state, including the Hudson River up to the Tappan Zee bridge.

TITLE 3

Marine Fisheries

Figure 1. The sections of the Environmental Conservation law (also called the Fish and Wildlife Law) that deal with shellfish include provisions for all stages of the harvesting and use of shellfish.

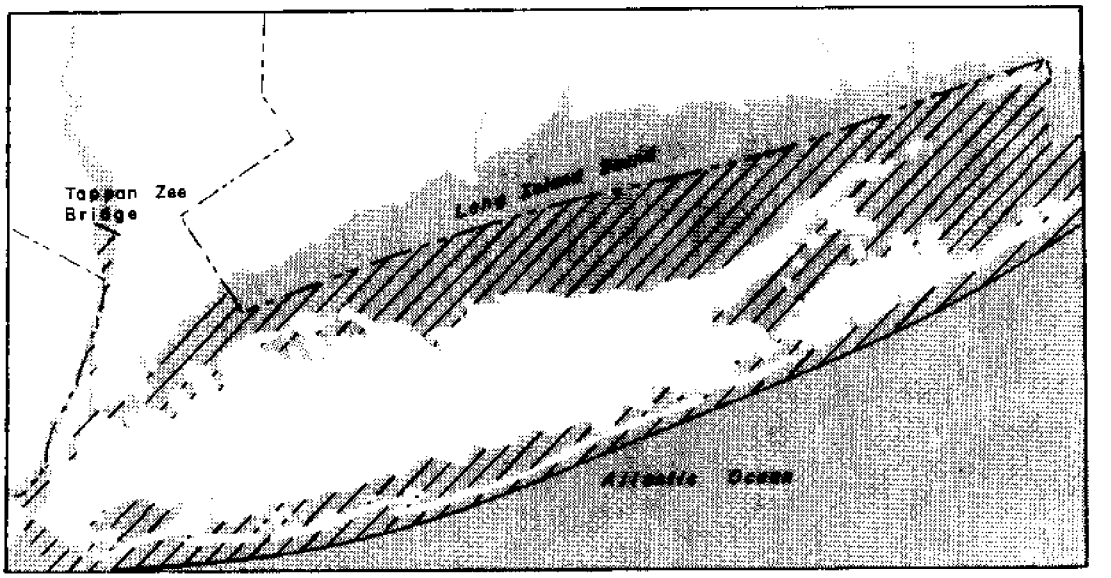

Figure 2. The New York State Marine and Coastal District is described in the Environmental Conservation law (§13-0103). It is shown here in the area marked with diagonal lines.

are to be treated not by the biblical requirement but by the legal requirement that recognizes the renewable nature of the living resources. The Department accepts this mandate and acknowledges the concept that the environment, with its resources, is not inherited from our fathers but is borrowed from our sons.

NOTES

1. Genesis 1:28.
2. US Constit. Art. I, § 8, Clause 3.
3. The Cod, T.Y. Crowell Co., NY 1972.
4. Manchester *v.* Massachusetts (139 USR 240).
5. NY Constit. Art. 1, § 6.
6. NY Constit. Art. 14, § 4.
7. Chap. 664, NY, Laws of 1972.
8. NYECL § 1-0101.
9. NYECL § 3-0301 (e,r,t).
10. NYECL § 11-0105.
11. NYECL § 11-0305 (2,6,7,10).
12. NYECL § 13-0103.
13. Skiriotes *v.* Florida (313 USR 69).
14. Sloup *v.* Town of Islip (356 NYS 2d 749).

Microbiologist pipettes a sample of shellfish product in the bacteriology laboratory, part of New York State's participation in the National Shellfish Sanitation Program.

Public Health Significance of Shellfish Management

R.B. MacMillan

The New York State Department of Environmental Conservation (DEC) in 1974 issued 8,000 individual digger permits in addition to those permits issued to the large shellfish farming operations. The shellfish industry landed a reported 14.8 million pounds of shellfish, with a dockside value of $19,000,000. As a prerequisite for this industry to function, the state must maintain a viable shellfish sanitation program to assure the consuming public that shellfish harvested and marketed within this state are of a high sanitary quality.

Shellfish-associated outbreaks of disease have been widely reported in the past. However, one outbreak is of particular concern and is described in a report entitled *A Typhoid Fever Epidemic Caused by Oyster-Borne Infection (1924-25)*, L.L. Lumsden, H.E. Hasseltine, J.P. Leake, and M.V. Valdee, 1925. The report concludes:

> 1. The main factor in the spread of the infection causing the recent excessive prevalence of typhoid fever in New York City, Chicago, Ill., Washington, D.C., and several other cities in the United States, was beyond reasonable doubt, shell oysters distributed by a producing company operating within the vicinity of West Sayville, N.Y.

Following this outbreak, members of the shellfish industry petitioned the Surgeon General to develop a program to restore consumer confidence in their product. This request resulted in what is known today as the National Shellfish Sanitation Program (NSSP).

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The term "shellfish" has many definitions. However, as discussed in this paper, two definitions will be considered. Shellfish, as defined in the NSSP, include "all edible species of oysters, clams or mussels, either shucked or in the shell, fresh or frozen." The New York State Environmental Conservation Law defines shellfish as "oysters, scallops, and all kinds of clams and mussels."

These particular mollusks are commonly referred to as "filter feeders," a term describing the method the animals use to obtain food and oxygen from the overlying waters. In addition to filtering phytoplankton necessary for growth, the shellfish can also filter out and *concentrate* contaminants that might be present in the overlying waters, including bacteria, viruses, metals, and pesticides. Examples of the ability to concentrate may be seen in soft clams[1] harvested in a portion of Moriches Bay, under special permit, where fecal coliform levels increased from 130 to 16,000+ MPN/100 gms within six hours following significant rainfall and its associated runoff. Hard clams in the area of the Great South Bay were observed to increase from fecal coliform levels of 50 to 9,200 MPN/100 gms under dry weather conditions in an area subject to increased boating and population densities on summer weekends.

Many people agree that there may be health problems associated with the ingestion of raw hard clams and oysters, but feel that mussels and soft clams are safe because of the cooking they receive prior to consumption. This is not true since the cooking normally given to these shellfish is not a complete sterilization and harmful organisms may survive.

With wide recognition of the need for some type of program to insure the consumer a safe product, the NSSP was initiated in 1925. The program originated as a cooperative program involving federal-state-industry participation. The program was first administered by the United States Public Health Service; a

reorganization order transferred the program to the Food and Drug Administration (FDA) effective 1 July 1968.

At the present time, there are 22 states within the program, including all shellfish-producing states, excluding Alaska and Hawaii and many inland receiver states. The Maritime Provinces of Canada, the Prefecture of Hiroshima, Japan, and the Republic of South Korea are also certified by the NSSP.

The program is administered today by the Shellfish Sanitation Branch within the FDA, functioning directly through FDA regional offices. Each regional office is staffed by a shellfish consultant responsible for reviewing and evaluating individual state programs within the region. In addition, the program includes two field units to aid state programs or engage in special problem areas as required.

The FDA itself has certain responsibilities within the NSSP. One of the most important involves an evaluation of each state program within the NSSP to determine compliance with criteria presented in the National Shellfish Sanitation Program Manual of Operations. As required within the Manual, each state program is rated on eight particular elements.

The FDA assists state programs through its field units. The Northeast Technical Field Services Unit has assisted the New York State program in conducting hydrographic studies of Oyster Bay Harbor and Flanders Bay and has been involved in water quality studies of portions of Great South Bay.

The FDA presents training courses on topics related to the program and conducts national workshops to discuss and consider problems within the NSSP. Within the framework of the workshop, the FDA reserves the right to make the final decision on all matters related to public health.

The FDA also investigates and reviews standards used within the program and publishes monthly a document entitled the *Interstate Certified Shellfish Shippers List*, listing by state all dealers certified by that state to ship shellfish in interstate commerce.

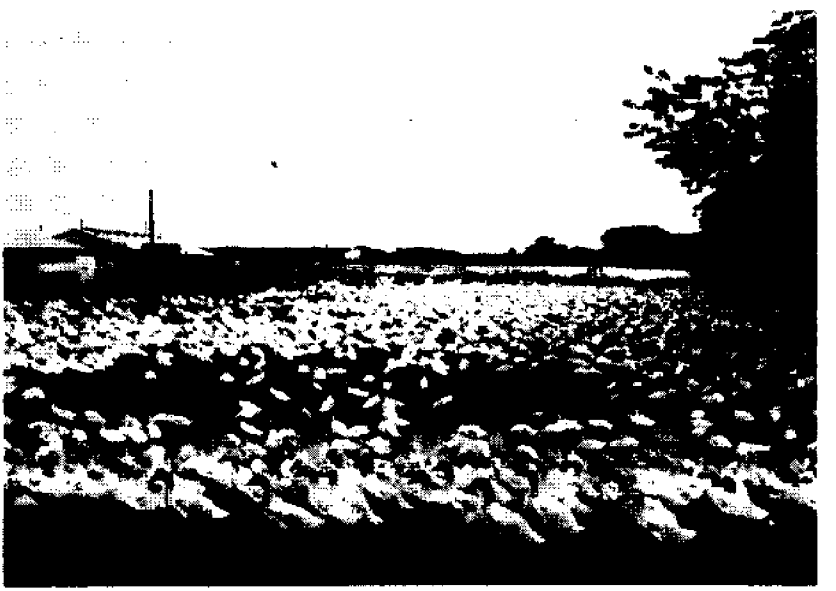
The New York State Shellfish Sanitation Program is located within the Department of Environmental Conservation and, with the exception of Law Enforcement, within the Division of Marine and Coastal Resources. Basic elements within the state program include those related to water quality studies, shellfish inspection, microbiology and chemistry laboratory support, and the issuance of permits.

The primary function of the water quality studies section is to classify all actual and potential shellfish-producing waters within the Marine and Coastal District in accordance with established standards. The Marine and Coastal District, as defined by law, includes "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." This region includes approximately 1,200,000 acres of underwater lands of which 575,000 acres are considered actually or potentially productive. Today, 24% or 139,000 acres of productive waters are closed to the taking of shellfish.

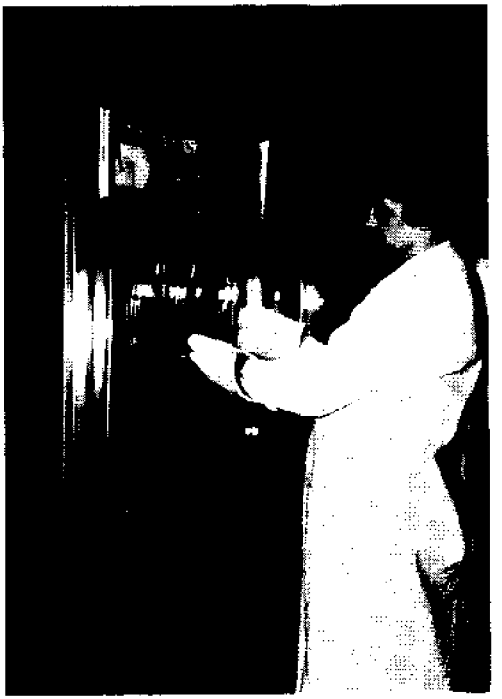
Basic activities included in the classification of these waters involve the gathering of bacteriological data at designated sampling stations, the completion of shoreline surveys to identify actual and potential sources of pollution, and the completion of basic hydrographic studies to determine the impact of major sources of pollution on adjacent shellfish-growing waters. All data and other related information are then analyzed to determine compliance with established water quality standards used to certify shellfish-growing waters.[2]

Several major sources of pollution may be considered serious problems affecting the shellfish industry today; these include the treatment of sanitary wastes by individual systems or sewage treatment plants, the impact of urban stormwater runoff on adjacent waters, and the unique problem related to the Long Island duck farms and the treatment of their wastes.

Careful chemical analysis of water from shellfish grounds, to insure the high quality of shellfish available to the consumer.



Runoff from Long Island duck farms was for many years a major source of pollution. Recently, duck farm managers have installed wastewater management systems that have virtually eliminated the pollution.



Laboratory technician testing bacteriological samples in the incubator for indicator organisms.

The shellfish inspection program's mobile laboratory, fully equipped.

The shellfish inspection section is responsible for maintaining surveillance over all shellfish marketed in the State of New York through the wholesale level. Though this section is responsible for activities throughout the state, major emphasis is placed on the Long Island-Metropolitan New York City-southern Westchester County area. Through the remaining upstate areas, the program is aided by local conservation officers and health departments.

Personnel are responsible for the initial inspection of all shellfish storage and processing facilities prior to the issuance of the necessary permit to operate. Then the facilities are inspected monthly in the Long Island-New York City-Westchester areas and biannually in the upstate regions for compliance with regulations found in *Rules and Regulations--Sanitary Control Over Shellfish.*

In addition to facility inspections, section personnel collect market samples of shellfish for bacteriological analysis, and periodically inspect harvest vessels. Samples of shellfish are also gathered directly from the growing areas for analysis.

The primary function of the microbiology laboratory is to support the water quality and shellfish inspection sections in the analysis of seawater, shellfish, and related samples for the presence of sanitary indicator organisms. Samples are routinely analyzed for the presence of total and fecal coliform, fecal streptococcus, and standard plate count.

In addition to its routine functions, the laboratory also participates in collaborative studies to improve upon current methodology for standard and new methods. The laboratory is supported in its activities by a mobile laboratory designed to provide on-site support in the areas of water quality and shellfish inspection. The mobile laboratory is partially funded under the federal program, Aid to Commercial Fisheries--Public Law 88-309.

The chemistry laboratory supports the shellfish program and other units within the region in analysis for pesticides and metals. Samples of shellfish, water (saline and fresh), sediments,

air, and other things are analyzed for the presence of pesticides such as DDT, DDD, DDE, aldrin, and dieldrin, and metals such as mercury, copper, lead, zinc, and cadmium.

The chemistry laboratory participated in a program entitled *Estuarine Monitoring Program,* in which 15 estuary areas were sampled for shellfish every month for six years. As a result of this program it can be stated that pesticides in shellfish within this state are not of public health concern.

The permit office is responsible for issuing all permits required within the Marine Section of the Environmental Conservation Law.[3] There are presently 16 types of permits, including those for lobster, menhaden, and others, in addition to shellfish digger and shipper permits. It is interesting to note that this office issued 8,000 individual digger permits in 1974, an increase of 1,500 over 1973. This office works closely with Law Enforcement on legal matters related to the various permits.

The New York State Shellfish Sanitation Program will probably continue to function basically as described above.[4] At this time, the FDA is promulgating regulations for the National Shellfish *Safety* Program (NSSP). A review of the prepublication draft of these regulations indicates some changes will be required within the state program--hopefully to improve upon the present program. The full impact of these regulations will not be realized for two to three years. The industry views these changes with certain reservations. However, for the present and immediate future, this program will continue to function to guarantee a high quality shellfish product to the consuming public.

NOTES

1. See Appendix Tables 3 and 4 for lists of scientific and common names.
2. See Appendix Table 5.
3. See Appendix Tables 6 and 7.
4. See Appendix Table 8.

Ongoing Shellfish Management Programs

S.A. Hendrickson

The Department of Environmental Conservation is presently involved in three ongoing shellfish management programs: shellfish transplants, population surveys, and the leasing of state-owned underwater lands for shellfish cultivation.

TRANSPLANTS

Due to the encroachment of pollution on the natural shellfish beds within the Marine and Coastal District, the Department initiated a formal shellfish transplant program in 1964. The major purpose of this program was to reduce the standing crops of shellfish in certain uncertified waters to a level no longer attractive to poachers, thereby reducing the potential health hazard and minimizing the pressure on law enforcement agencies attempting to patrol the restricted waters. The second objective of the transplant program was to make available, to both private and public land shellfish farmers, shellfish within the uncertified waters on a controlled basis, thereby utilizing an otherwise unusable resource.

Within the past ten years, the Department has supervised the relaying or transplanting of over 215,000 bushels of hard clams to underwater lands within almost every town on Long Island and to privately owned or leased lands belonging to various shellfish companies on both the north and south shores.

In 1973 a federally funded shellfish program was initiated to provide 50% matching funds for transplanting and for purchasing additional spawning stock by interested towns on Long Island through Public Law 88-309, with New York State acting as the administrator of the monies and the supervising agency. In this

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program the Conservation Department initially provides 100% of the project monies and is later reimbursed 50% by the federal government and 50% by the participating township. Total project allowances for 1973 and 1974 were $50,000 and $80,000 respectively; $50,000 is budgeted for 1975.

Another continuing transplant program carried out by the Department is the relaying of bay scallops and oysters from waters where they are well established to areas where they are historically important but presently found in limited amounts. Introducing oysters or scallops from a different environment has on many occasions stimulated spawning and provided increased sets in the receiving waters. Such a relay project falls within the guidelines of the federally funded program so that towns interested in conducting this type of transplant may apply for matching funds through the Department.

SURVEYS

Shellfish population surveys are conducted by the Department on a continuing basis to determine resident populations in proposed dredging areas, potential transplant areas, and on underwater lands proposed for shellfish cultivation leases. In the instance of dredging projects, if the Department determines through its survey that a valuable shellfish resource is endangered, a transplant is proposed and is carried out under the supervision of the Department, with the costs borne by the dredging company, individual, or agency involved.

In order to intelligently and successfully manage the shellfish resources of our state, we must have at our disposal accurate information as to the type, location, and extent of our shellfish populations. If proper funding is made available in the near future, the Department's survey program will be expanded or increased to provide such information on a continuing basis.

LEASING

At the present time, the Department is in the process of developing a program to lease state-owned underwater lands for shellfish cultivation. The economic, political, and managerial problems surrounding this program are many and varied. The Department, while fulfilling its mandate to manage the resources of this state, must take into consideration the needs of all segments of the fishing industry as well as the needs of the general public before embarking on any management programs.

The mechanized shellfish farmers and the public land shellfish farmers are sometimes at direct odds on leasing. It is not the desire of the Department, nor would it be proper for the Department, to set up a program directly benefitting one segment of the industry at the expense of the other. The Environmental Conservation Law states in Section 13-0301 that "lands underwater shall not be leased where there is an indicated presence of shellfish in sufficient quantity and quality and so located as to support significant hand raking and/or tonging harvesting." It should, therefore, be obvious that the Department will not propose for lease any parcels of underwater lands where independent baymen are presently or may in the future be making a living.

Very soon, however, the Department will be determining which areas are suitable for shellfish cultivation leases, using the Conservation Law as a guideline. In deciding which lands shall be offered for lease, and under what circumstances, the Department will need the cooperation and participation of the whole fishing industry so that the interests of all parties are properly represented and so that a meaningful, constructive, and beneficial program may be developed to benefit not only the shellfish industry but also the whole fishing industry and the general public.

Notes on Investigations Pertaining to Molluscan Shellfish

J.C. Poole

POND CULTURE OF OYSTER SEED, OYSTER POND, MONTAUK, 1967-1972

The purpose of work at the 115-acre salt pond was to determine its potential as a sustained source of oyster seed for commercial use. We suspended the following cultch materials from rafts or placed them on the bottom: surf clam shells, oyster shells, bay scallop shells, plastic screen, plastic bags, and snow fence coated with a cement-lime mix. Although native oysters were abundant in the pond, oysters from Connecticut and Maine were added to the supply for spawning purposes. Some native oysters were held elsewhere at low temperatures to prevent their spawning at the normal time. They were returned to the pond when temperatures were still suitable for spawning but after those oysters left in the pond had spawned, to extend the spawning period.

We measured water temperatures, salinity, nitrates, phosphates, and dissolved oxygen at five stations in the pond, added fertilizers, and also measured pesticide residues and trace elements. From these observations, we determined that the environment of the pond was suitable for the development and growth of oyster larvae and the setting of oyster spat. The only detrimental features noted were the frequent abundant numbers of barnacle larvae (food competitors) and comb jellies (predators). However, there were no oyster drills or starfish.

A commercially successful set of oyster seed occurred in 1972 only, when an average of 78 oyster spat per scallop shell set on strings suspended from rafts and grew well. We concluded that the pond is not reliable as a sustained source of oyster

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seed but could serve as an initial growth area for oyster seed produced in shellfish hatcheries.

INVESTIGATION OF *CLADOPHORA*

Cladophora gracilis is a filamentous green alga that develops annually from spores in seawater. Bloom proportions of this alga occurred in 1963 in Great South Bay. In many of the years since then, it has also bloomed in this bay as well as others on Long Island. Its most obvious concern to the shellfish industry is entanglement with clam tongs, rakes, and dredges.

We investigated the life history of *Cladophora* and measured its physical and chemical environment. The overwintering spores occur in Great South Bay just west of Fire Island Inlet on the north sides of Fox Island and Grass Island; small plants called *germlings* develop from these spores in the spring. They grow on sand grains before breaking loose to move about in the tides and currents, increasing in length and producing the spores for the next season's production. They sometimes form large mats at the surface in late summer and then die.

The limited presence of germlings indicates that physical removal of these before heavy spore production may lower the abundance of *Cladophora* in Great South Bay. Algicides, too, are not practical, but we cannot determine any other reasonable method of control. Limited evidence indicates that lower nitrate levels in the bay may be the reason for smaller populations of the alga during the early 1970s.

INVESTIGATION OF *CODIUM*

In addition to entangling clam tongs and rakes and shellfish dredges, *Codium fragile* attach to oysters and scallops. In strong currents and during wind storms, oysters and scallops with *Codium* attached are moved from their normal beds, often being driven to beaches where they perish.

This perennial green alga reproduces mainly by spores, is capable of regenerating, and can withstand long exposures to air. We measured light, temperature, and salinity in the areas to which it has spread since it was first observed about 18 years ago at Orient Point, Long Island and concluded that it is a very tolerant alga, capable of spreading throughout all the temperate zone. Its only limitation here seems to be its need for shell, rock, wood, or metal large enough for attachment by the holdfast.

Mechanical methods of removing *Codium* are impractical because it can regenerate from the holdfast and broken fragments. Algicides are not practical either; thus, as with *Cladophora*, there does not appear to be any efficient control.

THE SURF CLAM MANAGEMENT PROGRAM

DEC is represented on the Surf Clam Sub-Council and the Surf Clam Technical Committee in a state-federal management program. The goal of the management program is to conserve the surf clam resource and to protect the industry. The National Marine Fisheries Service contracted with marine biologists from Brooklyn College to survey the surf clam beds from Rockaway to Montauk. Data are now being examined to determine how a sustained yield can be taken from this area.

BAY SCALLOP MANAGEMENT AND REHABILITATION

In an attempt to rehabilitate the bay scallop fishery in areas that no longer have populations of the bivalve, we transplanted 120 bushels in 1974 to Sebonac, Mt. Sinai Harbor, Cold Spring Harbor, and Northport Bay. We measured total carbon and phytoplankton abundance in each of these waters to learn if there is a correlation between these factors and a good set of bay scallops.

Pond culture of oyster seed and the bay scallop rehabilitation investigations were financed in part by funds made available through Public Law 88-309. *Cladophora* and *Codium* investigations were financed in part by funds made available through Public Law 89-720.

Private homes built close to the bay add to the pollution that requires closure of shellfish waters.

Rules and Regulations by Which We Work

R.A. Cook

GENERAL

The New York State Department of Environmental Conservation operates under the statutory authority of the Environmental Conservation Law (ECL)--a codification of the Conservation Law--and portions of the Public Health and Agriculture and Market Laws; codification was effected by Chapter 664 of the Laws of 1972. The Department's authority is extended by its Rules and Regulations pertaining to a number of areas of concern to the shellfish industry. Some of these Rules and Regulations are presently in force, and others have been proposed.

SHELLFISH LEGISLATION

Specific portions of the NYSECL pertaining directly to the shellfish industry include the requirement for and issuance of diggers and shippers permits, as well as the control of harvest areas. DEC also has responsibility for the shellfish sanitation program and maintenance of sanitary conditions and the enforcement of operating standards.

TIDAL WETLANDS PROGRAM

The Department is responsible for enforcement of the Tidal Wetlands Act of 1973 and the moratorium on wetland alterations imposed by this act. At the present time, this authority is being used to prevent destruction of tidal wetlands by developers.

HARD CLAM MARKETING STANDARDS

To ensure that the consumer can be confident of the number

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Regional Director, Region I
NYS Department of Environmental Conservation
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Stony Brook, NY 11794

and size of the clams in the container purchased, the Department has formulated hard clam marketing standards. A public hearing on these standards was held in Hauppauge in August 1974. The hearing officer's report has been submitted, and action is awaited.

Following is a copy of the proposed standards.

44.1 Grading of clams. No person shall sell hard clams (*Mercenaria mercenaria*) as shell stock unless such clams are graded or identified as follows:

(a) Clams one inch in thickness or larger, but less than one and seven-sixteenths inches in thickness, shall be called "necks."

(b) Clams one and seven-sixteenths inches in thickness or larger, but less than one and five-eighths inches in thickness, shall be called "cherries."

(c) Clams one and five-eighths inches in thickness or larger shall be called "chowders."

44.2 Packaging of clams. No person shall sell hard clams (*Mercenaria mercenaria*) as shell stock except in a container which shall be labeled to show:

(a) The grade of such clams as graded pursuant to section 44.1;

(b) the weight of the contents thereof;

(c) the minimum number of clams contained therein; and

(d) the name, address and zip code of the seller.

MARINE TOILETS

Federal legislation pertaining to marine sanitation devices has been enacted by the US Environmental Protection Agency, and rules and regulations have been promulgated by the US Coast Guard relative to manufacturing performance standards to be achieved by manufacturers of the chlorinator-macerator device. We feel that equipment like the chlorinator-macerator could have adverse effects on shellfish quality; we believe that holding tanks are preferable, to protect our shellfish-producing waters.

The Role of Law Enforcement

G.W. Thilberg

Much of the success or failure of the shellfish program depends on Law Enforcement. If Law Enforcement is weak, so is the program.

Patrolling the noncertified areas is our main problem and responsibility. There are many closed areas that are very productive for shellfish. With present high prices, such shellfish are temptations to some people who disregard the safety of others. As we all know, not too many years ago we had only six officers and limited equipment to patrol the whole Marine and Coastal District. A few years ago our force doubled. Right after that we requested more men, and again we received an increase so that today we are working with a complement of 34 officers. We have much modern equipment: boats with radar, fast skiffs with 135-HP outboards, radio-equipped cars, walkie-talkies, and the necessary personnel to operate them. We hope, as you do, that the time will come when we have no closed areas, but that is unlikely. Needless to say, it would be a lot easier for us, and the public would feel safer. However, I believe that very few shellfish from closed areas are getting into the market and to the people. In fact, I feel secure enough to go into any restaurant in New York and order raw shellfish.

We are also concentrating on a "seed problem." Unfortunately, small, illegal hard clams have a high market value. I want to point out further that on Long Island over 90% of our work effort is concentrated on marine resources and the major marine resource is shellfish. So you can see we aren't just sliding over this and going at it as a "hit or miss."

Capt. G. W. Thilberg
Chief Environmental Conservation Officer
Division of Law Enforcement
NYS Department of Environmental Conservation
Building 40, State University of New York
Stony Brook, NY 11794

Shellfish waters closed to harvest because of pollution are clearly marked. The boundaries are delineated with closure signs.

We will contine to devote all the time necessary to combat any violations that may be taking place.

In the past we have had some problems with the courts (too lenient) and we are hoping that we can eventually get that straightened out. The new Suffolk County District Attorney has assigned an Assistant District Attorney to handle only conservation cases. It is really too soon to tell what the results of this assignment will be. We also take steps to discourage illegal shellfish harvesting. Any person caught taking the shellfish from noncertified waters or operating in noncertified waters has his permit immediately suspended, pending the outcome of official revocation. Furthermore, if a person is apprehended in restricted waters, his boat, motor, and all equipment is seized. We have found this approach to be a tremendous deterrent. Thus, with the revocation of licenses, and the seizure of equipment, I feel confident that before too long individuals will realize that it isn't worth the risk to take shellfish illegally.

The Noncommercial Value of Shellfish

J.L. Renkavinsky

When Long Islanders think of shellfish, they usually consider only those species that are of direct economic or gastronomic benefit or are something of a pest. Surprisingly, there are 37 species of gastropods and 31 species of bivalves native to local waters. From this large number, we commonly recognize only the eight species of bivalves regularly eaten: hard clams, soft clams, razor clams, surf clams, oysters, smooth mussels, bay scallops, and sea scallops. Also, we are aware that the toredo is an industrial pest, that of the gastropods, two large whelks (conchs) are edible, and that oyster drills (two species) and moon shells (three species) prey on other shellfish. The other 53 species of mollusks are often dismissed as either "mud snails" or as "duck feed" even though their total biomass may sometimes be greater than that of the economically important species.

Long Island waters support an extensive crustacean, finfish, and wildlife (mostly waterfowl) resource ecologically entwined with shellfish populations. Lobsters, crabs, winter flounder, blackfish, cunners, and members of the cod family are dependent upon shellfish for part of their subsistence. Also, many waterfowl, rails, and ibises regularly feed upon the diverse shellfish species. Although Long Island is not primarily important as a waterfowl breeding area, we do winter 120,000 waterfowl from as far away as central Alaska and provide seasonal habitat for an additional 150,000 transients. Most are quarry to 12,000 licensed hunters, but they are also objects of interest and beauty to a million or more Long Islanders who make special note of their existence.

Based on their feeding habits, waterfowl can be classified as either *divers* or *dabblers*. Among the most numerous on Long Island are

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Stony Brook, NY 11794

greater scaup or broadbill (divers) and black ducks (dabblers). They both feed heavily on shellfish. In general, waterfowl utilize 26 of the 31 species of the bivalves and all 37 known species of the gastropods. The following table, based on the crop and gizzard analysis of waterfowl taken on Long Island, presents some idea of waterfowl feeding habits relative to shellfish.

PROPORTION OF SHELLFISH IN DIET OF LONG ISLAND WATERFOWL

Waterfowl	Number Examined	Percent Animal Matter	Shellfish Species	Study I	Study II
Dabblers	200	41%	Smooth mussel	8.7%	5.7%
			Soft clam	--	1.0%
Food other than shellfish				91.3%	93.3%
Divers	166	95%	Smooth mussel	65.0%	34.0%
			Soft clam	5.0%	2.3%
			Oyster drill	15.0%	2.3%
			Hard clam	1.0%	--
Food other than shellfish				14.0%	61.4%

The bulk of dabbler diets are made up of gem clams, mud snails, and salt marsh snails. The divers complement their diets with salt marsh snails and small surf clams, the latter often the exclusive shellfish resident of extremely soft bottom.

The shellfish resource on Long Island is rich and varied. Nearly every species is useful in one way or another to our own interests.

Shellfish for the Dinner Table

A.S. Taormina

Probably the highest and best use that we can put to the shellfish resource is to eat it. Wherever men have lived along the seacoasts of the world, shellfish have been in their diets.

Today, our food processing industry gives everyone the opportunity to have frozen or canned shellfish of excellent quality all year long. By the way, our oysters can be eaten during any month; forget that notion about the "R" months. Although shellfish such as little neck clams and oysters are often eaten raw, they are most delicious when prepared in any one of 100 or more recipes. In fact, cookbooks have been written just on shellfish alone. One such cookbook is *Shellfish Cookery* (MacMillan Co.). It contains 300 recipes and was written by two Long Island residents, Jane (Mrs. Haig) Chekenian from Nissequogue and Monica (Mrs. Fred) Meyer from Smithtown.

Unfortunately, a few of us "would be" gourmets seem to have difficulty digesting some shellfish. Some folks break out in hives, become nauseated, or have allergic reactions to particular components in shellfish. However, to the rest of us, shellfish make up a delicious and important part of our diets, and I trust will always be abundant and wholesome enough to be regularly available on our dinner tables.

Note: The shellfish at the luncheon were provided by the Long Island Shellfish Farmers Association.

Role of Public Agencies Other Than NYSDEC in Shellfish Management

A.S. Taormina

US DEPARTMENT OF COMMERCE, National Oceanic and Atmospheric Administration, National Marine Fisheries Service : A major role is to assist state programs with federal aid funds, primarily through Public Law 88-309, Aid to Commercial Fisheries. Another role is developing management strategies through federally funded cooperative state-federal programs, e.g., the surf clam. They are responsible for gathering catch and marketing statistics in cooperation with the states and publishing data for public dissemination.

US DEPARTMENT OF HEALTH, EDUCATION AND WELFARE, Food and Drug Administration: This agency's role is described in MacMillan's paper, *Public Health Significance of Shellfish Management*. Also, the Environmental Protection Agency (EPA) provides grants supporting estuarine monitoring for pesticides and heavy metals.

The following public agencies were invited to comment on the role their agency serves in managing the shellfish resource on Long Island. Here is a digest of their comments.

Atlantic States Marine Fisheries Commission
Mr. Irwin Alperin, Executive Director
1717 Massachusetts Avenue NW
Washington, DC 20036

A primary objective is to work with the member states in establishing uniform regulations relative to shellfish standards, particularly for the hard clam.

New York Sea Grant Institute
Mr. William Walters, Marine Advisory Specialist
Old Biology Building
State University of New York
Stony Brook, NY 11794

The New York Sea Grant Institute has two major roles bearing directly on the shellfish industry. The first, *research,* is presently focused on the following problems:

1. Shellfish processing waste treatment. Studies are under way to reduce the discharge of protein from processing plants and to utilize this material for production of a marketable food product.

2. Utilization of shellfish by-products. A valuable industrial enzyme has been located in surf clam viscera. Our researcher is now optimizing extraction processes and developing this product for the market.

3. Genetic studies of *Mercenaria*. These studies are beginning to develop identifiable population markers in hard clams, which will enable us to evaluate stocking programs and population estimates.

4. Shellfish (and fish) viral research. This research is being conducted by the NYS College of Veterinary Medicine at Cornell. Diseases in the wild population are being determined and analyzed.

5. Fishery policy studies. Dr. McHugh outlines his efforts in his presentation.

The second area of involvement, *extension,* is charged with the responsibility of developing educational programs and providing technical assistance to meet the needs of the industry. We are presently developing an industry advisory committee to increase the effectiveness of our extension program.

Our main programs to date have dealt with 1) technical and organizational assistance to cooperatives, 2) financial and business management information for independent fishermen, and 3) tax management programs and assistance.

Regional Marine Resources Council*
Mr. DeWitt Davies, Environmental Planner
H.L. Dennison Building, Veterans Memorial Highway
Hauppauge, NY 11787

The Council has published *Guidelines for the Management of Long Island Hard Clam Resources*. It hopes to receive a grant through the Regional Planning Board to do a waste water study (sewage treatment) consistent with maintaining the shellfish industry. The Council estimates the ultimate retail value of hard clams on Long Island to be $100 million a year.

Town of Hempstead
Harold Udell, Commissioner
Department of Conservation and Waterways
PO Box 548
Point Lookout, NY 11569

No shellfish harvesting is permitted within the waters of the Town of Hempstead, due to existing levels of pollution from sewage plant discharges and surface runoff. The Hempstead estuary has been undergoing water quality degradation for the past 25 years and presently receives nearly 100 million gallons of treated waste water and 60 million gallons of surface runoff and stream flow each day.

If the current wave of pressure for clean water persists, we could see a return to shellfish harvesting as a result of sewage plant construction and expansion, and plans to deal with surface runoff.

Law enforcement problems relative to diggers taking clams

*Committee of the Nassau-Suffolk Regional Planning Board

from uncertified waters are rapidly increasing. Our constables have made numerous arrests over the past months.

To ascertain what can be done, we are initiating an in-depth shellfish inventory of our underwater lands, together with a feasibility study for a large-scale depuration program. We believe a large-scale depuration plant, operated and monitored by our own FDA-certified laboratory, is an answer at this time. A precious resource would be made available and the number of uncertified clams on the market would be reduced.

We will not entertain any aspect calling for transfer or removal of clams out of our jurisdiction, and whatever management program we undertake will be solely for the benefit of the people of the Town of Hempstead.

Town of Oyster Bay
Mr. John Vander Veer
Commissioner of Environmental Control
150 Miller Place
Syosset, NY 11791

The town is concerned primarily with water quality monitoring and underwater leasing.

Town of Islip
Dr. Malcolm Hair
Environmental Consultant
Department of Environmental Control
577 Main Street
Islip, NY 11751

The town is concerned with wetlands restoration and coordination of town programs with state and county, especially relative to enforcement and management (primarily relaying or transplanting). They wish to determine what the standing crop of shellfish is on the 22,000 acres of town-owned bottom in Great South Bay and how fast the crop is being exploited and to what degree long-term productivity can be increased.

Management of New York's Hard Clam Fishery

J.L. McHugh

It does not take much searching to discover the most important commercial living marine resources of New York State. In 1974, according to statistics published by state and federal governments, about 35.5 million pounds of fish and shellfish were landed in New York ports. Fishermen received over $25 million for this catch, most of which was landed in Suffolk County. Nearly $21 million of this landed value was shellfish: mollusks, lobster, and crab. The greatest single harvest was hard clam, most coming from Great South Bay. Reported landings of hard clam in 1974 were slightly over 8 million pounds of meats (about 669,000 bushels of clams in the shell) with a landed value of nearly $13.5 million. Most people familiar with the industry believe that this is an underestimate. Whatever it is, a substantial residential and recreational catch must be added. One estimate has put the retail value of the harvest at $100 million.[1] This is a major industry that makes important contributions to the economy of local communities.

The coastal states of this nation have not been notably successful at husbanding the living resources of the sea. New York has been no exception, as the history of her commercial marine fisheries demonstrates.[2] Part of the problem has been lack of cooperation from other states, part has been caused recently by foreign fishing, but the major and most difficult problems are right here at home in the State of New York. Theoretically, at least, the hard clam resource should be amenable to management. Clams do not migrate, so cooperation of other states, or even of other local communities, is not

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Contribution 125 of the Marine Sciences Research Center, SUNY at Stony Brook

J.L. McHugh
Professor of Marine Resources
Marine Sciences Research Center
State University of New York
Stony Brook, NY 11794

necessary. Hard clams are not harvested by foreign fishermen, so it does no good to stand on the beach, shaking a fist at "the Russians." If any marine fishery resource can be managed by the state unilaterally, the hard clam resource is the most important place to begin. Yet until very recently, no serious attempts have been made. It is encouraging that in the last two years some of the towns that control bay bottom, led by the Town of Islip, have begun serious attempts to gather information necessary to conserve and manage this valuable resource. The state is also taking this responsibility seriously.

What are some of the major problems of the hard clam industry and how can they be solved? In the space available these can be discussed only briefly.

WATER POLLUTION

It is generally agreed that water quality ranks among the top problems. The rapidly growing human population of Long Island has added to the difficulty of control. More and more shallow coastal waters are being closed to shellfishing. This pollution not only creates health problems but also removes a growing proportion of the living resource from access by clam diggers. The solutions are pollution control, pollution abatement, and effective enforcement of pollution laws.

LAW ENFORCEMENT

Adequate law enforcement is absolutely essential to successful management of fisheries. The best program in the world will fail if enforcement fails. Enforcement is costly, and its success is affected by a number of complications, including extreme ease of access to the resource and lack of cooperation by many citizens. Success of enforcement also requires cooperation in the courts.

OBTAINING INFORMATION FOR MANAGEMENT

It is not commonly recognized that an adequate management program is totally dependent upon having certain information on the living resource, information presently not available for the hard clam resource in New York. Some of this information cannot be obtained without cooperation from those who dig clams for a living or for recreation. As a minimum, five kinds of information are needed: 1) how large is the resource, 2) how many clams of legal size are added each year by spawning and growth, 3) how many die from natural causes, 4) how many are removed by man, and 5) how do these quantities vary from year to year? Unless reasonably accurate information of this kind is available, management will be largely guesswork, and success not likely. Cooperation of all segments of the community is necessary. Confidentiality of information provided by individuals and companies must be assured.

PUBLIC COOPERATION

The need for public cooperation runs like a thread through all the major problems of the hard clam industry. Citizens have to *want* to make the program work; they have to *want* pollution control and abatement; they have to *want* to support reasonable law enforcement; and they have to *want* to cooperate in providing the necessary management information. To *want* to do these things requires an understanding of the reasons why, a belief that the program is logical and reasonable, and a desire for the common good in the long run. The only way to accomplish such levels of understanding and public spirit is to enlist the aid of all available media for public education. Public understanding and support are the keys to successful management. Can it be done?

CONCLUSIONS

The hard clam resource is a valuable natural resource that can provide food, income, and recreation forever to the citizens of the state if they husband the resource wisely. It must be recognized that this is a finite resource and a variable resource, which can be destroyed if the environment is not protected, and which can be destroyed if man removes more than nature replaces.

Management is possible by local communities and the state working together. A successful program can be a model of public planning and cooperation. Formidable obstacles lie in the way, most of them related to conflicts between short-term, selfish interests and long-term objectives. It is not at all certain that these obstacles can be overcome but that should not provide an excuse for failure to try.

NOTES

1. Nassau-Suffolk Regional Planning Board, Marine Resources Council, 1974. *Guidelines for the Management of Long Island Hard Clam Resources*. Hauppauge, NY.

2. McHugh, J.L. 1972. Marine Fisheries of New York State. US Dept. Commerce, NOAA, Natl. Marine Fish. Serv. *Fish. Bull.* 70(3):585-610.

Attitudes and Issues Raised by the Industry

To provide a logical format, the editors have integrated the individual presentations and prepared a summary of issues discussed by the following people who participated in the industry panel:

Mr. Edwin Furman
President
Southampton Town Baymen's Assn.

Mr. John German
President
Great South Bay Baymen's Assn.

Mr. George King
Representing
Independent Baymen

Mr. Stephen Lane
President
Long Island Shellfish Farmers Assn.

Mr. Richard Miller
Executive Secretary
Long Island Fishermen's Assn.

Mr. Nelson Slager
Secretary
Long Island Shellfish Farmers Assn.

DEPURATION

Depuration, defined as the process of placing shellfish from uncertified growing areas in a controlled environment until they purge themselves of pathogens if present, was one of the more controversial issues raised during the day. Depuration is strongly endorsed and vehemently opposed by various segments of the industry. Some point out that unless depuration is approved, a tremendous food resource will remain unavailable for public harvest and consumption. Opponents of depuration stress their concern for the potentially disastrous effect of any ensuing shellfish-related disease outbreak. It is generally accepted that data on depuration (especially viral) is incomplete and there may indeed be unresolved public health concerns. Marketing of depurated clams was discussed and reservations were conveyed concerning labeling requirements and their effects on the consumer. Depuration is already being practiced by both the state and local governments in their transplant programs and with soft clams under controlled "ultraviolet systems."

LEASING OF SHELLFISH GROUNDS

The industry was bitterly divided on the issue of leasing of public bottom for private exclusive shellfish harvest. Generally, the independent shellfish industry was opposed to any new leases and in some cases expressed desire that existing leases be terminated. The commercial companies contended that these areas are vital to their survival if they are to develop aquaculture to its maximum value. It was mentioned that the leasing policy of the state is currently being re-evaluated and no decision has been reached. The question of leasing of grounds not economically harvestable by individuals was raised, as was the issue of leasing of grounds beyond the depth that can be worked by hand tongs or rakes. Both these issues are under consideration in the state plan. Hopefully, a leasing policy can evolve that will enhance the future of both segments of the industry.

POLLUTION AND CLOSURE OF GROWING AREAS

If concensus was evident in any one area, it was most apparent in that of pollution abatement. Virtually all participants identified pollution as one of the most serious immediate threats we face. It was recommended that whatever necessary steps can be implemented should be done as soon as possible. The continual closure of shellfish areas by both point and nonpoint pollution must be reversed if we are to survive.

THE EFFECT OF GROUNDWATER CHANGES

This is a largely unexplored area. Industry and government data have revealed a general trend toward increased salinity in the shellfish areas. These increases in salinities are expected to decrease setting of shellfish as well as increase conditions favorable for predation. The development of

major ocean outfalls for processed sewage has been identified as a major factor in decreasing groundwater flow to the bays. It was agreed that this problem needs immediate analysis and corrective action. Recharge systems were proposed as a possible solution.

MARKET STANDARDS

The proposed standards were briefly mentioned and will be implemented in the near future. Terminology has been modified as per industry request. The export of seed to Pennsylvania and perhaps other areas was opposed and closure of this market was requested.

LAW ENFORCEMENT

It was mentioned that law enforcement needed strengthening. Although recent increases in effectiveness were lauded, it was felt more effort is necessary. It was reported that sentencing is generally minimal and that the courts need tightening.

TRANSPLANT PROGRAMS

The Department's efforts in transplanting were favorably received by the industry. The policy of concentrating the shellfish versus seeding over a scattered area was discussed. It was requested that transplant programs be expanded.

Appendix

Table 1. Amount and value of commercial shellfish landings in New York State[a]

Species	1973		1974	
Molluscan Shellfish	Bushels	Value	Bushels	Value
Hard clams	607,286	$11,175,115	669,452	$13,434,190
Soft clams	6,524	116,094	6,363	113,301
Razor clams	300	2,850	63	315
Surf clams	196,348	413,479	232,422	715,062
Oysters	185,668	3,260,045	207,211	3,748,735
Mussels	68,233	194,456	48,831	207,761
Sea scallops	21,600[b]	303,390	29,400	310,225
Bay scallops	24,100[b]	395,482	97,000	849,905
Conchs	2,980	10,243	3,613	16,314
Total Bushels	1,113,039		1,294,355	
Squid (lbs)	537,305[c]	96,514	963,699	178,350
Total Mollusks		$15,967,668		$19,574,158
Crustacean Shellfish				
Blue crabs (lbs)	--[c]	--	3,200	$ 645
Lobsters (lbs)	892,568[c]	$ 1,428,155	730,514	1,395,867
Total Value		$17,395,823		$20,970,670

[a]Statistics compiled primarily by Senior Marine Fisheries Technician (DEC) Walter Henry and do not include shellfish used for bait, as published in National Marine Fisheries Service current Fisheries Statistics, New York Landings.

[b]Scallops sold as gallons of meats: 1 gallon = 9 lbs. For this chart, assume yield of 7 lbs of meats per bushel of shell stock.

[c]Squid, crabs, lobsters sold by pound, not converted to bushels.

Table 2. People participating in marine recreational finfishing and shellfishing by state of residence, 1973-74

State of Residence	Recreational Fishing Households Number	90% Confidence Range Percent	Participants Number	90% Confidence Range Percent
Connecticut	307,000	± 2.3	658,000	± 10.0
Delaware	65,000	± 4.6	146,000	± 19.7
District of Columbia	45,000	± 3.9	92,000	± 32.6
Maine	86,000	± 2.1	203,000	± 12.1
Maryland	412,000	± 3.0	904,000	± 12.3
Massachusetts	626,000	± 2.8	1,430,000	± 13.3
New Hampshire	70,000	± 3.1	148,000	± 15.9
New Jersey	771,000	± 2.1	1,620,000	± 10.0
New York	1,360,000	± 2.0	2,980,000	± 12.1
Pennsylvania	583,000	± 1.6	1,235,000	± 14.4
Rhode Island	124,000	± 3.1	285,000	± 13.6
Vermont	18,000	± 3.3	39,000	± 26.7
Virginia	455,000	± 2.3	980,000	± 10.2
West Virginia	64,000	± 1.8	136,000	± 20.7
Total	4,986,000		10,856,000	

Source: Current Fisheries Statistics 6236, National Marine Fisheries Service, NOAA

Table 3. List of scientific and common names of commercially and recreationally harvested shellfish in New York

Phylum ARTHROPODA	
Class CRUSTACEA	
Homarus americanus	Lobster
Palaemonetes vulgaris	Grass Shrimp (B)
Crangon septemspinosus	Sand Shrimp (B)
Cancer borealis	Jonah Crab
Cancer irroratus	Rock Crab
Callinectes sapidus	Blue Crab
Carcinus maenas	Green Crab (B)
Geryon quinquedens	Red Crab
Uca sp.	Fiddler Crabs (B)
Ovalipes ocellatus	Sand Crab (B)
Pagurus pollicaris	Hermit Crab (B)
Class MEROSTOMATA	
Limulus polyphemus	Horseshoe Crab (B)
Phylum MOLLUSCA	
Class CEPHALOPODA	
Loligo pealei	Long Finned Squid
Ilex illacebrosus	Short Finned Squid
Class GASTROPODA	
Busycon canaliculatum	Channeled Whelk
Busycon carica	Knobbed Whelk
Crepidula fornicata	Slipper Limpet
Littorina littorea	Periwinkle
Lunatia heros	Moon Snail (B)
Polinices duplicatus	Moon Snail (B)
Class BIVALVIA	
Arctica islandica	Ocean Quahog
Crassostrea virginica	Oyster
Aequipecten irradians	Bay Scallop
Ensis sp.	Razor Clams
Mercenaria mercenaria	Hard Clam
Modiolus demissus	Ribbed Mussel (B)
Mya arenaria	Soft Clam
Mytilus edulis	Blue Mussel
Placopecten magellenicus	Sea Scallop
Spisula solidissima	Surf Clam

(B)--harvested primarily for bait

Table 4. Cross list of common names of shellfish

Hard Clam	Little Neck Clam Cherrystone Clam Chowder Clam Quahog Hard Shell Clam Round Clam Seed Clam
Soft Clam	Steamer Long Neck Clam Sand Clam Soft Shell Clam Long Clam Piss Clam
Surf Clam	Skimmer Hen Clam Ocean Clam Sea Clam
Ocean Quahog	Mahogany Clam Black Quahog
Blue Mussel	Mussel Edible Mussel Sea Mussel
Oyster	Eastern Oyster Virginia Oyster
Blue Crab	Hard Shelled Crab Soft Shelled Crab
Short Fin Squid	Northern Squid Summer Squid
Long Fin Squid	Common Squid Southern Squid
Sand Crab	Calico Crab

Table 5. Example of order certifying condition of shellfish grounds within a township

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ENVIRONMENTAL CONTROL UNIT
Stony Brook, NY 11794

NOTICE TO ALL SHELLFISH HARVESTERS

NOTICE OF CONDITION OF ALL SHELLFISH GROUNDS LOCATED WITHIN OR ADJACENT TO THE TOWN OF BABYLON, SUFFOLK COUNTY, STATE OF NEW YORK.

Excerpted from Part 41 of the Official Compilation of Codes, Rules and Regulations of the State of New York.

The following is a statement of sanitary condition of shellfish lands in New York State. Notice of changes in classification will be sent to baymen by mail as and when they may occur. Whenever used in this Part 41:

(a) the term "mile" refers to statute mile;

(b) the term "monument" refers to a permanent post of marker placed on or near the shore by the Department of Environmental Conservation to serve as a landmark in establishing the lines of closure.

Section 41.3 Shellfish Lands in Suffolk County.

(a) The shellfish lands in Suffolk County, except those listed in subdivision (b) are in such sanitary condition that shellfish thereon may be taken for use as food, and such lands are designated as certified areas.

(b) The following shellfish lands in Suffolk County are in such sanitary condition that shellfish thereon shall not be taken for use as food and such lands are designated as uncertified areas.

Town of Babylon

Great South Bay

1. All that area, including adjacent creeks and canals, north of a line extending easterly from the southernmost tip of the bulkhead at Unqua Point to the southeastern end of the dock at the Unqua-Corinthian Yacht Club (local landmark)....

Note: All reference points in the Town of Babylon taken from U.S.C. & G.S. Nautical Chart #120-SC dated December 1971, except as indicated as "local landmark."

Ogden Reid
Commissioner

Dated: Albany, N.Y.
April 8, 1969

As Amended 1/1/75

As Amended thru
October 23, 1972

By:

Robert B. MacMillan
Supervisor of Marine
Environmental Control

STATE LAW PROHIBITS THE TAKING OF SHELLFISH FROM THE UNCERTIFIED AREAS OF THE SHELLFISH LANDS AND WATERS OF THE STATE.

If you intend to harvest shellfish from the waters of any town other than that in which you claim residency, then contact the offices at New York State Department of Environmental Conservation at Stony Brook and obtain listings of the uncertified areas in that town.

Table 6. Summary of commercial fishing permits, 1974

Marine and Coastal District
New York State Department of Environmental Conservation

Type	No. Issued	Fee	Value
Digger	8,027	$ 7.50	$ 60,202.50
Shipper			
Class A (Processor)	27	100.00	2,700.00
Class B (Reshipper, Interstate)	76	50.00	3,800.00
Class C (Reshipper, Intrastate)	119	25.00	2,975.00
Class D (Grower or Buyer, Orig. shipper)	66	50.00	3,300.00
Class E (Individual, Interstate)	9	10.00	90.00
Class F (Individual, Intrastate)	852	2.50	3,130.00
Class G (Scallop Shucker, Intrastate)	92	10.00	920.00
Bed Permit ($.25/acre x acres on permit)	18		4,123.83
Shellfish Hatchery	6	100.00	600.00
Lobster			
Resident	745	5.00	3,725.00
Nonresident	76	50.00	3,800.00
Menhaden	28		3,675.00
Nonresident Food Fish	37		8,316.00
Crab			
Resident	8	15.00	120.00
Nonresident	11	25.00	275.00
Total	10,197		$101,701.50

Table 7. Summary of commercial shellfish digger permits issued by township, 1970-74

New York State Department of Environmental Conservation

Township	1970	1971	1972	1973	1974
Hempstead	148	172	104	98	83
Oyster Bay	69	92	80	80	102
North Hempstead	3	6	9	7	7
Babylon	901	1,064	957	1,130	1,501
Islip	1,973	2,235	2,326	2,384	2,869
Brookhaven	1,025	1,218	1,251	1,282	1,418
Southampton	468	386	368	463	638
East Hampton	263	228	193	362	435
Shelter Island	94	66	83	95	120
Southold	306	268	207	322	577
Riverhead	82	67	60	64	98
Smithtown	32	30	47	45	48
Huntington	137	164	114	89	82
Staten Island	1	--	--	2	2
Brooklyn	14	10	7	6	12
Queens	18	14	15	18	15
Manhattan	4	1	1	4	5
Bronx	3	2	5	3	4
Westchester	2	3	4	7	8
Upstate	4	--	1	1	3
Total Permits	5,547	6,026	5,832	6,462	8,027

NOTE: The *digger's permit*, as defined in Section 13-0311 of the Environmental Conservation Law, authorizes a person who has been a resident of this state for six months immediately prior to the date of application to take shellfish from underwater lands in the state for commercial purposes.

Table 8. Organization chart: Division of Marine and Coastal Resources, Bureau of Shellfisheries and Algae

Supv. of Marine Environmental Control

Senior Steno

Steno

Section

SHELLFISH SAFETY PROGRAM

Assoc. Aq. Biologist (Marine)

Water Quality Studies

Mar. Res. Sanitarian

Jr. Engineer

Sr. Mar. Res. Technician

Shellfish Inspection

Sr. Food Inspector

Food Inspector

Food Inspector

Microbiology Laboratory

Sr. Lab. Technician

Sr. Lab. Technician

Lab. Worker

Chemistry Laboratory

Sr. Analytical Chemist

Sr. Lab. Technician

Permit Office (Marine)

Typist

Section

MANAGEMENT AND INVESTIGATIONS

Supv. Aq. Biologist (Marine)

Shellfish Relaying & Underwater Leasing

Sr. Aq. Biologist (Marine)

Sr. Mar. Res. Technician

Commercial Landings Statistics

Sr. Mar. Res. Technician

Investigations

Sewer Outfall--Algae & Plankton

Sr. Mar. Res. Technician

FEDERAL AID PROJECTS 88-309

Bay Scallop

Sr. Aq. Biologist (Marine)

Mar. Res. Technician

Comparative Bay Study

Sr. Aq. Biologist (Marine)

Mar. Res. Technician

Mobile Lab (Shellfish Safety)

Sr. Lab. Technician

Flax Pond Lab

Maintenance Man

Janitor

Janitor

FUNCTION: The Bureau has primary responsibility for maintaining the viability of the state's shellfish resources. The value of the commercial shellfish industry is estimated at approximately $100 million. The Bureau is responsible for the public health aspects related to the industry and in this capacity works closely with the Food and Drug Administration. The Bureau is also responsible for management programs within the industry with special emphasis on those harbors and embayments within the Marine and Coastal District.

COVER PHOTO by Frank Greenfield, courtesy of the Town of Islip

Opening of a transplant area brings scores of clam diggers to the harvest in Great South Bay off Bay Shore. These clams have been taken from uncertified areas and transplanted in this certified area by Islip Town Department of Environmental Control's Bay Management Division.