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UNIVERSITY OF MARYLAND COLLEGE PARK • EASTERN SHORE

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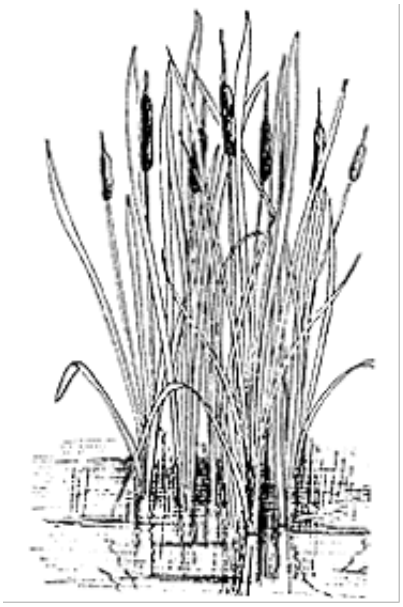
In This Issue:

Controlling Lilies and Cattails

Daniel Terlizzi, Sea Grant Water Quality Specialist



Late summer is a good time to begin planning for control of some emergent and floating species of aquatic plants. Aquatic flowering plants are classified according to their pattern of growth as (1) emergent, or those that grow out of the water like cattails; (2) floating, which are species with leaf surfaces exposed like water lilies; and (3) submergent, which are species that are totally below water like hydrilla. While this classification scheme is used as part of the process for identifying aquatic plants, even more important to the pond manager is that the pattern of growth determines, to a great extent, the type of herbicidal treatment that may be required. Control of emergent and floating species has now become fairly straightforward with the introduction of aquatic formulations of glyphosate.

Glyphosate is the active ingredient of the aquatic formulation of Rodeo. This product is registered for use in all fresh water systems and is generally available from agriculture supply businesses. Glyphosate is a broad spectrum herbicide that is absorbed through the leaf and translocated to the root system where it literally destroys the plant from the ground up. This explains why the herbicide is so valuable in controlling emergent and floating vegetation - anyone who has ever attempted to control cattails or lilies mechanically by cutting or pulling out the plants has found that these methods seem to increase weed growth rather than control it.

Late summer or early fall is an ideal time to apply glyphosate to the foliage of aquatic plants. Glyphosate resembles chemicals that are a normal part of plant metabolism - when it enters the leaf, the transport processes that are normally moving amino acids, sugars and other chemicals

from the leaf to the root for winter storage also send glyphosate. In the root, glyphosate behaves like an important amino acid that the plant uses to manufacture protein; because it is chemically different, however, glyphosate "jams" the biochemical machinery and prevents the formation of new proteins. Proteins in the form of enzymes are necessary for every aspect of plant life - with the elimination of new enzymes, the life processes of the plant slow down and eventually it dies, literally from the ground up.

Although highly effective against many emergent and floating species of aquatic plants, glyphosate is environmentally safe when used according to label directions. In water or soil, glyphosate is broken down by bacteria into naturally occurring chemicals; consequently, any material that does not penetrate the plant and is released into the environment is quickly removed. At high application rates, glyphosate is toxic to some submerged aquatic plants as well; however, such use is neither effective nor approved.

To control emergent or floating aquatic weeds, apply glyphosate by spray or with an applicator until the foliage is wet. Glyphosate has been successfully used to control overgrown cattails and lilies in farm, recreational, and ornamental ponds. A fall treatment is effective but usually limited regrowth will be observed the following spring, which can be eliminated by using an early season application. The most persistent stands of cattails and water lilies may require follow-up treatment over several seasons. For many pond owners, the best cure may be in prevention. Both cattails and water lilies can quickly overgrow shallow ponds - although they are valuable as ornamentals and as habitat and food web components, problems can outweigh benefits so planting should be carefully considered.

> **Note:** You can learn more about cattails and waterlilies in the *Aquatic Plant Identification and Workbook* series of fact sheets. Contact Jeannette Connors at (301) 405-7500 or by e-mail, connors@mdsg.umd.edu and ask for UM-SG-MAP-89-06 (water lily) and UM-SG-MAP-92-06 (cattail).

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Managing Water Quality in Pond

Don Webster, Eastern Shore Area Agent
and Reginal Harrell, Finfish Aquaculture Specialist

The Kent County Pond Management Field Day was held on October 14, 1998 at the Carl Plummer farm near Chestertown, Maryland. The Plummer property includes several ponds of various sizes and ages - they provide good examples of what happens to managed and unmanaged ponds and what procedures are necessary in order to keep ponds from being overgrown with nuisance aquatic vegetation.

Of the three ponds, the smallest was used for duck hatching operations; it flows into a two-acre pond that is used for recreational fishing. A very large pond of more than 10 acres serves as a runoff buffer and has a constant flow through a dam and control structure.

The large pond has been in existence for some 40 years and has become quite heavily silted. As a result of its shallowness and the high Canadian goose population in the area, the pond has developed a severe filamentous algae problem. Because of the pond's size, depth and water flow, it is not economical to treat it with herbicides. When ponds such as these age, the most cost effective treatment may be maintenance dredging.

The primary pond on the Plummer farm is fairly new - less than ten years old - and has become a model for good management practices. Carl Plummer, working with Kent County Ag Agent John Hall, first began monitoring the soil pH of the pond about five years ago. Based on recommendations by the College of Agriculture, he added about 2,000 pounds of lime to the pond the first year; a year later, the pH had not been adequately affected. After retesting, another 2,000 pounds of lime was added and both pH and alkalinity levels have remained satisfactory since.

During 1997, Plummer used a new time release pond fertilizer (produced by the Scotts Company) to stimulate phytoplankton growth during the spring and summer. This growth helped to shade the pond, increase primary food availability for fish populations, and prevent heavy growth of filamentous algae. In 1998, a Program Development grant from the University of Maryland Cooperative Extension allowed the continued use of Scotts time release fertilizer as well as

purchase of herbicides and spray equipment to control the growth of duckweed, which likely was generated by a severe duckweed growth in an adjoining pond. The grant also allowed expansion of the Pond Management Field Day to include participation by adjacent counties as well as development of a packet of materials for attendees to use as reference material.

There are well over 13,000 ponds in Maryland; many have been constructed for use in controlling sediment and runoff into the Chesapeake Bay. While ponds can be useful and, in many instances, beautiful, they can cause problems for homeowners or community associations who don't know how to care for them. Maryland Cooperative Extension has provided information on pond and lake management to state citizens for many years. Publications from the Maryland Sea Grant Extension Program include fact sheets on liming and fertilizing ponds, as well as a series of 40 fact sheets on common aquatic plants with information on their biology and control.

One of the best ways to learn about management of water is by actually seeing what others have done with their ponds. The use of the Plummer ponds as working demonstrations of how to proceed and what problems may be encountered has been very useful in providing pond owners on the Upper Shore with factual data and useful experiences. For Sea Grant Extension publications on liming and fertilizing ponds and a list of available fact sheets on aquatic plants and managing them, call (301) 405-7500, or send a request to connors@mdsg.umd.edu.

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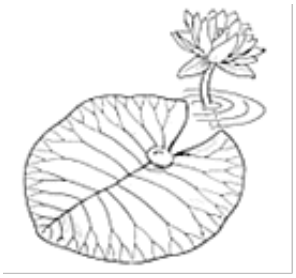
Soil Testing Your Pond

Don Webster, Eastern Shore Area Agent
and Reginal Harrell, Finfish Aquaculture Specialist



Now is the time to check the pH in your ponds for next year's management program. Maintaining proper pH is necessary in order to help productivity and to be able to effectively control some forms of aquatic weeds. Checking pond soils provides the best readings and can give an accurate application rate of lime.

First, stop by your local Cooperative Extension office and purchase a soil test kit. Then make a sampler by taking a can or other container and fastening it to the end of a long stick. Go around your pond and take several samples of pond bottom by using the sampling "scoop." Spread the samples out on a flat surface and allow them to dry; then mix them together to make a composite sample of the pond soils. Place this sample in the soil test container and send it to the University of Maryland as directed on the sample package. Indicate on the enclosure questionnaire that the soil sample is for a fish pond.

With the results of the sample, you will receive the agricultural limestone needs for your pond. Follow the directions during the winter or early spring, since it takes several weeks to months for the lime to get into solution. Lime should be spread evenly across the entire pond so that all the pond bottom is treated. For additional information, get a copy of the fact sheet entitled "Liming Farm Ponds" from your local University of Maryland Cooperative Extension office, or contact (301) 405-7500 or by e-mail at connors@mdsg.umd.edu.

Liming does not have to be done every year. A single treatment will usually last for several years. But doing it at the right time will make everything in your pond work better, and now is the right time to do your soil testing.

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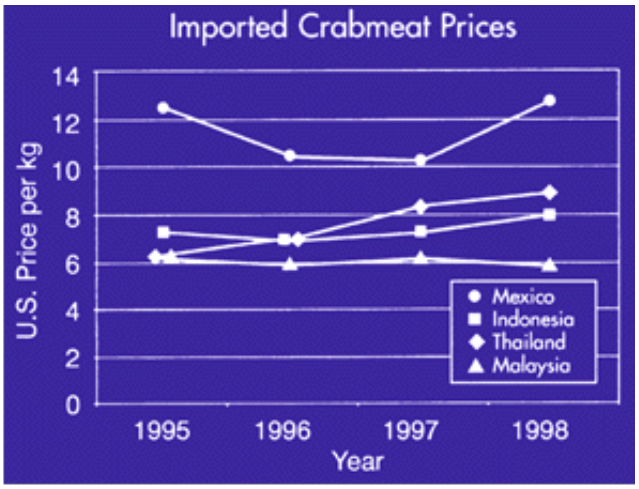
The Global Crabmeat Market

Nancy Wallace, Cooperative Extension Associate
and Doug Lipton, Marine Economic Specialist

Crabmeat processors in the Chesapeake Bay region are less concerned about the record low harvests of blue crabs this summer than they are about a longer-term problem: increases in low

cost-imported crabmeat. Processors are used to the fluctuations in crab harvests, which are an unwelcome characteristic of their business that has been present since the industry began. Low-cost imports however, are a relatively new phenomenon, and the industry is struggling with how it is going to deal with this threat to their livelihood.



The crabmeat of concern is not the traditional coldwater species of king, tanner and dungeness crab, but warmwater species that are closer substitutes for the blue crab *Callinectes sapidus.* Historically, warmwater crabmeat has been imported to the United States in four categories: Fresh/Salted/Dried/Brine, Frozen, Air-Tight Containers (ATC), and Other Preparations. ATC is the largest category entering the United States and has increased dramatically this year.

United States imports totaled 3.9 million kilograms of warmwater crabmeat from January to May 1998. These figures compare with an average of 2.2 million kilograms during the same months from 1995-1997 – a 75% increase. Reasons for this increase could be attributed to an expanded market, lower production costs abroad, quality differences, competitive advantages due to exchange rate or, most likely, a combination of the above factors.

The main suppliers for warmwater crabmeat are from both the Pacific Rim and Central/South America. South East Asia (including Indonesia, Malaysia, and Thailand) is supplying the largest quantity at the lowest prices. The accompanying chart shows the prices received by the South East Asian Countries and Mexico for ATC crabmeat. The prices for the South East Asia region are an average of 40% lower than the prices coming from the Central/ South American region. This significantly lower price could have a great impact on the Chesapeake Bay processing industry due to the volume of crabmeat arriving from these countries. The amount of crabmeat in ATC from South East Asia between the months of January and May increased 161% since last year. The totals during these months were 1.3 million kilograms in 1997 and 2.1 million kilograms in 1998.

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Research Update
Striped Bass Strain Performance

John M. Jacobs, University of Maryland Center for Environmental Science and Reginal M. Harrell, Finfish Aquaculture Specialist

The culture of striped bass *(Morone saxatilis)* and its hybrids is one of the fast growing segments of the U.S. aquaculture industry today, with an annual farm gate that the Striped Bass Growers Association has estimated at over $20 million. There is a concern, however, that high production costs and narrow profit margins may limit further growth of the industry – it is for these reasons that most research and development activities on reducing striped bass costs have focused primarily on environmental and husbandry factors, nutrition and feeding, and genetic manipulations. There has been less attention on genetic improvement, though genetic improvements in growth rate may be the best way to increase production output and reduce costs, since intensive aquaculture systems generally operate near maximum density.

The catfish *Ictalurus punctatus* provides one example of genetic improvement: domestication led to as much as an 18% increase in body weight after one generation of selective breeding. Such selection has yet to be attempted with striped bass. This is because the striped hybrid fish farming industry still relies primarily on the collection of wild broodstock; consequently, year-to-year variability in supply and growth performance of fingerlings is problematic. There are promises of change, however: recently, University of Maryland College Park researcher Curry Woods documented the viability and potential of progeny of domesticated broodstock for future selective breeding programs.

Perhaps the most effective means for starting a selective breeding program is through strain selection. Strain evaluations have been conducted for channel catfish, rainbow trout *(Oncorhynchus mykiss)* and Atlantic salmon, *(Salmo salar)* among other species. By simply examining a wide range of strains under common culture conditions, improvements in weight at a given age up to 50% are possible even before selective breeding efforts are initiated.

Strain Selection Experiments

At the University of Maryland Center for Environmental Science, we conducted studies in recirculating tanks at the Horn Point Laboratory to determine if we could improve aquaculture performance by selecting a given strain of striped bass. We compared the performance of six geographically separate populations of striped bass; the traits we assessed were growth rate, condition factor, and survival. Starting with larval fingerling striped bass from six geographical regions – the Appalachicola and the St. John's River in Florida, and rivers in South Carolina, Maryland, New York and Canada – we grew these different strains of fish (22 families) until they reached an average size of 700 grams (just over 1.5 pounds), a market-size fish.

The results showed that family variance was most important of the traits we examined: each strain was represented in the 10 best performing families. Still, the Appalachicola, Maryland and Canada strains had the best overall performance in terms of growth.

The significance of this growth differential is equated with the length of time it took given strains to reach the target weight of 700 grams. For example, the Appalachicola strain took eight months to grow from 50 to 700 grams, two months faster than the slowest growing strain from New York. Also important in this growth differential was the size variation within a given strain. The five families with the largest variation in size included two Appalachicola families, two Maryland families, and one Canadian family.

The overall ranking of strain variation at harvest was Appalachicola, Canada, Maryland, South Carolina, St. John's River, and New York. From the perspective of fish farmers, these results may seem counter-productive since they want fish of uniform size. However, from the perspective of genetics, strains with high variances are wanted because they provide the basis for selectively breeding future stocks. In other words, superior-performing individuals of a given cross can be selected for producing the next generation of fish.

We did not detect differences in terms of condition factor, that is, the ratio of body weight divided by the total fish length, an overall indication of the relative "plumpness" of the fish. However, there were differences in the economically important trait to the consumer of yield: the Maryland strain had the greatest filet yield both with and without belly flap, while the St. John's fish had the lowest.

To farmers, survival is an important trait – our experiments showed the greatest survival in the Canadian families (about 98%) and lowest in the Maryland fish (about 84%), which was due, in part, to the Maryland fish being the most excitable: they had a tendency to jump out of the tanks when disturbed. This may not be a significant factor over the long term: studies with other species show that excitability diminishes with domestication.

Surprisingly, our study indicated no difference in growth performance for males and females. However at the 700 gram target weight, the yield products were significantly larger for males in terms of gutted, filet with belly flap, and filet without belly flap. There was no difference in headed and gutted weights between sexes.

Qualifying the Results

While this study demonstrated significant differences between the six strains, it also demonstrated between-family differences. The fact that the ten best performing families included at least one family from each strain is important to note. Farmers well understand that environmental conditions play a major role in the performance of a given genetic group of fish – genetics alone is not sufficient in predicting performance. For instance, our experiments may have exhibited different results had we reared these stripers in ponds instead of the closed controlled system; it is certainly possible that farmers could get different overall results than we did under our controlled conditions.

The take-home message is that overall high growth rates and dress-out percentages (or yield) are a good characteristic of the Maryland strain. This strain had the highest variance in size at the end of the study, which means that sufficient variation exists for initiating a selective breeding program. The Appalachicola fish grew extremely well and had the additional benefit of being complacent. In analyzing the top five families differently, we could conclude that by choosing the faster performing

families within the best strains, we found improvements of up to 16% over the average family performance and 28% over the worst family performance. In addition, the best performing family had a 2.3% greater dress-out percentage than the overall population average. This funding equates to an additional 2.3 pounds for every 100 pounds sold. With production estimates for striped bass ranging from 8 to 15 million pounds and market prices in the $2 to 3 per pound range, a 2.3% improvement could increase profits by over $1 million.

Future genetic efforts at the University of Maryland will continue in the domestication, selective breeding, and improvement of striped bass and its hybrids. In the long run, we hope to develop strains that under given environmental conditions, will shorten the time it takes to grow stripers from fingerlings to harvestable size.

Editor's Note: A summary of the state-of-the-art in striped bass research is compiled in *Striper 2000: Research Advances on Striped Bass and Its Hybrids* and is available from Maryland Sea Grant. Call (301) 405-7500 or send a request to connors@mdsg.umd.edu.

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Research Update
Sea Grant Research on Finfish

A major objective of Maryland Sea Grant support of finfish research is to understand the network of interactions that affect species of ecological and commercial importance in Chesapeake Bay. With regard to aquaculture, an important goal is to provide the advanced knowledge necessary for improving production – towards these ends, Maryland Sea Grant has supported research to evaluate faster growth of different strains of striped bass (see "title of Reggie's article"), the role of biotechnology in aquaculture development, and techniques for enhancing disease resistance in highly-intensive aquaculture systems. Here are two current projects:

Stepping up Striped Bass Production

The Novel Gonadotropin-Releasing Hormone of Fish-Endocrine and Molecular Studies: Toward Developing Novel Strategies of Spawning Manipulations in Striped Bass. Among the major limits to intensive farming of striped bass and its hybrids is the lack of regular supplies of newly hatched fish. While captive striped bass have been spawned in hatcheries, captivity often disrupts the stripers' hormonal systems – consequently, suppliers of striped bass fry have had to depend on the capture of gravid fish from their spawning grounds. Not only are these practices costly, they can be quite unreliable. It is for these reasons that Yonathan Zohar of the University of Maryland Center of Marine Biotechnology has been studying the molecular processes that control egg development. Among his findings is that the pituitary gland controls the release of a previously-unknown gonadotropin which regulates final ovarian development; he has also found that confinement of female striped bass affects the gonadotropin-releasing system, so that the hormone is blocked from the bloodstream. The effect is that the hormone does not reach the ovaries. In this project, Zohar has synthesized chemical analogs of the newly-discovered gonadotropin so they they can be administered to captive striped bass to improve spawning. This summer, he and his colleagues successfully produced three-quarters of a million striped bass fry from captive broodstock.

Freezing Fish Embryos

Cryopreservation of Fish Embryos: Permeability of the Yolk Syncytial Layer in Dechorionated Zebrafish Embryos. The low temperature freezing of fish sperm and eggs is one way to continue lines of desirable traits in cultured fish – unfortunately, while such cryopreservation has been done for fish sperm, it has so far been unsuccessful with fish eggs and fertilized eggs (embryos). Yolk-laden fish embryos can be thought of as a complex, multi-compartmental system: the components are separated by distinct cellular boundaries. To successfully achieve cryopreservation, the cryoprotectants must be transferred to each component of the embryo prior to freezing. Mary Hagedorn from the Smithsonian Institution and Fredrick Kleinhans of Indiana University have found that the boundary separating the developing embryo from the yolk (called the yolk syncytial layer) is impermeable to a number of commonly used cryoprotectants. When these chemicals are absent, water in the yolk is thought to form large ice-crystals that ultimately cause irrevocable damage to the embryo. In using zebrafish as a model species, Hagedorn and Kleinhans are examining how the damage occurs and seeking clues to the mechanism that allows the yolk syncytial layer to block transport of cryoprotectant. They will use new methods designed to

permeate this layer – success with zebrafish could have far-reaching implications that extend to economically important species.

Editor's Note: For more information about these projects or other Maryland Sea Grant research, call (301) 405-7500 or visit the website at www.mdsg.umd.edu/Research/

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Aquaculture in Action Workshop

Adam Frederick, Sea Grant Extension Education Specialist

Aquaculture is on its way to becoming a feature of environmental education in Maryland high schools. Over the last decade, it has been capturing the interest of educators largely because the rearing of fish can integrate a number of fields – science, mathematics, computers, economics, writing and language skills – and engage student interest in hands-on learning. Aquaculture also engages students and teachers in a comprehensive understanding of the biology of local fish species and other aquatic organisms.

In response to the increasing interest of educators, Maryland Sea Grant and Carroll County Public Schools hosted a workshop, *Aquaculture in Action,* for 14 high school educators from eight Maryland counties this past July – our aim was to equip teachers to use aquaculture systems and to enhance their science curriculum for the raising and releasing of local fish species. Each participant was able to custom design a 210 gallon recirculating aquaculture system while receiving over $1,000 in materials of instruction.

The methods and content for the workshop were adapted from a model program at South Carroll High School led by Maryland Teacher of the Year Bob Foor-Hogue. Foor-Hogue has been using aquaculture as a part of his science curriculum in a Science Research Course for 10 years at South Carroll High School. The numerous conservation and restoration projects resulting from this unique approach have expanded his classroom into the community and many other partnerships in Maryland. The choice to host the workshop at South Carroll High School proved to be beneficial for the participating educators since they were able to view the structure and function of the 12 systems operating in the South Carroll Science Research area.

The week long workshop featured a collaboration of partners that included:

- Maryland Sea Grant Extension Program
- Carroll County Public Schools
- Chesapeake Bay Trust
- Maryland Department of Natural Resources
- University of Maryland Aquatic Pathobiology Lab
- University of Maryland Biological Resources Lab
- University of Maryland Center of Marine Biotechnology

The partnerships provided a level of expertise in the field of aquaculture, education and grant writing which the participants greatly appreciated. The partnership also illustrates the willingness of a variety of institutions to extend their role directly to the classroom teacher. These types of intensive efforts are valuable in helping educators to keep current and to refresh their teaching methods.

The *Aquaculture in Action* workshop engaged educators in a "hands on" experience for six days to:

- Learn the techniques for setting up a successful aquaculture system.
- Gain experience with the tools and techniques for monitoring an aquaculture system including lab based activities for students.
- Develop a network of raise-and-release programs that incorporates a variety of Chesapeake Bay species.
- Learn the techniques for monitoring and restoring local wetlands by field study of the South Carroll High School Wetland Restoration Project.

Participant projects from the workshop will be evaluated and monitored utilizing the strengths of the partners in the project and on site visitation.

Maryland Sea Grant will add a special *Aquaculture in Action section* to its web site that will facilitate the communication by teachers and students involved in the project; the web site will be equipped to allow connections to participating school web pages and to link participants by e-mail through a common list serve. The link will help teachers and students monitor and trouble shoot their projects throughout the school year and strengthen educational partnerships throughout Maryland. A frequently asked question section will allow teachers and students to access answers to common questions pertaining to aquaculture; teachers and students will be able to tap into the Maryland Sea Grant aquaculture resources for additional assistance.

We will do on-site visitations to assess the current status of projects, further needs, student-based investigations and the relationship of projects to application in the field (e.g., raise-and-release programs and wetland restoration). We will also use on-site visits to capture digital images of the various aquaculture systems in action for description and display on the web.

Participants have been asked to keep a log book that summarizes the major milestones of the project from design and construction, introduction of species into the system, inquiry-based lessons developed as a result of the project and the successes related to raising fish during the school year. This anecdotal information will be used to evaluate the overall success of the aquaculture system and the need for modification during the second year.

In the summer of 1999, we will hold a "get together" mini-retreat to share project results and discuss expanded partnerships among schools for the following year. We plan a second *Aquaculture in Action* workshop for the summer of 2000; participants from the 1998 workshop will serve as mentors. To view the South Carroll High aquaculture facilities, visit the web site at www.carr.lib.md.us/schs/scireslaquaculture/index.html.

For more information about *Aquaculture in Action* and other K-12 education programs, contact Adam Frederick at (410) 234-8850 or Jackie Takacs at (410) 326-7356.

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Oyster Hatchery Expansion

Donald W. Meritt, Shellfish Aquaculture Specialist

The oyster hatchery program at the Horn Point Laboratory, part of the University of Maryland Center for Environmental Science, received a shot in the arm this summer with the construction of a new 1,800 square foot greenhouse. Adjacent to the existing hatchery building, the green house will provide increased production capacity and enable us to more efficiently produce oysters for research, outreach and restoration projects.

Until now, we have been limited in our capability for producing large volumes of cultured phytoplankton for use in rearing oyster larvae; we had also reached the limit for meeting the increasing demand for eyed oyster larvae. Our capacity was about one billion eyed larvae during favorable years - in years of heavy rainfall, which depress salinities, production is lower. While such levels were sufficient to meet the needs of all hatchery programs, the surge of interest in oyster restoration activities in recent years, spurred on by the Maryland Oyster Roundtable, has increased demands on hatchery production in the state. The new greenhouse should enable us to significantly increase production of larvae and spat to meet these needs.

Funded through external sources, the greenhouse consists of four 25,000-liter larval tanks and nine mass algae culture tanks. While we should now be able to expand larval production two or threefold, algae production capacity should increase some tenfold over current capacity. The new facility will also have increased capacity for producing algae paste that can be reconstituted for use in setting oysters.

Just as we were unable to meet the increased demands for eyed larvae, until now we were also limited in producing spat on shell for use in oyster restoration activities. A new setting system built near the Horn Point Lab boat basin will enable us to go from setting 1,500 bags of spat on shell a week to 4,500 bags a week. In addition, because the new setting tanks are located near the boat basin, bags of oysters should be easier to load and unload. While both greenhouse and setting tank were not online at the beginning of the hatchery season, both are now operational - we plan on being in full swing by next spring's oyster spawning season.

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Upcoming Conferences

International Conference on Shellfish Restoration
November 18-22, 1998

The second International Conference on Shellfish Restoration (ICSR '98) will provide an opportunity for government officials, resource managers and users to discuss approaches to restoring coastal ecosystems through habitat quality assessment and restoration; stock enhancement, management, restoration; and habitat remediation through watershed management. Throughout the world there is a growing commitment to restoring degraded coastal ecosystems. Everywhere there seems to be a renewed interest in preserving and enhancing coastal resources at all levels of government.

The conference will be held at the Crown Plaza Resort on Hilton Head Island and will consist of invited and contributed oral and poster presentations and workshops. A session also will be organized by the Oyster Disease Research Program. The mornings will feature internationally recognized plenary speakers, and the afternoons will feature concurrent sessions organized around theme areas.

For more information, contact Elaine Knight: e-mail: knightel@musc.edu, voice mail, (803) 727-6406 or fax (803) 727-2080. You'll also find updated information on the world wide web at: http://www.scseagrant.org/text/ICSR.html

East Coast Commercial Fisherman's and Aquaculture Trade Expo
January 29-31, 1999

The East Coast Expo, which has one of the longest names in the industry, will also be celebrating one of the longest runs, 25 years. The seminar program is being coordinated by a committee of the Mid-Atlantic Sea Grant Extension Program - while a full schedule will be available in the winter issue of Maryland Aquafarmer, a preview is available on the Maryland Sea Grant Extension website. That schedule will include aquaculture and commercial fishing issues, among them the following:

- *Biosecurity in Aquaculture* - purchasing fish and shellfish from other facilities and ensuring that they are disease-free.
- *Getting into Ornamental Fish Farming, Raising Aquatic Plants, and Baitfish Production*.
- *Clam Aquaculture* - the farming of hard clams from hatchery through growout including nursery areas and predator control.
- *Status of the Blue Crab Resource* - representatives from Virginia and Maryland will present views on the current status of the stocks and possible management measures for ensuring viability of the species.
- *Crab Shedding System Construction and Management* - cover basic system design, including new options for closed system operators.
- *HACCP and Crab Shedders* - the basics of regulations for shedders.
- *Status of the Scallop Industry* - current status and research updates
- *Marketing and Business* - business planning for commercial fisheries and aquaculture

Added highlights this year year: *Junior Watermen's Program* will give children of all ages a chance to learn and participate in the show; highlights will include demonstrations and interactive booths to show the next generation "what it's all about." Also a *Family and Consumer Program,* on seafood safety and what consumers need to know. Mark your calendars!

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New Publications

Maryland Sea Grant: Program Directory

This attractive 56-page guide will give you a plain language overview to the Maryland Sea Grant Program, its research, outreach and education programs. Sea Grant supports research by scientists at institutions throughout the state, including the University of Maryland's Center for Environmental Science; University of Maryland Biotechnology Institute's Center of Marine Biotechnology; the University of Maryland, College Park; the Maryland Department of Natural Resources; The Johns Hopkins University; the Smithsonian Environmental Research Center; and the Academy of Natural Sciences Estuarine Research Center.

Of special interest to aquaculturists is support of research on molecular studies of striped bass reproduction, cryopreservation of fish embryos and oyster disease. For a copy of the directory, call (301) 405-7500 or send an e-mail request to connors@mdsg.umd.edu.

Restoring Oysters to U.S. Coastal Water: A National Commitment

This report from the National Sea Grant College Program spotlights feature articles on how scientists are working to reverse the impact of Dermo and MSX disease on eastern oyster populations in the mid-Atlantic, juvenile oyster disease (JOD) in the northeast and summer mortality on the Pacific oyster on the west coast. Topics include include techniques for breeding dual disease-resistant strains, which have gone from the hatchery to the field; new molecular tools for diagnosing disease rapidly in the field, and computer models for helping to better monitor around disease. This 24-page publication has been produced by the Maryland and Virginia Sea Grant College Programs for the National Sea Grant College Program. For a copy, call (301) 405-7500 or send an e-mail request to connors@mdsg.umd.edu.

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