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AQUACULTURE SITUATION AND OUTLOOK REPORT 2007: MARYLAND

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Industry Trends and Outlook

Maryland has a small but diverse aquaculture industry with an annual farm-gate production of approximately \$5 million annually. Growers produce a wide range of finfish, shellfish, aquatic plants, and reptiles. The largest contributing sectors currently are producers of ornamental fish and aquatic plants. Plants are produced for wholesale water garden trade, shoreline stabilization, and mitigation, with expected strong demand for the latter two in the near future. Growers of water garden plants have begun to cultivate alternative markets for their products such as the use of aquatic plants in the healthy management of stormwater ponds.

The second largest sector is shellfish production - Eastern oysters and hard clams. Disease epizootics have kept most bottom leases in the Chesapeake and coastal bays from maintaining their traditional productivity, but innovative growers have evolved techniques to manage their animals in areas of high disease prevalence. Recent development of selected oyster lines, and the production of triploids, has made it possible to raise native oysters in zones of high disease intensity. In addition, the states of Maryland and Virginia are actively investigating the use of a non-native oyster, *Crassostrea ariakensis*, for potential introduction. An Environmental Impact Study of this proposed introduction is expected in early 2008.



Aquatic plants are the largest segment of Maryland's aquaculture industry. Floating plant rafts serve to beautify community stormwater ponds while taking up nutrients, extending the life of the pond and minimizing weed problems. (Photo: Don Webster)

A small segment of the industry raises products in recirculating systems. These include organisms such as tilapia, shrimp, and ornamental fish. The market for live tilapia has peaked in recent years with remaining producers having become adept at business management and marketing in order to remain competitive.

Recent trends have included government interest in modifying laws and regulations that hinder or inhibit

Emerging Issues and Critical Needs

- Most recently the State has moved to renovate its aquaculture laws. Recent changes led by extension faculty resulted in speeding up of aquaculture permits and recognition by key political leaders of the benefits of aquaculture for the economy and the environment.
- Continued funding of positions is deemed to be the most critical need at this time so as to continue the work of the existing faculty while developing new programs and initiatives through access to additional funding.
- Development of shellfish aquaculture is critical to the health of the Chesapeake and coastal bays due to the importance of biological filtration and nutrient transfer. Solutions for the current oyster disease problem will require species, production systems, and genetic hybrids able to resist disease.
- Renovating state leasing laws for enhancement of shellfish production will be critical for development of the industry, as will enactment of programs through the U.S. Army Corps of Engineers for being able to utilize near-bottom and off-bottom production techniques.
- Continued support for research into defined industry problems and culture techniques for new and innovative species will be a priority.
- As the population expands, conflicts with aquaculture producers will become more prevalent, especially with methods that use public waters. Conflict management resolution will become necessary to help minimize these problems and allow production while protecting the environment.

aquaculture. The State renovated its permitting policy in 2005 to direct initial inquiries for aquaculture through the state Aquaculture Coordinator who tracks permits through agencies while chairing the Aquaculture Review Board. That body meets regularly to discuss applications and mediate differences between agencies. A state Aquaculture Coordinating Council is charged with recommending policy and legislative initiatives annually to the executive and legislative branches of state government. Other tasks include developing and maintaining current Best Management Practices and forming options to initiate Aquaculture Enterprise Zones for the enhancement of shellfish aquaculture.

Commercial Species List

- Eastern oyster (*Crassostrea virginica*)
- Northern quahog (*Mercenaria mercenaria*)
- Red swamp crawfish (*Procambarus clarkia*)
- Tilapia (*Tilapia* sp.)
- Striped bass and hybrids (*Morone* sp.)
- Diamondback terrapin (*Malaclemys terrapin*)
- Various turtle species (Chelydridae)
- Pennaeid shrimp (Penaeids)
- Soft corals (*Alcyonacea* sp.)
- Blue crab (*Callinectes sapidus*)
- Clownfish (*Premnas* sp.)
- Various aquatic plants cultured for shoreline protection and stabilization, ornamental use, pond management
- Various ornamental fish (freshwater and marine)

Addressing Industry Needs

Researchers, extension specialists, resource managers, industry associations and concerned stakeholders all play a role in addressing industry needs. The following sections outline the new initiatives and recent accomplishments in these areas.

Aquaculture Research

The University System of Maryland (USM) includes thirteen institutions and campuses with aquaculture research conducted at several facilities.

The Center for Environmental Science includes the Aquaculture and Restoration Ecology Lab (AREL), at Horn Point on the Eastern Shore, which provides oyster larvae for large-scale restoration projects for the Eastern oyster, as well as quarantine facilities for non-native shellfish and finfish. In 2006, the AREL facility produced over 350 million spat for innovative projects



Oyster farm in Snow Hill, Maryland (Photo: Luke Breza)

such as managed reserves that combine ecological and economic benefits in carefully defined and regulated areas. The AREL also serves as a base for endangered species research on the sturgeon, and provides facilities for work on tropical ornamental fish like clownfish. Aquatic vegetation research conducted here is leading to advances in large-scale introduction of depleted plants important in maintaining the health of an estuary.

The Center of Marine Biotechnology (COMB), on the waterfront in the city of Baltimore, provides cutting-edge research that has closed the life cycle of the blue crab and provided production information important in the culture of sea bream. Other research teams at COMB are working to develop effective bacteria for the biological filtration used in recirculating aquaculture systems, which has led to recirculating technology that discharges no water.

The Biological Resources Engineering Department on the main campus at the University of Maryland College Park (UMCP) has a long history of research and development in seafood technology and aquaculture production systems. They have worked closely with extension faculty in applying science to industry problems for many decades.

The Animal Science Department at UMCP carries out breeding and selection projects, as well as feed and nutrition development, for the striped bass and hybrid industries. This program, first developed during the 1980s, has helped the annual growth of the striped bass and hybrid aquaculture industry in the nation.

The University of Maryland Eastern Shore (UMES) has done research on tilapia aquaculture as well as developed technology for recirculating systems. Some of their work on finfish systems has been adapted for use in the soft crab production industry. A new lab on Chincoteague Bay will provide an opportunity to work with hard clams and other shellfish in a high salinity environment.

Aquaculture Extension

Maryland has eight full-time extension faculty dedicated all, or in part, to programs in seafood and aquaculture. These include three regional specialists who are located in geographically distinct areas; statewide finfish and shellfish specialists with joint research and extension appointments; a resource economist; education specialist; and seafood technologist. The program faculty organizes state, regional, and national educational programs addressing aquaculture topics. They teach short courses, as well as evening or day-long programs in support of ongoing



Restoration aquaculture is a major thrust of Maryland programs. The F/V Robert Lee plants oyster spat produced at the UMD's Aquaculture and Restoration Ecology Lab on the Eastern Shore on managed reserves, an innovative concept that combines ecological and economic

extension project areas.

The Extension program is administered by University of Maryland Cooperative Extension, with support from the Maryland Sea Grant College Program. The Extension faculty is located at labs and campuses throughout the state in places where they can more easily interact with industry. State specialists have joint research appointments, while regional faculty provide industry liaison and work with researchers in field demonstrations and application of technology. Maryland Cooperative Extension administratively ties the 1862 and 1980 programs together, which gives strong support through both the traditional programs as well as those aimed at minorities.

Aquaculture Education

The *Aquaculture in Action* program is a year-long K-12 outreach program emphasizing aquaculture as a dynamic tool for learning. The goal is to create a curriculum that integrates science skills of chemistry, physics, mathematics, ecology, and animal husbandry using hands-on learning sets. Teachers are assisted through biennial workshops, annual planning and development meetings, yearly fish deliveries and stocking events, and an interactive Web site for consultations and individual project reporting.

The *Aquaculture in Action* program consists of some fundamental pieces that are key to its success in the schools:

- One-week workshops that support teachers with an aquaculture companion manual and materials, and equipment for the construction of a 210-gallon recirculating aquaculture system.

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Yossi Tal	University of Maryland Center of Marine Biotechnology (410) 234-8875 tal@umbi.umd.edu	aquatic microbiology, marine aquaculture
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State Aquaculture Coordinator

Karl Roscher	Maryland Department of Agriculture 50 Harry S Truman Parkway Annapolis MD 21401 (410) 841-5724 RoscheKR@mda.state.md.us	permit coordination and tracking; chairman of Maryland Aquaculture Review Board; member of Maryland Aquaculture Coordinating Council
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Aquaculture Industry Associations

(inactive at this time)

Testing Laboratories

Ana Baya	Regional Animal Health Laboratory Avrum Gudelsky Veterinary Center College Park, MD 20742 (301) 314-6837	diagnosis of fish disease and recommendation for treatment
Shawn McLaughlin	Cooperative Oxford Lab 904 South Morris Street Oxford, MD 21654 (410) 226-0078	diagnosis of shellfish diseases



Teachers build their own recirculating system for the classroom.
(Photo: Jackie Takacs)

- A one-of-a-kind Web-based component that gives teachers and students the ability to enter project data related to their research in the classroom and communicate with one another about projects and ideas.
- Support throughout the school year including the coordination of obtaining native fish for culture and the release of fish at the end of the school year at Maryland Department of Natural Resources approved locations in Maryland.

Over the last ten years, the program has been: 1) incorporated into 43 schools in Maryland, one in Pennsylvania, and one in West Virginia; 2) used by over 10,000 students in the context of learning science; 3) developed into 50+ student projects; 4) presented at four national conferences (invited); and 5) used as a model by extension and education specialists from California, South Carolina, Louisiana, and Florida (for use in Costa Rica). Ten teachers in the program have successfully secured funding to expand their school's aquaculture program and two were named Maryland "Teacher of the Year".

Aquaculture Resources

Northeastern Regional Aquaculture Center
The NRAC is one of five Regional Aquaculture Centers established by the U. S. Congress which supports research and outreach efforts to promote the development of the aquaculture industry.
<http://www.nrac.umd.edu>

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