Sea Grant
Woods Hole
# Focal Points

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## Shellfish Aquaculture in Massachusetts

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**Nursery trays are commonly used during the early stages of shellfish culture. Shown here, trays holding seed quahogs in Blackfish Creek, Wellfleet.**

Shellfish aquaculture in Massachusetts is thriving! Though centuries old, the practice of farming shellfish is a fairly recent undertaking in the United States—within the last 150 years.

In Massachusetts, shellfish aquaculture can be divided into two categories: public and private. Public aquaculture, also known as community or municipal aquaculture, focuses on local restocking and / or restoration efforts in areas that are or once were productive shellfishing areas. Such programs generally fall under the auspices of town shellfish constables. Municipal aquaculture programs raise clams, oysters, and / or scallops to a size that they can be released into the wild with a reduced risk of mortality from predation. At the appropriate size threshold, the shellfish are seeded into productive fishing areas to support local wild harvests, both commercial and recreational.

Private aquaculture involves licensing tracts of marine intertidal and subtidal areas for private use to grow a variety of commercial shellfish species, including quahogs and oysters. Local shellfish hatchery and nursery

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**The surf clam is a new candidate for shellfish aquaculture. A rigid cage (top photo) and a mesh bag (bottom photo) are two containment options for the commercial grow-out stage.**

businesses often support public and private aquaculture operations and municipal restoration programs.

### Current Production

Production of farmed shellfish in Massachusetts has been expanding steadily over the past 10 years as the number of towns, farmers, and areas licensed for culture have increased. Of the $4.6 million total value for cultured shellfish production in Massachusetts in 1996, quahogs account for the vast majority, at $3.8 million, while oysters make up the difference, at $0.8 million. Since 1996, the number of private aquaculture permits for shellfish culture has increased from about 250 to over 300, while the areas privately licensed for culture has increased from 600 acres to over 1,000 acres. Greater than 95 percent of this culture area is located on intertidal and subtidal flats within two counties of southeastern Massachusetts: Barnstable (Cape Cod), and Dukes (Martha's Vineyard).

While shellfish aquaculture is experiencing significant growth, commercial harvest of wild quahogs and oysters in Massachusetts has remained fairly flat, hovering at the $5.5 million mark for the past ten years. Of this, Cape Cod harvests account for approximately $3.1 million, while Martha's Vineyard harvests provide an additional $0.55 million, together accounting for nearly two-thirds of the total harvest in Massachusetts. In terms of the recreational fishery for quahogs and oysters, figures are more difficult to come by, mostly because recreational harvesters do not have to report their catch—other than an estimate—when renewing their licenses. Despite the lack of harvest data, recreational quahog and oyster fisheries are a very important component to the way of life in southeastern Massachusetts.

Town shellfish departments on Cape Cod and Martha's Vineyard are committed to public aquaculture of hard clams and other shellfish species for the purpose of stocking shellfish for wild harvest. In 1999, with funding from the Massachusetts Division of Marine Fisheries, distributed by Barnstable County, all fifteen towns on Cape Cod collectively purchased 20 million juvenile quahog seed from commercial hatcheries as part of their municipal restocking programs.

On Martha's Vineyard, the Martha's Vineyard Shellfish Group (MVSG), a consortium of Island towns dedicated to producing shellfish seed in a hatchery, provided 11 million quahog seed, four million oyster seed, and six million juvenile bay scallops to the six island towns in the program. These juvenile bivalves will be released into the wild fishery after nursery culture within each town's municipal shellfish nursery program. In addition, the MVSG provided one million seed oysters to private growers on the Island that are participating in a fishermen's retraining program administered by the MVSG.

### Current Culture Practices

Massachusetts has two shellfish hatcheries that pro-

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duce a wide variety of seed shellfish, including American oysters, quahogs, bay scallops, soft shell clams, and surf clams. One hatchery is a commercial enterprise, Aquaculture Research Corporation (ARC), located in Dennis, MA. ARC has been at the forefront of shellfish hatchery technology and production for over thirty years. MVSG is the second Massachusetts hatchery and has been operational since 1978. Unlike a commercial hatchery, the goal of MVSG is to supply the public shellfish propagation programs on the island with quahogs, oysters, and bay scallops. Both hatcheries are proven success stories.

The nursery stage of both quahog and oyster farming involves the use of trays: a bottom tray system on Cape Cod, and a raft-based tray system on Martha's Vineyard. In both methods, growers purchase small seed (1-3mm) and plant it into shallow trays (4–8 inches deep and usually 32-square-feet in size) in late spring (June). Private quahog growers harvest the seed stock in October, or once quahogs reach approximately 15mm in size. They are then planted under netting for the final grow-out stage. Town shellfish restocking programs take a different approach: seed remains in nursery trays throughout the winter until it reaches approximately 25mm in size. This generally occurs by spring, at which point the seed is planted directly into the wild.

A recent WHOI Sea Grant Extension Program / Cape Cod Cooperative Extension effort involves assisting with the development of upwelling nurseries in Massachusetts. Upweller technology allows growers to purchase smaller, less expensive seed and grow it in a protected environment (the upweller) until it is ready for the field nursery (late summer) or direct grow-out planting (fall). For the final grow-out stage, most growers plant on the bottom and cover the crop with a fine-mesh net to exclude surface predators.

### Current Problems and Possible Solutions

Currently, there are three major issues confronting the shellfish aquaculture industry in Massachusetts: lack of knowledge and understanding of the industry by the general public, multiple use conflicts in the coastal zone, and disease. A 1999 industry survey conducted by the Massachusetts Department of Food and Agriculture (MDFA) found that many aquatic farmers identified an overall lack of understanding of their industry by the general public as their primary concern. As a result, public education has been identified as a high priority area for future efforts designed to support the industry by the state aquaculture coordinator and the MDFA. Education covers a range of programs, from demonstration projects and technological workshops for the industry to public relations and introductory education for the general public. The aquaculture industry in Massachusetts, through the state's industry survey process, believes that such education efforts offer the greatest potential for changes in the public's attitude toward the development of an aquaculture industry in the Commonwealth, all at a relatively low cost.

Conflicts between users of the coastal zone are on the rise as the industry grows. Users range from wild shellfish harvesters, who are concerned with losing fishing bottom by privatization of the resource areas, to upland owners, who are concerned that farming activity on the flats will have a negative impact on the aesthetic value of the coast.

The potential for disease is another chief concern throughout the industy. The oyster industry must contend with a suite of diseases specific to oysters—primarily dermo and MSX—while quahog growers are faced with a relatively new disease known as QPX, for quahog parasite unknown. There is growing support within the industry and throughout the Commonwealth for developing an organized shellfish health monitoring program and for increasing disease research by local scientists to assist the industry in dealing with this issue in the future. Nationally and at the local level, Sea Grant has made significant efforts in providing research funding for shellfish disease research and offering assistance to the industry with development of disease management programs.

In order to address all of the concerns with respect to aquaculture in Massachusetts, the industry, in collaboration with the SouthEastern Massachusetts Aquaculture Center (SEMAC), a state funded center resulting from a collaboration between WHOI Sea Grant, Barnstable County / Cape Cod Cooperative Extension, and the MA Department of Food and Agriculture, has embarked on the development of best management practices, or BMPs. BMPs can be defined as a voluntary set of operating procedures that promote the development of an industry using technologies that have a low impact on the natural resources, yet support good production. Issues to be addressed by the BMPs have been identified through a public discussion process and recommendations are being developed by an industry working group. It is hoped that the product of these discussions, a BMPs manual, will be accepted by a wide array of groups, including the shellfish farming industry, the regulatory agencies controlling shellfish farming, and the non-governmental agencies that serve as watchdogs for the environment and the rights of property owners.

### Industry Concerns

As with any new and expanding industry, the Massachusetts shellfish farming industry will be faced with growing pains. Among them:

• There will be an increasing level of space use conflicts between shellfish farmers and other users of the coastal zone. What is currently happening in Massachusetts will continue to escalate as the coastal zone becomes more populated and more heavily used for recreational purposes. One possible solution is for commercial aquaculture to move onshore or off-shore in order to

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move away from multiple use areas. A second possible solution is to legislate aquaculture areas within the coastal zone. Such areas would facilitate the permitting process and minimize conflicts between the industry and other potential users of the area.

• The ability for existing hatcheries to supply enough seed stock for the industry will be tested as the number of growers increases. Massachusetts had a severe shellfish seed shortage in 1997-98 due to the failure of one of the primary commercial hatcheries supplying the Commonwealth. Although a number of new hatcheries have been started in response to this situation, the stability of the seed supply is still in question as the industry grows and seed demands increase.

• There will always be a need for new and improving technology to keep the industry vital. Such technologies must focus on:

—Alternate shellfish nursery technology: the key to successful production is a good supply of healthy seed stock at the right time of the year. By developing better nursery technologies, our ability to meet this need is greatly enhanced.

—Alternate species development: the shellfish culture industry in Massachusetts currently relies on two species of bivalve, the American oyster and the quahog. Expanding the species list would take the pressure off growers if a particular species suffers a loss in any given year. Recent losses of farmed quahogs to QPX in southeastern Massachusetts offer a tragic example of a financial disaster encountered by growers who focus on a single species.

—Genetic selection: improving the performance of commercially cultured strains of clams and oysters through genetic selection and manipulation will provide great benefits to the industry. Classical genetic selection and the application of genetic techniques to make the shellfish sterile have the potential for significant improvements to the growth and survival of cultured bivalves.

The shellfish aquaculture industry in Massachusetts has been growing at a rate of 10 percent per year for the past decade. Yet there is potential for continued development of the industry. With proper incentives and support for this developing industry, and a concerted effort to educate the public about shellfish aquaculture, the Massachusetts shellfish aquaculture industry will continue to provide a high quality product and significant economic benefits to our coastal communities.

For more information about the research or outreach projects profiled in *Focal Points*, contact WHOI Sea Grant at the address shown above.

This *Focal Point* was prepared by WHOI Sea Grant in collaboration with Cape Cod Cooperative Extension.