

History of Molluscan Fishery Regulations and the Shellfish Officer Service in Massachusetts

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Introduction

The beds of oysters, *Crassostrea virginica*, and softshell clams, *Mya arenaria*, on the south coasts of Cape Cod Bay, Mass., must have staggered the minds of the settlers of the Plymouth Colony in the 1620's because they were extensive and well populated. The outer

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ABSTRACT—Oysters, *Crassostrea virginica*, and softshell clams, *Mya arenaria*, along the Massachusetts coast were harvested by European colonists beginning in the 1600's. By the 1700's, official Commonwealth rules were established to regulate their harvests. In the final quarter of the 1800's, commercial fishermen began harvesting northern quahogs, Mercenaria mercenaria, and northern bay scallops, *Argopecten irradians irradians*, and regulations established by the Massachusetts Legislature were applied to their harvests also. Constables (also termed wardens), whose salaries were paid by the local towns, enforced the regulations, which centered on restricting harvests to certain seasons, preventing seed from being taken, and personal daily limits on harvests. In 1933, the Massachusetts Legislature turned over shellfisheries management to individual towns. Local constables (wardens) enforced the rules. In the 1970's, the Massachusetts Shellfish Officers Association was formed, and was officially incorporated in 2000, to help the constables deal with increasing environmental problems in estuaries where fishermen harvest mollusks. The constables' stewardship of the molluscan resources and the estuarine environments and promotion of the fisheries has become increasingly complex.

section of the Cape Cod peninsula was named Eastham, with reference to a section of London known as East Ham, and it included what is now known as Wellfleet, Eastham, and Orleans (Fig. 1). This area so reminded the settlers of the bountiful Billingsgate ward of London that they gave that part of the land the same name. The town of Eastham was incorporated in 1651. From 1641 to 1647, every family was permitted unlimited harvest of the oysters and softshell clams for home consumption and use as bait for catching finfish (Pratt, 1844).

This paper describes the regulations enacted to conserve the molluscan stocks because they were being harvested in increasingly larger quantities as time passed, and the development of the Massachusetts shellfish officer service (Table 1) (Fig. 2). Some of the information was obtained from town records in Eastham and a book authored by R. A. Rider (1989).

First Regulations

Massachusetts coastal communities have had "wardens" for many years who were responsible for the management and oversight of the towns' fisheries (Fig. 3). In the first half of the 1700's, the unregulated taking of game, fish, and shellfish drove many species to the brink of extinction. In 1739, Massachusetts enacted game laws and employed "State Game Wardens" to enforce environmental laws. Many towns appointed their own, mostly volunteer "Game Protectors" (Malone¹). By 1769, harvesting had diminished the molluscan

stocks substantially. A description of the oyster fishery in the northern part of the town now named Wellfleet stated "... Oysters were found in great abundance on the flats, at the first settlement but at this time the number of people had so increased and such quantities were taken for local consumption and for Boston market, that it became necessary to prevent their entire destruction for the district to take measures to preserve and propagate them" (Pratt, 1844). In 1772, an Act of the General Court of Massachusetts was passed regulating the taking of oysters in Billingsgate Bay (near Wellfleet). The residents disagreed and, "Now voted by the district to ask the court to repeal the act so that in the three summer months they should not be taken for Boston market, nor in July and August for the use of the inhabitants" (Pratt, 1844).

In 1773, the inhabitants of the town voted to the effect that "whereas the oyster fishery in this district was the principal support of many of the inhabitants and of great advantage to the province in general and whereas it had been greatly hurt and damaged by persons taking the young oysters and would be ruined if not timely prevented, it was agreed to make and adopt bylaws to preserve them. A committee was chosen to enforce the penalty against all persons who should violate the regulations" (Pratt, 1844). Thus perhaps the first enforcement there was accomplished by committee. After 1773, shellfish became a town responsibility for the first time (Rider, 1989). There is some evidence that the colonial subjects were frustrated with the British rule and perhaps this factored into the general sentiment

¹Malone, Brian G., Director of Natural Resources, Town of Dennis, Mass., Personal commun., 2009.

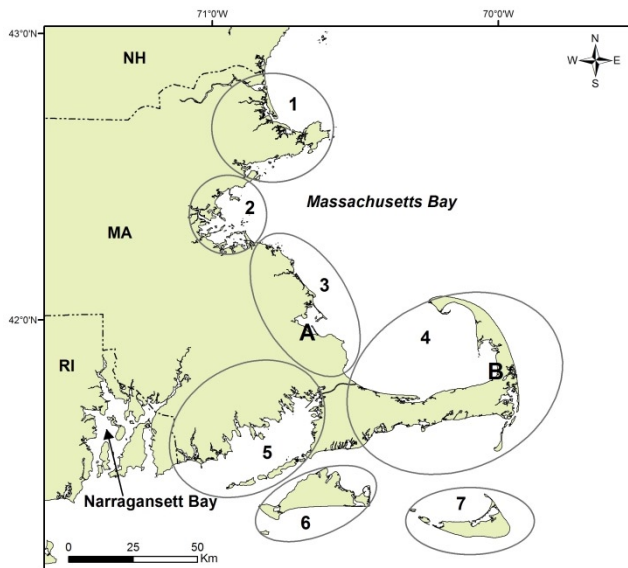


Figure 1.—Location A was the site of the Plymouth Colony, and Location B was the site of Eastham. The coastline of Massachusetts has been grouped into 7 areas that contain towns or cities producing commercial mollusks. Area 1 has 12 towns: Salisbury, Newburyport, Newbury, Rowley, Ipswich, Essex, Gloucester, Rockport, Manchester, Beverly, Marblehead, and Salem—principal species: softshell clams; Area 2 has 10 towns: Swampscot, Lynn, Nahant, Revere, Winthrop, Boston, Quincy, Weymouth, Hingham, and Hull—principal species: softshell clams; Area 3 has 6 towns: Cohasset, Scituate, Marshfield, Duxbury, Kingston, and Plymouth—principal species: softshell clams and oysters; Area 4 has 13 towns: Sandwich (no fishery but shares one with Bourne), Barnstable, Dennis, Brewster, Eastham, Wellfleet, Truro, Provincetown (shares a fishery with Truro), Orleans, Chatham, Harwich, Yarmouth, and Mashpee—principal species: quahogs, softshell clams, oysters, and bay scallops; Area 5 has 8 towns: Bourne, Falmouth, Wareham, Mattapoisett, Fairhaven, New Bedford, Dartmouth, and Westport—principal species: bay scallops, quahogs, and oysters; Area 6 has 6 towns: Oak Bluffs, Edgartown, West Tisbury, Tisbury (Vineyard Haven), Chilmark, and Aquinnah—principal species: bay scallops and quahogs; and Area 7 has 1 town: Nantucket—principal species: bay scallops.



Figure 2.—A shellfish constable is discussing matters with a softshell clam harvester in Orleans. The photographers of this and all other images were various shellfish constables.

Table 1.—History of actions to protect natural resources in town of Dennis, Mass. (Malone¹).

Year	Actions
1869	Fish Committee formed.
1903	Town appoints first volunteer “Fish Wardens.”
1935	Town appoints volunteer “Fish and Game Wardens.”
1936	Town appoints volunteer “Shellfish and Clam Wardens.”
1939	Town appoints volunteer “Shellfish Constables.”
1941	Town appoints first full-time salaried “Shellfish Constable.”
1963	Town appoints a person to position of “Conservation Officer.”
1969	Town adds two assistant positions to town roster: 1) assistant “Shellfish Constable” and assistant “Conservation Officer.”
1975	Title of “Conservation Officer” is changed to “Natural Resource Officer.” The title “Shellfish Constable” remained.

¹ Malone, Brian G., Director of Natural Resources, Town of Dennis, Mass., Personal commun., 2009.

regarding the revolutionary tone of the times. In 1781, a town meeting in Wareham voted to join with the town of Sandwich to ask the Massachusetts General Court to pass an act to preserve the shellfish (Rider, 1989).

In 1763, what is now Wellfleet, which had large oyster populations, became a separate entity, and soon after the American Revolution, 1775–83, the large land area of Eastham began to be further divided. In 1797, the southerly portion known as Orleans became an independent town. Included in the articles of separation were the rights to the shellfishery of either Eastham or Orleans to be retained by the inhabitants of the other as if they were residents of that town. A resident of one town could purchase a commercial

permit in the other town as if they were a resident of that town. This remains one of the few instances of towns in the commonwealth where the shellfishery was shared on a commercial level between neighboring towns. In addition, the towns recognized the need for regulations and their enforcement to protect the molluscan resources due to their high value. The threat of overfishing oysters was so great that the town selectmen voted to choose a committee to “prosecute the inhabitants of other towns if they took oysters in the town of Orleans” (Pratt, 1844).

At the time, the total harvest of softshell clams was listed as 100 barrels with a value of \$5.00 per barrel. Later estimates of the quantity of the clams in the Pleasant Bay section of Orleans

was 500 barrels in 1800 and 1,000 barrels in 1802; from 12 to 18 bushels were required to fill a barrel which was then worth \$6.00 when full. From 100 to 200 persons were employed at least part-time in the fishery. The economic value of a bushel of clams was equal to that of 6–8 bushels of corn.

The first committee on shellfish in Wareham was appointed at the annual town meeting on 6 March 1819. The subsequent committees were chosen at each annual town meeting up to 1902.

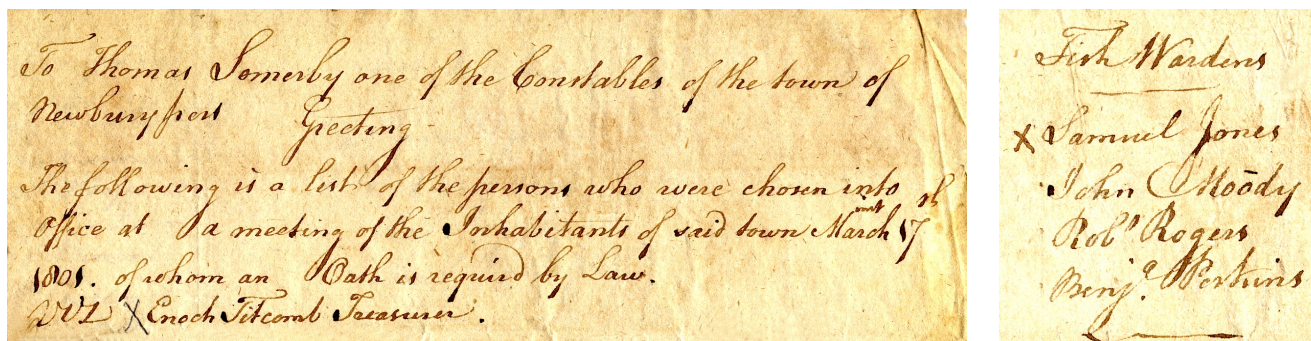


Figure 3.— Fish Wardens of Newburyport chosen along with other town officers in 1801.

A single person later was chosen by ballot to be the shellfish warden, overseeing the shellfish and the river herring, *Alosa pseudoharengus* (alewife) and *Alosa aestivalis* (blueback). In the mid 1800's, the position was absorbed into the harbormaster's duties (Rider, 1989). The concept of shellfishery management grew slowly in the 1800's, perhaps beginning with a reference in 1829 to a town meeting in Eastham which in awarding a petition to raise oysters advised, "That no person shall steal the same." Still, different species were often viewed and treated differently (Pratt, 1844).

The term "inexhaustible supply" was used by Pratt (1844) to describe the clam populations because their supply on the flats would recover completely in 2 years after having been mostly "fished out," due to regular sets of seed. The concept of protection appears to have been aligned more with economic stability than ecological well-being.

During the 1800's, the overall control of the laws pertaining to shellfisheries was in the hands of the Commonwealth of Massachusetts. They were overseen by the Commonwealth Fish and Game Commission, at least in the early 1900's. However, various efforts were under way to allow local towns or groups of towns to have some control of their own shellfisheries. Ingersoll (1887), in his descriptions of the shellfisheries of Massachusetts in the 1870's, stated that town laws placed regulations of the local beds into the hands of the town selectmen who then issued annual licenses to local citizens

to harvest the mollusks. The town clerks in each town physically issued the shellfish licenses (*Fairhaven Star*, 9 Oct. 1897).

Enforcers of laws were local officers under the employment of the towns. Eastham established positions with the titles, "Fish Warden" and "Fish Constable" to enforce the rules. In some towns, the officers were referred to as wardens or constables (*Fairhaven Star*, 1 Dec. 1888; 15 Oct. 1898; 29 Oct. 1898; *Boston Daily Globe*, 1 Jan. 1896). In 1880, the Commonwealth of Massachusetts legislature passed an act to give the towns the right to regulate eels, *Anguilla rostrata*; clams; quahogs, *Mercenaria mercenaria*; and bay scallops, *Argopecten irradians irradians* within their waters. The town regulations were somewhat informal with the commonwealth being in formal control. In 1885, a closed season for scallops, from April until September, and a statewide limit of 25 bushels/person/day were established (Belding, 1910).

The *Fairhaven Star* and *Boston Daily Globe* newspapers list some actions by fish wardens and constables against violators in the late 1880's. The 1895 annual report of the town of Eastham listed the names of persons who held the title of "Fish Warden." They were elected at the annual Town Meeting. Their duties and responsibilities included overseeing the various fisheries in town including harvesting shellfish, the use of eel fykes, and herring runs. In 1899, the fish warden was paid \$3.00 for the year.

Legislation for Private Leasing

In 1904, the first state legislation regarding protection and cultivation of mollusks in Eastham, Orleans, and Wellfleet (Acts of 1904, Chapt. 270) was passed with several provisions:

- 1) A permit system for issuance to the residents was established;
- 2) A minimum size for quahogs, 1½ inches (38 mm) widest part, was set;
- 3) A limit of 1 bu/day for personal consumption and 1 bu/day for fish bait was established;
- 4) The selectmen could issue permits to "bed" quahogs on private leases, that had:
 - a) a maximum of 75 ft²;
 - b) no shellfish already present on the beds;
 - c) unobstructed natural navigable waterways.

Moreover the private rights of any person were not to be impaired. The penalties were a fine not more than \$100, or 6 months imprisonment, or both.

The 1905 Eastham Annual Report reflects the acceptance by the town meeting of this statute as well as another entry which lists monies expended and "expenses to Boston on Quahog Act" (Anonymous, 1905). In 1906, the receipts for "oyster grants" were listed at \$23.00 without reference to their number or location.

Studies by David L. Belding

In 1905, the Massachusetts Commissioners of Fisheries and Game hired for

3 years a 21-year-old biologist named David L. Belding, a Williams College biology graduate, to conduct studies of the commercial mollusks and their fisheries in the state. Belding performed most of his work on the Lower Cape, principally in Wellfleet. He wrote a series of publications that described the biology and individual fisheries of quahogs, softshell clams, bay scallops, and oysters throughout the state (Belding, 1909a,b; 1910, 1912, 1931). The shellfishing bays and the numbers of fishermen, boats, types and value of gear, and economics were included. Belding's work became the cornerstone for the understanding of the natural history of the commercial mollusks and the overview of the molluscan fisheries in Massachusetts.

Belding reported that the history of management had consisted largely of closing beds to harvesting with little attention paid to propagation efforts. In the introduction to his quahog booklet (Belding, 1912), he called for seeding the public flats by the various towns and the state as well as the introduction of more private "grants," now know as "aquaculture lease sites."

Belding (1909a) discussed the possibility that mollusks would be depleted if an unlimited number of fishermen were allowed to harvest them, and he described the laws of supply and demand which produced enormous fishing pressure on the mollusks when the demand was high and prices were good. Belding apparently felt that the large number of boats (100) in the Wellfleet quahog raking fleet was threatening the stocks. He strongly supported the concept of local control and town rule of the beds, and he believed that the private cultivation of shellfish was required to sustain the fisheries. To him, this would involve the planting of seed shellfish on the beds if the abundances of various species were to remain as commercially viable.

Belding also documented the economic viability of the aquaculture industry and argued for many management strategies which are still valid today. They include: 1) planting spawners on beds to assist nature in increas-

ing the supply of seed, 2) informing the fishermen about the importance of seed so they will not take it from the beds, 3) doing away with soaking bay scallop muscles in fresh water to swell them before marketing, 4) providing better cooperation between commission merchants and fishermen, and 5) increasing the popular demand for shellfish by improving transportation facilities and advertising them as good foods. Belding did not consider increasing the abundances of the mollusks by improving the condition of their habitats, i.e. controlling predators, spreading shells to collect oyster spat, or planting eelgrass on bare bottoms. This concept of improving habitats has been used in other states to enhance abundances of oysters.

Reducing State Limits on Bay Scallop Harvests

The Massachusetts oyster and soft-shell clam fisheries were well established throughout the 1800's, but the quahog and bay scallop fisheries were relatively undeveloped until that century's last quarter. In the 1870's, fishermen began digging quahogs with long-handled rakes from their anchored catboats and taking bay scallops with hand dredges from sailing catboats. The numbers of days and hours each week that the catboats could harvest scallops was limited by weather conditions because the winds were irregular: catboats could not work during calm or stormy days.

The state allowed a daily limit of 35 bushels/boat to be taken, a quantity sufficiently large to enable the fishery to be profitable even though the number of harvesting days in a week might be limited. Shortly after 1900, the fishermen were installing engines in their catboats, enabling them to dredge for the scallops many more days and also in more locations. So, in 1909, the daily harvest limit was reduced to 10 bushels/man and no more than 20 bushels/2-man boat. During afternoons when the boats were returning from the beds with the shellfish, the shellfish wardens walked along their waterfronts to make sure the fishermen had not exceeded that limit or had not taken seed. This limit remains

in effect today (Mass. General Laws, Chapt. 130, Sect. 72).

By the mid 1920's, Massachusetts towns were regulating their own molluscan fisheries informally with little influence from the state. For example in Eastham, the voters "left the disposition of the shellfishery in the hands of the Selectmen." (Belding, 1910).

The company Cape Cod Oyster Farms² held leases in the 1920's that totaled some 350 acres in Eastham waters. The town charged them an annual rental fee of \$1.47/acre. On public beds, annual shellfish licenses were issued to the commercial harvesters for either the "flats" at a fee of \$1.00 or the "bay" at a fee of \$5.00. Requests for dredging in Cape Cod Bay were reviewed by the selectmen but not necessarily permitted. From 50 to 60 "bay" permits were issued annually.

Town Control: Shellfish Constables in the Towns

About 25 years after Belding's publications, the State Legislature established a statewide protocol for the protection and propagation of the shellfishery. This came in the form of Chapter 329 of the Acts of 1933, which established what is now known as Chapter 130 of the General Laws of Massachusetts. The overall control of shellfisheries, then under the auspices of the State of Massachusetts, was transferred to each town. Massachusetts then had 78 coastal cities and towns (Anonymous, 2004), of which 56 were involved with shellfisheries (Fig. 1). If, by the vote of a town meeting, a town adopted the provisions of the law, the selectmen could then establish rules and provide for the designation of a shellfish constable (elected or appointed) "for the detection and prosecution of violations of the laws of the commonwealth or local ordinances, rules or regulations relative to shellfish or shellfisheries." This is the first time in the legislation that the term "constable" is formally identified. Considerable authority was given to this position.

²Mention of trade names or commercial firms does not imply endorsement by the National Marine Fisheries Service, NOAA.

The shellfish constable and also coastal wardens and the State Director of Marine Fisheries were given the power to search any boat, vessel, or vehicle without a warrant where there was probable cause to believe a rule violation was involved. This authority remains in place to this day, and it is remarkable because it permits such searches without an official government warrant.

The early shellfish constable was a citizen of his town and the town paid his salary. He knew the fishermen and their families. In the 1940's and 1950's,

most constables were men in their 50's and older and most had been shellfishermen. They did not wear a uniform (Fig. 4). During the 1930's, the towns had reduced the daily scallop limit to between 3 and 7 bushels/person/day; the quantity varied among the towns. The purpose was to lengthen the scallop season so fishermen would earn incomes for a longer time each season during the 1930's economic depression. The reduced limits have remained in effect.

The town of Eastham adopted the provisions of Chapter 130 at a town meeting

on 1 Feb. 1937—some 5 years later. The article which provided for that action also directed that the townspeople elect a “shellfish constable.” An article was passed to appropriate the sum of \$300 each year to pay the shellfish constable who was required to work a minimum of 600 hours during the year. In addition, the sum of \$350 was appropriated for expenses including the transplanting of seed shellfish. The town also had three fish constables who presumably continued to enforce regulations concerning the finfish.

By 1940, the town had established a so-called family shellfish permit, and in that year issued 500 such permits at \$1.00 each and 30 commercial permits at \$2.00 each. Many other revisions to the statute relative to the duties of shellfish constables have been made, including the addition of enforcement of the lobster regulations. The 1937 Act marked a distinct departure from shellfish management in many other coastal states, where there was no local management control and all the enforcement and propagation efforts are undertaken by either the state or county government.

Belding was also concerned about pollution contaminating shellfish growing waters. A revision to Chapter 130, passed by the state in 1941, provided for penalties for those persons who were found polluting waters in which shellfish were growing. The State Legislature also established a purification plant in 1928 in Newburyport to treat clams harvested from those areas before they were put on the market (Anonymous, 2004).

The Shellfish Constable's Duties

During the late 1880's and through most of the 1900's, the primary function of the shellfish officers was to enforce regulations. A main goal of the management laws was to assure equitable harvests of the molluscan crop for as many people as possible. The officer made sure that all fishermen had licenses and did not harvest 1) out of season, 2) at night, 3) more than the town daily limit, and 4) take seed from the beds (Fig. 5).

The limit rule was one of the most difficult to control, especially with bay scallops, because they can be easy to



Figure 4—Top: Shellfish constable, locally referred to as “fish warden,” in Edgartown supervising the opening of Edgartown Great Pond to the Atlantic Ocean, in about 1950. Bottom: Bulldozer digging a channel through South Beach to open Edgartown Great Pond to the Atlantic Ocean, about 1950. During that period, the pond was opened once a year and in the spring. The purpose was to increase the salinity of the pond's water and thus allow softshell clams to grow and fatten. Nowadays, the pond is opened 2–3 times a year for the benefit of the clams and also oysters.

harvest and conceal. The constables also have served as herring (alewife), *Alosa pseudoharengus*, wardens if herring runs are present in their towns. They strive to maintain the runs in good condition between the marine waters and the freshwater ponds for the fish, and they enforce catch regulations.

Fishermen have purchased their shellfishing licenses at the town clerk's offices. When the season for a shellfish species begins, the shellfish constable obtains a list of people who own a commercial or a recreational shellfish license from this office, and then surveys the beds from shore or by boat to determine whether all persons have licenses. Constables are "user friendly" and allow fishermen without a license to purchase them before they go again without making a formal charge. A "good" constable has been regarded as one who was consistent and applied the law firmly but without discrimination.

The percentage of violations was probably low in earlier years because the shellfishing communities were "more closed" then. Within a town, the violation of any law, such as stealing property, was rare among its citizens, because such an act could bring considerable shame to him and his family. It was also rare for a town shellfisherman to violate a regulation. During a harvesting season, most fishermen rarely saw the town shellfish officer. The fishermen also regulated one another to an extent by challenging a persistent violator.

In recent years, an average of 25% of commercial fishermen throughout the State of Massachusetts commits some violation, mainly harvesting without possessing a license, harvesting in a closed area, or taking seed, in a given year. Penalties for violations include fines and suspensions of licenses (Sherman³).

The town shellfish constables have an office, commonly shared with the harbor master or environmental officer. The office is usually located in the town hall or in a small building at a town dock.

³Sherman, G. President of the Massachusetts Shellfish Officers Association and Shellfish Constable, Town of Westport, Mass. Personal commun., 2008.



Figure 5.—Edgartown shellfish constable or "fish warden" holding a seed bay scallop he found in the harvest of a scalloper unloading at a shore of Sengekontacket Pond. Massachusetts allows no more than 3% seed, by count but not volume, in relation to the total scallops landed by fishermen. Fishermen rarely take many seed because they are easy to separate from the larger fully-grown scallops they sell.

He reports to the town's selectmen or the town shellfish board (if one exists), to describe his activities and problems about once a month.

One of his duties is to estimate the daily landings of each shellfish species. He does this by observing the numbers of fishermen on each of the beds and estimating the quantities of mollusks, by species, each will harvest. He maintains daily log sheets, and at the end of each year he adds up the totals and sends them to the State Division of Marine Fisheries (DMF) office, which then tallies the totals from each constable to determine the state landings for the year. State officials regard the totals that the constables submit each year as only rough estimates of actual landings, because the constables cannot monitor all the landings. The data are kept on file in the state office and a copy is sent to NOAA's NMFS, Fisheries Statistics Office in Silver Spring, Md. Annual landings records have been maintained

from 1880 to the present (Table 2), and they are available to researchers and the general public.

Each Massachusetts town has bays of different sizes and also environments. Their predominant species could be oysters, softshell clams, quahogs, bay scallops, or various combinations of each. The conditions are so variable that local knowledge is a critical part of the successful implementation of any regulatory or conservation effort. Thus, the shellfish constable in each town has had to pursue his own approach to management. The towns gradually saw the need for deputy shellfish constables who are employed either part- or full-time.

The MSOA

During the late 1950's and early 1960's, an awareness developed that estuaries needed to be "healthy" to continue to produce mollusks and be good nurseries for juvenile finfishes. Various research studies and popular



Figure 6.—Emblem of the Massachusetts Shellfish Officers Association.

literature were documenting that salt marsh habitats were valuable nurseries and sources of nutrients in estuaries, and they described how important estuarine systems were being destroyed by dredging and filling.

Shellfish constables were aware of the pressing need to preserve the estuarine habitats, and they collaborated with legislators to produce a series of “Estuarine Reports,” which spanned from 1965 through the early 1970’s, that named all the major estuaries of the state with an emphasis on the need for legal protection of their wetlands (Jerome et al., 1968). Subsequently, a law, known as the Jones Law, was enacted to protect estuarine environments from wholesale demolition of wetlands and shellfish beds. This important step was the catalyst that resulted in the formation of the Massachusetts Shellfish Officers Association (MSOA), a loose association of constables with an elected Board of Directors and a President. The MSOA was formed during the 1970’s and was officially incorporated in 2000 with a filing with the State of Massachusetts Secretary of State and Attorney General.

Since the MSOA has been organized, ideas and successful techniques can be effectively shared, and collaborations among towns are possible. As a symbol of continuity, the constables are encouraged to wear a standardized green jacket and cap with an official

Table 2.—Landings in bushels of the most important estuarine mollusks in Massachusetts, every 25 years, 1900–2000. Data were collected by shellfish wardens and constables.

Year	Mollusks			
	Northern quahog	Softshell clam	Bay scallop	Oyster
1900 ¹	71,000	175,000	100,000	93,000
1925 ¹	138,000	138,000	206,000	86,000
1950 ¹	168,000	117,000	164,000	33,000
1975 ²	93,000	86,000	275,000	8,700
2000 ²	123,000	46,000	4,120	1,300

¹ Source: Lyles, 1969.

² Source: NMFS Annual Landings Statistics.

emblem on them (Fig. 6). Meetings of the constables have been held every 3 months. They are in different towns each time so that some constables have a shorter distance to travel to at least one of the meetings each year. From 40 to 50 constables or deputy constables attend each meeting, driving from their towns early in the morning and returning home in the evening.

The meetings allow the constables to interact socially, discuss topics of common interest, hear lectures from state officials and biologists, and have a noontime meal. The DMF has been an integral part of the group, and 2–4 of its officials participate in each meeting and contribute a wider perspective. Officers of the State Environmental Law Enforcement Division, who initially were referred to as Coastal Wardens and are currently organized as the Environmental Police, also have participated and have provided new information at the meetings.

The mission of the Environmental Police is to protect the bays and shorelines, and enforce the regulations for finfisheries, lobsters, boating safety, and all hunting laws. Shellfish constables cooperate with them, watching for violations and assisting in some prosecution actions that they may not be specifically authorized to enforce. Increasingly, in this era of homeland security issues, the shellfish constable also assumes the additional role as observer of suspicious activity along waterfronts and in the bays.

In 1972, a previously unrecognized event changed the landscape of shellfish management when blooms of a red tide-producing organism appeared in some bays. Paralytic shellfish poisoning

(PSP) phytoplankton was present and it spread across wide areas as the result of a late season hurricane. Bays containing red tides were closed to harvesting, and this marked the beginning of another phase of management of the shellfish constables.

A program for regular monitoring of the shellfish beds for the red tide organism was established and the local constables were called to assist with weekly sampling of shellfish for analysis. The program continues to the present. When beds are closed to harvesting, the constable must post the area and patrol it every day to ensure that no person either knowingly or accidentally harvests any shellfish. As a result, there have been no reported instances of PSP health issues in the state.

Enhancing Mollusk Populations

In the early 1970s, several shellfish hatcheries in the state began to produce seed, mainly quahogs, for private aquaculturists (Fig. 7). As Belding’s wise words were being assimilated and his forecasts became reality, growers were realizing that profitable farming of quahogs in bays was possible. Some towns purchased quahog and bay scallop seed for their public beds. Their constables grew it to larger sizes, and then broadcast it onto the beds (Fig. 8). This introduction of seed would not replace a bountiful natural set but might enhance abundances to counter the depletions from harvesting and the degrading of water quality.

The MSOA members also became aware of the value of political involvement. To that end, a group of legislators who represented the coastal cities and towns formed a group known

The following are two annual reports of the shellfish officers in the town of Edgartown for the years 1962 and 2004. The officer, termed Fish Warden in 1962, did not have a staff, and he dealt with enforcing regulation and propagation using wild seed and adults. He removed and destroyed horseshoe crabs, but currently they are a protected species.

The officer in 2004, then termed Shellfish Constable, had a staff of 2 permanent deputies and 2 summer deputies. He dealt with enforcing regulations, probations using hatchery seed, and was active in monitoring environmental conditions. There was more recreational shellfishing recorded in 2004 than in 1962.

Report of the Fish Warden for the year 1962

(Source: Town of Edgartown Annual Report for 1962)

The shellfisheries of Edgartown valued nearly \$68,622 during 1962. The following is a breakdown of the shellfish taken by species.

Shellfish	Bushels	Value
Scallops	9,946	\$53,428
Softshell clams	1,251	12,510
Quahogs	355	2,684

A total of 528 licenses were issued in 1962 as follows:

- 126 commercial scallop licenses
- 19 commercial soft clam licenses
- 17 commercial quahog licenses
- 366 family permits, seasonal and resident

1. 240 chicken wire bags each containing 1.5 bushels of scallop shells were made up and 500 bushels of scallop shells were planted in Edgartown Great Pond as oyster cultch.
2. 147 bushels of seed oysters were obtained from Wareham and planted in Great Pond.
3. 100 bushels of small quahogs were obtained from the state and planted in Pocha Pond.

4. 20 bushels of seed quahogs were moved from Wasque Pond and planted in Anthier's Pond, Eel Pond, and Edgartown Harbor.
5. Seed and adult oysters exposed after the opening of Great Pond were moved into deeper water.
6. Bi-weekly records were maintained of the temperature and salinity of Great Pond to determine what conditions appeared favorable or unfavorable for oyster spawning and setting.
7. 78 bushels of clams were obtained from the Oyster Pond and Great Pond and planted in Anthier's Pond, Eel Pond, and Caleb's Pond.
8. Horseshoe crabs and starfish were destroyed wherever observed.

Four violations of shellfish regulations were reported to the selectmen resulted in disciplinary action. Generally speaking, the cooperation of the fishermen in supporting the regulations has been excellent.

The shellfish officer has continued to work in cooperation with the Massachusetts Division of Marine Fisheries in his efforts to promote the shellfishing industry of Edgartown.

I would like to express my thanks to Mr. John Hughes and Dr. George Matthiessen for all the help they have given me since my appointment as Fish Warden.

Hiram Jackson
Fish Warden

Summary of the Shellfish Constable's Annual Report to the Town of Edgartown, 2004

(Source: Town of Edgartown Annual Report, 2004)

To the Honorable Board of Selectmen and Citizens of Edgartown:

The 2004 commercial catch in Edgartown was valued at \$264,167 in the following categories:

Softshell clams	401 bushels
Oysters	336 bushels
Quahogs	182 bushels
Bay scallops	1,552 bushels

Severe weather in January and February and a small crop of scallops in November and December led to a poor commercial crop year in the town of Edgartown. Cape Poge Pond had the most scallops this year and has some seed for next year. Recreational scallopers were able to harvest scallops out of the shallow areas of Cape Poge. Family fishermen found a limited number of scallops in Sengekontacket (Anthiers). We are cautiously optimistic about a good scallop crop for the 2005–2006 season. Commercial oystering and quahogging were limited by market situations this year, most harvests were sold in local fish markets.

In addition to the wild harvest, aquaculturists in Edgartown have raised 625 bushels of oysters worth \$162,500.

These are the landings for recreational permit holders:

Softshell clams	106 bushels
Oysters	65 bushels
Quahogs	598 bushels
Bay scallops	81 bushels

Shellfish received from the Martha's Vineyard Shellfish Group are as follows:

Quahog seed	1,200,000
Large scallop seed	187,500
Small scallop seed	1,300,000
Single oyster seed	334,000

All hatchery-reared bay scallops were broadcast in Sengekontacket Pond and Cape Poge Pond. As in the past, some of these scallops were genetically tagged with black and white stripes. The oysters that we received were placed in nursery up-weller for growth out to 15 mm.

The Shellfish Department continues to monitor shellfish diseases within town waters. Despite substantial softshell clam mortality among adults in Edgartown Great Pond in 2002 and 2003, we had a decent softshell clam harvest on Edgartown Great Pond in 2004.

In 2004, Edgartown participated in several water quality monitoring programs. The Massachusetts Estuaries Program is an ongoing study of Edgartown Great Pond that will be completed in 2005. The intent of this study is to better understand nutrient cycling within the watershed.

The following predators were removed from shellfish areas in Edgartown:

983	pounds of conchs from Cape Poge
2,300	conch egg cases from Cape Poge
800	pounds of conchs from Katama Bay
5,600	conch egg strands from Katama Bay
200	pounds of conchs from Sengekontacket
8,940	pounds of green crabs from Sengekontacket

The shellfish Department continues to work with the Dredge Committee on permitting various dredging projects.

Personnel in 2004 included Department Head/Marine Biologist Paul Bagnall and full-time Deputy Warren Gaines. Full-time deputy David Medeiros resigned in May and was replaced by Francis Fisher III. Summer Deputies were John Black and Matthew Hedstrom.

Respectfully submitted,

Paul L. Bagnall
Marine Biologist and Shellfish Constable
Herring Warden



Figure 7.—A float in Eastham serves as a nursery for growing northern quahog seed.



Figure 8.—A net over an intertidal flat in Eastham protects northern quahog seed from predaceous crabs.

as the “Coastal Caucus.” This group was instrumental in cooperating with the MSOA to craft legislation which provided for additional funding for towns that wished to participate in efforts to protect and propagate shellfish—the so-called 571 Fund. The requirement was that the towns had to develop a management plan for their shellfisheries. The amount of funds

would be based on the previous year’s expenditure.

This program was initially set at direct funding but as more towns began to participate the percentage diminished. The program was a wholesale effort by cities and towns to plan and implement various projects which would enhance the fishery. Some towns used hatchery seed while others

transplanted abundant shellfish stocks from polluted beds that were not certified as clean for harvest to clean beds (Fig. 9a, b). The shellfish depurated naturally and the beds could be opened for harvesting after 90 days. Over time, many thousands of bushels of quahogs and oysters were relayed from polluted areas along Massachusetts’ south coast to the beds of various towns to boost their stocks.

In 1974, the Barnstable County government of the towns on Cape Cod began an initiative to encourage cooperation among the towns. The County Commissioners formed a Shellfish Advisory Committee (SAC), that provided reports to the commissioners and was assisted by the Cape Cod Economic Development Commission. Later on, the University of Massachusetts Cooperative Extension Service began to support the SAC by providing staff and resources to assist in the various towns’ propagation plans. An alliance with the Woods Hole Sea Grant program together with funding from the state Environmental Bond Bill provided additional funding for regional aquaculture centers that would serve to guide the increasing needs of private aquaculturists and those towns involved with nursery growout of seed shellfish for restocking, disease testing,



Figure 9a.—Shellfish constables and helpers in Chatham transplanting bay scallops that had been washed ashore by a storm to a replanting site.



Figure 9b.—(above left) Shellfish constables in Westport supervising the transplanting of quahogs from polluted waters to clean waters.

Figure 10.—(below left) Shellfish constable showing youngsters aspects of quahog reproduction.

Figure 11.—(above right) Shellfish constable collecting sample of surface water to be examined for pollution.



predator control, public outreach, and other programs (Fig. 10).

In 1987, Massachusetts reorganized some of its agencies in response to Federal requirements for the inspection and classification of waters from which shellfish were harvested. The duties and responsibilities relative to testing water and the classification of areas in accordance with Federal standards were assigned to the DMF, which turned to local shellfish con-

stables for assistance. Since then, regular monitoring of surface waters has been carried out by state personnel and the constables working together (Fig. 11). The authority to declare a body of water “approved” for the harvest of shellfish or “contaminated” and thus closed to the harvest of shellfish remains with the DMF. Enforcement of the regulations is carried out by the local constables with assistance from the Environmental Police.

The shellfish constables also frequently try to control sources of pollution that might result in an area being closed to shellfish harvesting. This can involve working with public works agencies to remediate storm drains, promote bylaws to restrict the feeding of waterfowl, and assist local Boards of Health to hold and, if possible, reverse a disturbing trend. Recent actions by the constables in the towns of Barnstable and Dennis have resulted

in the reopening of shellfish resources in waters that had remained closed for harvesting for the past 20 years.

In 1990, multiple failures of different hatcheries resulted in few seed being available for the different towns. The constables explored various alternatives cooperatively and the outcome was that the funding received by the DMF was channeled to the towns through the Barnstable County Extension Service by way of bulk purchases of hatchery seed. In this way, less expensive seed could be obtained and its availability would be more certain.

Training Program for Constables

Successful protection of the molluscan resources and aquatic environments has been under increasing strain as humans have crowded onto coastal Massachusetts. It became apparent that a standardized training program for constables was needed. An agreement was reached with the Massachusetts Maritime Academy in the town of Buzzards Bay to provide a 2 week training session for shellfish constables and deputies. Conducted on the campus of the academy when the cadets are at sea on training cruises and as the need

arises, this course is a comprehensive examination of the biology, natural history, and harvesting methods of various shellfish as well as their predators, and it encompasses training in law enforcement, boat handling, first responder measures, pollution monitoring, and on the red tide phenomenon.

Overview

Today's Massachusetts shellfish constable has a more complex and varied role than had his predecessors. The warden's main responsibility once was to enforce a few regulations regarding the harvests of the mollusks. The constable today also has to be aware of legal matters, environmental concerns, natural history, and law enforcement regulations. He or she should also be personable and have the ability to work on and near the water under various weather conditions. He has the satisfying role of being the steward of his town's molluscan resources and environment and a promoter of its commercial and recreational shellfisheries.

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