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The Oyster Alliance: Aquaculture for the Environment

**Don Webster, Eastern Shore Area Agent and
Don Meritt, Shellfish Aquaculture Specialist**

The Maryland Sea Grant Extension Program has teamed up with the Chesapeake Bay Foundation, the Oyster Recovery Partnership and the University of Maryland Center for Environmental Science to use aquaculture for establishing new habitat in the Bay. Called the "Oyster Alliance," the program offers participants an opportunity to grow oysters, a key species in the Bay, to learn about the Bay's ecology and to take a hands-on role in oyster restoration in Maryland.

Currently the group is working to expand the Oyster Gardening activities of the Chesapeake Bay Foundation in which citizens use shore side property to raise seed oysters. These oysters will be used to help create new oyster reefs, essential habitat that can provide food and shelter for fish and contribute to Bay restoration efforts by reducing the ecological impacts of excessive nutrient loading.

The Oyster Alliance has been seeking new gardeners for this year with a goal of doubling the current level of production. Expert training is provided to participants who will be invited to an annual program to share experiences with others and learn from area specialists.

In addition, a few individuals will be trained as master oyster gardeners; they will receive additional resources and provide the first line of experience for those in local areas who may need assistance. These leaders will also be responsible for collecting data from local producers.

The University of Maryland Cooperative Extension has helped to support and expand the program through a \$5,000 development grant. This funding will allow us to produce training materials and set up a network of communications that will make the Oyster Alliance program unique in the country. In addition to manuals and fact sheets which are underway, a web site will facilitate the recording of data on the growth and survival of the juvenile oysters. Participants will be able to compare the results of efforts in their areas and, eventually, track progress on the development of oyster reefs. The web site will be developed by the Maryland Sea Grant Program, which already

serves as a major source of important marine-related information in the network.

The Oyster Alliance is an example of how seemingly diverse groups working together can make a difference in contributing to the restoration of Chesapeake Bay. For more information on the Oyster Alliance, contact the Chesapeake Bay Foundation (410-268-8816), or your area Sea Grant agent.

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Oyster Gardening for Restoration and Education

A publication of the Oyster Alliance

This eight-page publication is a guide to getting started in the oyster gardening program. It provides basic information on setting up and maintaining oysters in Taylor floats or mesh bags, dealing with oyster predators, contending with oyster disease, and collecting growth and survival data. For a copy, call (301) 405-6376 or send an email to: connors@mdsq.umd.edu.



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Broodstock Management for Shellfish Hatcheries

Don Webster, Eastern Shore Area Agent
Don Meritt, Shellfish Aquaculture Specialist



The future of successful shellfish production will have to rely on the development of superior animals. While research has been going on in this area with some aquaculture species for many years, shellfish production has lagged behind. Now a group of mid-Atlantic researchers and extension agents have developed a training workshop that will teach hatchery operators and growers what they need to know in order to work with superior stocks and to develop ways to find out what industry needs from research.

Funded by the National Sea Grant College Program's Oyster Disease Research Program, the group representing Virginia, Maryland and New Jersey has been in contact with extension agents from all East Coast states. Local assistance in setting up the workshops will lead to involvement by extension personnel in a continuing dialogue between research and industry.

The teaching team includes Stan Allen and Tom Gallivan of the Virginia Institute of Marine Science, Greg Debross of Rutgers University, and Don Meritt and Don Webster of the University of Maryland Sea Grant Extension Program. Full day workshops are planned for many of the East Coast states during 1998; they include both classroom and hands-on experience, and will be held at a research lab or commercial hatchery facility.

The workshops deal with the basics of shellfish genetics and include an overview of the development of hatchery-bred stocks that are resistant to both MSX and Dermo, stocks were originally bred at the Rutgers Haskins Shellfish Lab. One requirement for obtaining these oysters in the future will be attendance at a Broodstock Management Workshop. In addition to learning about the current disease-resistant stocks, this group will also be involved in charting future directions of the genetics and breeding research.

Although the teaching team will provide their expertise without charge, individual state programs may charge a nominal registration fee to cover other costs. For information on time, location, and registration fees, contact your local Sea Grant or Land Grant agent who works with the shellfish industry in your state.

Editor's Note. The [Oyster Disease Research Program](#) is Congressionally-mandated and administered by the [National Sea Grant Program](#) (also see [Sea Grant Oyster Disease Research](#)

Drugs Approved for Aquaculture Use

The U.S. Food and Drug Administration has approved the product TRICAINE-S for anesthetic use for fish and other aquatic cold-blooded animals. Also referred to as MS-222 (tricaine methanesulfonate), TRICAINE-S is sponsored by Western Chemical, Inc. FDA has determined that this drug does not have a significant effect on the human environment; therefore, neither an environmental assessment nor an environmental impact statement is required.

PARASITE-S, which is also sponsored by Western Chemical, had been approved for control of certain external protozoan parasites on trout, salmon, catfish, largemouth bass, bluegills and shrimp and as a fungicide for trout, salmon and esocid acid. It has now received supplemental approval as a parasiticide for all finfish and as a fungicide on the eggs of all finfish.

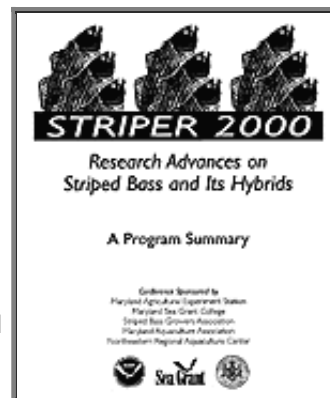
"It is important to note," says Gary Jensen of the USDA, "that PARASITE-S is currently the only formalin product approved by FDA for expanded use on all finfish. Other formalin products are approved by FDA but their uses are still restricted by the species identified on the product labels."

For more information about this product, contact, Western Chemical, Inc., 1269 Lattimore Road, Ferndale, Washington 98248, tel. (300) 283-5292. For information from the Food & Drug Administration, contact, Lonnie W. Luther, Center for Veterinary Medicine (HFV-102), FDA, 7500 Standish Place, Rockville, Maryland 20855, (301) 827-0209.

University of Maryland Sponsors [Striper 2000](#)

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

On June 6 and 7 the University of Maryland Agricultural Experiment Station and Maryland Sea Grant co-hosted - together with the Striped Bass Growers Association, the Maryland Aquaculture Association and the Northeastern Regional Aquaculture Center - a two-day national conference on the current research and production activities associated with striped bass and its hybrids. Over 120 people registered for the conference that included attendees from as far away as California and Spain.



The program focused, in part, on the research activities that have been recently funded by the Chesapeake Bay Aquaculture Grant provided by USDA to the University of Maryland Agricultural Experiment Station. It also included presentations on research activities by some of the best striped bass and hybrid researchers from around the country in such disciplines as genetics, growth, reproduction, nutrition, production, and disease. Leading representatives from industry also participated.

The first day's focus was on genetics, growth and reproduction; in addition to presentations by University of Maryland research leaders, Chris Kohler of Southern Illinois University discussed his research into domestication and selection of white bass broodstock, Bert Ely with the University of South Carolina covered his current work on molecular genetics and biotechnology of striped bass, and Craig Sullivan, one of the nation's leading reproductive endocrinologists, summarized studies on the regulatory effects of photo and water temperature on striped bass reproduction. The evening of the first day was capped off with an excellent banquet, with farm-raised striped bass hybrids as the main course, of course!

The second day began with the keynote address by Jim Carlberg of Kent Sea Farms in California; his topic was the phenomenal growth of the striped bass industry. Carlberg and his company were among the first to deal with commercial production of striped bass; Kent Farms is still the largest

single producer of food-sized fish in the U.S.

The technical sessions that followed led off with a focus on nutrition and feeding. Joining University of Maryland speakers were David Bengston of the University of Rhode Island who has long been recognized as a leader in larval fish nutrition. Steve Rawles from Delbert Gatlin's laboratory at Texas A&M University covered the diverse efforts Gatlin's lab is undertaking in working toward solving the complete dietary needs for striped bass and its hybrids.

Presentations on production and technology included two leading scientists, Ted Smith from South Carolina and Rod Hodson from North Carolina State University. Both addressed some of the latest technologies that are being applied in their respective states with pure species domestication of both striped bass and white bass as well as some of the innovative approaches to commercial-scale research with hybrids.

One concern always facing producers and researchers is disease; this session included Ed Noga of North Carolina State University who gave an excellent overview of the various types of diseases the industry faces. After lunch, the program shifted more to the practical and applied aspects of the industry with topics being addressed such as product utilization and HACCP issues. An entire session was devoted to regulatory concerns where state representatives including Tom Ellis from North Carolina, Roy Castle from Maryland, and Jack Whetstone from South Carolina addressed permitting and policy concerns from their respective states.

The conference ended with a panel discussion on future issues. These included outreach and technology transfer by Gary Jensen of USDA; commercial production by Jim Carlberg; policy issues by Tom Ellis, President of the State Aquaculture Coordinators Association; environmental concerns by John Goodall of the Chesapeake Bay Foundation; and overall industry concerns by Mike Freeze of Keo Fish Farms, Arizona, and a Board Member of the National Aquaculture Association.

In addition to the key research and industry leaders from outside of Maryland, many of the University of Maryland's finest researchers representing five different campuses of the University System were an integral part of the conference. These researchers covered a variety of research topics funded in part by the Maryland Agricultural Experiment Station and the Maryland Sea Grant College. These researchers and their topic areas included the following:

- **Genetics:** Reggie Harrell, the Center of Environmental Science Horn Point Laboratory and the Maryland Sea Grant Extension Program; Curry Woods, UMCP Department of Animal and Avian Sciences; Paul Schreduers, Biological Resources Engineering.
- **Reproduction and Growth:** Yonathan Zohar and John Trant, Maryland Biotechnology Institute Center of Marine Biotechnology; and Geoffrey Dahl, Department of Animal and Avian Sciences.
- **Nutrition and Feeding:** Brian Small from Joseph Soares' laboratory, Department of Animal and Avian Sciences; Allan Place, Center of Marine Biotechnology; and Steven Hughes, Maryland Cooperative Unit at the University of Maryland Eastern Shore.
- **Production and Technology:** Fred Wheaton, John Hochheimer and Sadev Singh, Department of Biological Resource Engineering.
- **Disease:** Siba Samal and William Hueston, University of Maryland College of Veterinary Medicine.
- **Utilization (HAACP and food safety):** Tom Rippen, Maryland Sea Grant Extension Program.

Follow-up comments and conference evaluations from both the research community and industry representatives indicated the conference was a success and well worth the two-day weekend commitment. Striper 2000, a 36-page collection of summaries for each presentation was produced for the conference. To obtain a copy, contact Maryland Sea Grant at (301) 405-6376 or send an e-mail request to Jeannette Connors: connors@mdsg.umd.edu.

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Occurrences

Doug Lipton, Marine Economic Specialist

The decline in Maryland's retail seafood sales resulting from extensive media coverage of the dinoflagellate *Pfiesteria piscicida* has been well documented. Newspaper articles also reported on widespread cancellations of recreational charter fishing trips because of customer concerns about the safety of fishing in Chesapeake Bay. The release of the National Marine Fisheries Service 1997 Marine Recreational Fishing Statistical Survey data allows us to examine the impact that concerns about *Pfiesteria* had on marine recreational fishing in Maryland.

Participation in marine recreational fishing trips is measured for three different fishing modes: (1) party/charter boat fishing; (2) private/rental boat fishing; and (3) shore fishing. While it appears from the survey data that neither private/rental or shore fishing were impacted by concerns about *Pfiesteria*, party/charter boat fishing was severely impacted. The level of impact was determined by examining the recent trends in fishing participation in each of the modes, keeping in mind that there may be wide fluctuations from year to year due to factors such as fishing success rates, the weather, and fishing regulations. Although fishing participation goes back to 1981, we only examined the participation rates from 1990-1996 to compare with the 1997 rate. Prior to 1990 there was a moratorium on striped bass fishing in Chesapeake Bay which severely impacted recreational fishing participation.

Shore based recreational fishing in Maryland's portion of the Chesapeake Bay and its tributaries totaled over 900,000 trips in 1997, the highest number of trips recorded since data collection began in 1981. This figure was also 28% higher than the six year average (1990-1996) number of trips. Private rental boat fishing trips were 9.5% above the six year average at almost 1.6 million trips. In contrast, the number of party/charter boat trips declined 24% below the six-year average at a total of just over 88,000 fishing trips.

We can only speculate on why there was such a great difference in the response of fishermen who go party/ charter boat fishing compared with anglers who fish on their own or rented boats or from shore. Perhaps private boat and shore fishermen are more knowledgeable about the localized nature of the *Pfiesteria* occurrences and felt confident that the areas they normally fish in were safe; on the other hand, party/charter boat fishermen may be on the water irregularly and feel less confident in their knowledge and are more dependent on the media.

We will be examining the 1997 data in more detail, as well as the 1998 data when they become available, to determine if the concerns from 1997 carry over into 1998 charter boat fishing activity and to assess the impacts of any new outbreaks in 1998.

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Sea Grant Oyster Disease Research Program

Oyster diseases may not be a plague in Chesapeake Bay but Dermo (*Perkinsus marinus*) and MSX (*Haplosporidium nelsoni*) have kept harvests at historical lows and have discouraged oyster aquaculture. The near-decimation of the Bay industry, as well as the recognition that oysters play a key ecological role in water quality, helped catalyze federal support for the Oyster Disease Research Program (ODRP). Administered by the National Sea Grant College Program, its goal is to better serve restoration for commercial and ecological purposes in U.S. coastal waters.

ODRP has been supporting fast-track and long-term research that has the aim of getting sustainable populations of oysters back into coastal waters. Its major efforts are to develop:

- Practical strategies for managing around disease
- Molecular tools to better monitor the onset and presence of disease
- Hatchery techniques for producing disease-resistant strains
- Improved understanding of the processes of parasitic infection
- Better understanding of the oyster's immune system

ODRP support has encouraged wide-ranging cooperation among researchers, industry and government agencies - one project that is already showing demonstrable impacts is the regionwide study to evaluate the effectiveness of oysters bred for resistance to both Dermo and MSX; it is these oysters that are the basis for the broodstock management workshops that Don Webster and Don Meritt report on (see [Broodstock Management for Shellfish Hatcheries](#) in this issue). The five projects currently underway in Maryland are listed below:

Managing Around Disease

- Development and Management Applications of a Dual-disease (MSX and Dermo) Model for Chesapeake Bay Oyster Populations. A sophisticated computer model developed by a number of scientists, including Steven Jordan of the Maryland Department of Natural Resources Cooperative Oxford Lab, will enable resource managers and commercial growers to evaluate the effects of different strategies for managing around disease. The models incorporate information relating factors such as temperature, salinity and the age, size and nutritional health of oysters to disease susceptibility.

Environmental Stress and Disease

- Examining the Ecological Physiology of Oysters on a Reef Habitat: Interactions of Dissolved Oxygen and Disease Dynamics. A number of environmental stresses may be involved in the oyster's susceptibility to Dermo disease, among them, oxygen depletion that occurs in the Bay. Using biochemical measures, Kennedy Paynter of the University of Maryland, College Park will study the distribution of disease and changes in oxygen in two different oyster reef structures. The findings could have direct application to the design of reefs for habitat restoration projects.

Disease at the Cellular Level

- Comparative Pathogenesis of Dermo Disease in Bivalves: Development of Prevention Strategies for the Eastern Oyster. In this study Robert S. Anderson of the University of Maryland Center for Environmental Science (UMCES) is studying the interaction between the oyster's disease-fighting blood cells and Dermo. In comparing reactions of the eastern oyster with two other molluscs that are resistant to infection, Anderson's aim is to clarify the basic mechanisms that make the eastern oyster so vulnerable.

Molecular Diagnostics

- Taxonomic and Genetic Characterization of *Perkinsus marinus*. Development of Mutagenesis and Gene Transfer Systems with Application to Therapeutic Strategies and A Molecular Approach: Transmission Dynamics of Infection in Chesapeake. Gerardo Vasta of the University of Maryland Center of Marine Biotechnology is characterizing the genetic life cycle of *P. marinus* and investigating the proteins it releases, which disrupt the normal functioning of the oyster's immune system. The ultimate goal is to develop chemical therapeutants to block the parasite's ability to proliferate within the oyster tissue. In a second project, he is refining a molecular probe that can be used to assess the onset of infections in oyster spat or juveniles - the probe will also provide a technique for hatchery managers to certify that batches of oyster seed are disease free.
- Monoclonal Antibody ELISA Assay for Detection of *Perkinsus marinus* in Oyster Tissues. While molecular probes are one tool for detecting Dermo disease, another promising tool is a rapid assay based on antibodies. Antibodies are proteins that are generated in the blood of a host, i.e., an oyster, when invaded by a foreign organism, in order to destroy invaders. Chris Dungan of the Maryland DNR Cooperative Oxford Laboratory has been developing this diagnostic approach in which antibodies are labeled with a fluorescent dye or linked to a specific enzyme.

For more information on the Oyster Disease Research Program, order a copy of Restoring Oysters to U.S. Coastal Waters, a report on its recent accomplishments, from Maryland Sea Grant by calling (301) 405-6376 or sending an e-mail request to connors@mdsg.umd.edu; or visit the ODRP website at: <http://www.mdsg.umd.edu/NSGO/research/oysterdisease/>.

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

Don Webster, Eastern Shore Area Agent

It's hard to believe, but the 25th anniversary of the [East Coast Commercial Fisherman's and Aquaculture Trade Expo](#) is coming up in 1999. The Expo, which has one of the longest names in the industry, will now also have one of the longest runs. Over these 25 years it has traditionally been held in Ocean City, Maryland, although there have been times when it was moved to Baltimore, Norfolk, Virginia and Salisbury, Maryland. With the completion of the renovated convention center in Ocean City, however, it once again returned in 1998 for a great show. The planning for the anniversary show is now underway and it looks to be the best yet.

The seminar program will once again be planned by a committee from the Mid-Atlantic Sea Grant Extension Programs. Discussions have been held regarding "hot" topics that will be of use to watermen and aquaculturists in their businesses. Many of the subjects are of interest to both groups, showing the strong interaction between the public and private sides of the commercial fish and shellfish industry.

Last year, new features were begun, including a Kids Program for the children of those attending the show and a Spouses Program which included information on seafood preparation and nutrition. In addition, a Rockfish Cookoff was held by the Maryland Seafood Marketing Office. All were very successful and are being planned for the 1999 show. The Kids Program will once again feature a range of learning stations that will give the children a chance to have fun as well as learn about their marine environment and the important resources that make up the Chesapeake Bay.

The trade show floor will once again be packed with equipment and boats for the successful waterman and aquaculturist to use in his or her business. Exhibitors will be there with the latest and best products, many of these exhibitors have been a part of the show for years and keep coming back because of the crowds that the East Coast show draws. Mark your calendar now and plan on being in Ocean City, Maryland for the [25th Annual East Coast Commercial Fisherman's and Aquaculture Trade Expo](#).

Aquaculture in the Mid-Atlantic: Spring 1999

Don Webster, Eastern Shore Area Agent

Aquaculture in the Mid-Atlantic, the oldest continuing aquaculture education program in the region, will hold a special program in Spring 1999. Currently in the planning stage, the conference will bring together producers, scientists, and marketing specialists for a look at the live aquatic plant and animal industry.

Live shipments of aquatic organisms have grown rapidly in the past decade in response to Asian market demands as well as domestic consumption by those wanting the freshest product available. A conference on the West Coast two years ago brought together many in the business and an East Coast version was held in Canada last year. Holding a related meeting in the mid-Atlantic region will give people a better chance to attend.

Products currently utilized in the live market include edible plants and those for water gardening, coastal commercially caught fish such as flounder, and aquaculture products like tilapia. Of course, one of the oldest forms of live marketed products are goldfish and other ornamentals. The potential for expansion of these products looks excellent, with opportunities for innovation.

The conference will be planned by extension agents and specialists in the region, many of whom have already been working with the developing industry dealing in live transport and sales. Aquaculture in the Mid Atlantic is a conference and trade show that has been involved in bringing quality educational programs to the region. It is supported by the Land Grant and Sea Grant Colleges in Maryland, Virginia, Delaware, Pennsylvania, New Jersey, and West Virginia.

Further developments as well as registration information will be available through *Maryland Aquafarmer*. Keep watching and begin planning now to attend.

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