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In This Issue:

Crab Survey Results Announced

By Richard E. Bohn

Preliminary data from the annual blue crab population survey, released by the Maryland Department of Natural Resources (MDNR) early this month, revealed some surprising results. Increasing pressure on the stock is evident from this and previous surveys.

The survey suggests this won't be a banner year for crabs, and they've been pretty accurate. Decreases over all size classes have been noted this year. More important is that incoming numbers (recruitment) of young crabs have been steady for the last four or five years. What changed is that a greater percentage of adult crabs are being caught, and this may eventually affect recruitment. But this hasn't happened yet.

The total number of crabs varies up and down with no pattern scientists can explain. When lower, like this year, it takes more effort to catch each bushel of crabs. There is also a greater tendency to keep everything caught. What also concerns policy makers is the increasing numbers of female crabs being kept, which are double those of the previous year.

This pressure is not entirely due to commercial fishing. In 1994, regulations capped the number of commercial crab licenses. The difference may be attributed to the recreational fishery, and it's a difficult catch to estimate. The best guess is that twenty five to fifty percent of the crabs go to the licensed recreational crab and "personal use" (1 bushel per day) fishery. There's plenty of pressure on our crab stocks.

Currently, the MDNR is reviewing harvesting regulations with an eye towards the results of next year's survey. Continuing downward trends, particularly in the number of adult female crabs, are likely to mean more restrictions. Private and commercial harvesters alike need to remember we

are sharing a resource and that it is renewable if we just respect it a little. Here's how you can help:

1. If you catch crabs, especially with enclosing gear like pots or bank traps, check your gear often. Less problems with crowding, low oxygen, predators and just plain stress means better crabs, and less later loss of crabs you release.

   The type of harvest gear doesn't matter if it isn't tended properly, and bank traps in particular should not be used as a holding pen. They are not designed to hold animals for long periods and may result in unnecessary and needless mortalities.

2. Respect the size limits. They're designed to allow crabs a chance to survive long enough to breed. You want that, too.

3. Think about releasing female crabs, especially sponge crabs (with eggs). This problem will cause new restrictions, for everybody, if we're not careful.

4. Catch just what you need, not what you'd like. Don't bring that extra bushel for the neighbor who isn't home after all, or "to fill the freezer". Although most of you with spouses already know that.

5. Treat what you catch with respect. If you want to keep them alive, start trying to keep them healthy immediately upon catching them. Keeping crabs cool and moist, or in aerated sea water, extends their shelf life (and it's good food safety).

6. If you catch peeler crabs, release green peelers. Their shedding success in good systems runs about 50%, compared to 85-95% for ripe peelers. We don't feed crabs in shedding systems, and often green peelers are still feeding actively, gathering strength to shed. Throw back paper shell (buckram) crabs, too. The meat is just awful.

7. If you're not fishing your gear, take it out of the water. Pots can continue to catch crabs, even after the bait is gone. Consider putting in a corroding release panel that opens the pot if it's abandoned or lost. "Ghost pots" are becoming a hot issue; while the magnitude of their impact is unknown, it is certainly not a positive one.

The responsible use of renewable resources starts with us.

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Bacterial Problem Strikes Maryland Tilapia

By Ana Baya, Frank Wills and Richard Bohn

Tilapia, also known as St. Peter's fish, are increasingly popular fish mainly raised in recirculating aquaculture systems. Since the summer of 1994, a significant number of cases of a bacterial disease are being reported to Animal Health Diagnostic Laboratories in College Park and Princess Anne. The streptococcus bacteria being found does not constitute increased risk to humans, but is responsible for some significant disease outbreaks in the normally safe fish culture systems.

The disease occurs following an episode of stress (such as temperature or water quality shock, or recent transport) and can affect all age groups of tilapia. Other fish species in the same culture facility may also be affected. Clinical signs of disease appear several days after the stress, but may be difficult to distinguish from other bacterial infections. Some signs are missing scales, small body sores, reddening at the base of one or more fins, bulging eyes (exophthalmia or popeye), milky eyes (corneal opacity), and loss of appetite. As the infection progresses, red sores become ulcers, eyes fill with pus and may then collapse, and the fish die. Groups of fish usually show a steady and significant death rate over several weeks, rather than a sudden, massive die-off. Mortality can occur more rapidly and affect greater numbers with continuing stresses.

The disease is treatable, and many fish can be rescued with the use of approved antibiotics. The fish should first be screened by an Animal Health Lab to determine which antibiotics will be effective, rather than applying an expensive and inappropriate treatment which may further stress the fish. Since intensive culturing systems are prone to episodes of stress, preventing the introduction of the bacteria is the most effective way of avoiding the problem.

Ideally, new fish to be added to any culturing system should be inspected and be accompanied by a health certificate. It is also prudent to ask the seller if any bacteria or viruses were isolated from the lot of fish you are purchasing, or are common at their facility even without disease outbreaks. The ability to be on the lookout for specific disease symptoms will shorten your reaction time for correcting them, if they occur. If this information is not available, then fish may be tested at the Animal Health Diagnostic Laboratory in College Park. **Contact Dr. Ana Baya (301-935-6074) to schedule submission of at least four live fish from the seller to the Fish Health Lab prior to shipment**.

Despite whether or not consultants, regulators or fish sellers feel pre-testing fish for diseases is important in closed systems, persons operating those systems are at a disadvantage if this information is not available. It is a matter of quality control. Fish sellers should be particularly sensitive to this, since disease outbreaks are usually blamed on the source of fish, and without documentation this is difficult to disprove. Although streptococcus has been identified in Maryland's wild fish, these fish are an unlikely source of disease in a closed system. **Testing fish for diseases before introduction is prudent management, and may prevent a lot of sick or dead fish on your farm**.

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Seafood Update '95

By Gayle Mason-Jenkins

Seafood Specialist Gayle Mason-Jenkins has announced that Seafood Update '95 will take place at the University of Maryland Eastern Shore on August 15 and 16, 1995. The program is sponsored by the Maryland and Delaware Sea Grant Extension Programs and the Maryland Department of Agriculture's Seafood Marketing Program. The program is designed for home economics professionals including home economics teachers, extension agents, school food service managers and supervisors, dieticians, nutritionists and other food and health educators. Continuing education credits have been requested from the ADA, AAFCS, and the American School Food Service Association.

The program will cover a wide range of issues concerning fish and shellfish and feature prominent researchers and educators from throughout the country. The Role of Fish and Shellfish in the Diet will be covered by Constance Pergerson, R.D. from the Maryland Cooperative Extension Service while Ken Gall of the New York Sea Grant Program will discuss their Aquaculture Marketing Survey.

Dr. Sue Snider of the Delaware Cooperative Extension Service will speak on Project Food Safety including lesson plans developed under the program. The increasingly important issues of Seafood Inspection and Hazard Analysis Critical Control Points (HACCP) will be covered by an employee from a major seafood company as well as Austin Heute, an Inspector with the US Department of Commerce.

Consumer Concerns and the Seafood Hotline will be the topic addressed by Robin Smith of the US Food and Drug Administration, while Jean Pennington of FDA will talk about seafood labeling. Rick Greene of the Delaware Department of Natural Resources and Environmental Control will speak on Seafood Consumption Advisories and Risk Assessment and Dr. George Flick of Virginia Tech, one of the leading experts in the country, will address the topic of Seafood Jeopardy.

On August 16 there will be a hands-on session followed by a demonstration of the culinary arts by James Hughes of UMES who will show how to prepare aquaculture products. After a question and answer session, you'll pick up a box lunch and tour the UMES Aquaculture Farm before going to HyRock Aquaculture Farm, one of the prime producers of salt water raised hybrid striped bass. The tour will finish with a trip to Aquamar Industries in Pocomoke City for a look at tilapia produced in a commercial water reuse system.

For a registration form and information on lodging and travel, contact Gayle Mason-Jenkins at 410-651-6212 or fax her at 410-651-6207.

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Niche Marketing And Aquaculture

By Douglas Lipton

The ecological notion of niches is that different species utilize different components of the ecosystem in how they reproduce, feed and generally make their lives. The greater the overlap in niches, the greater the competition between species and the more energy and reproductive capacity must be used to out compete the other species. This is quite analogous to the concept of market niches. In the case of markets, overlap is a result of firms competing by offering the same or similar products to the generic marketplace. Profits are less than they could be because of lower prices when there are a lot of competing alternatives for your product, or additional expenses incurred in marketing or advertising.

In an industry such as aquaculture, where production may be on the margin of profitability, niche marketing may be a way to achieve higher profits. Niche marketing consists of two components: 1) product differentiation, and 2) market segmentation. Product differentiation entails distinguishing your product from the generic forms on the market. One of the promises of aquaculture is the control that the grower has to produce a commodity that the market desires. In wild fisheries, one must sell what is pulled from the ocean. There is some limited ability to differentiate product in wild fisheries such as by quality (e.g. hook and line caught salmon versus the lower quality gill-net salmon). Aquaculture offers the ability to control the size of the product, the time of availability, the color, the taste and other factors. Aquaculture has a distinct advantage over wild fisheries in offering live product to the marketplace. There is a great deal of opportunity, mostly not yet realized in aquaculture, to differentiate product.

The other part of niche marketing is market segmentation. There are innumerable ways to segment the market. Some broad categories include segmentation by geographic region and socio-economic status of buyers. Some buyers make purchase decisions on price alone while others are also interested in the service you provide. An important way to look at your market is to segment it by the degree with which the population uses your product. Who are the heavy users, the light users and the non-users? Find out why they use or don't use your product to the degree they do.

True niche marketing combines the components of product differentiation and market segmentation. It entails identifying a segment of the population looking for a particular set of product attributes, producing a product with those attributes and making the buyers aware of the product. One of the best examples of niche marketing in aquaculture has been the development of the sale of tilapia and other species live to Asian markets in major cities.

Niche marketing should be considered along with other marketing strategies for your product. On the down side, it may be a problem to maintain quality assurance and low production costs over a variety of product lines. Logistically, it may entail large shipping costs for small quantities. Ultimately, niche marketing should only be undertaken if it increases the profitability of your aquaculture operation.

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Organic Certification For Fish Culture

Fish producers may be interested in organic certification for their product as a marketing tool. It is one that may be investigated as part of a comprehensive market analysis at the start of a business or for one that is currently in production. Organic certification is not easily obtained but may provide an outlet to markets otherwise not available.

There are international certification companies which verify organic production practices. One such operates in over twenty countries and licenses fifty operations around the world representing over 4000 growers of food and fiber, as well as processors, manufacturers, and livestock producers.

*Organic production uses nature as a model and the production system is viewed holistically. Crop practices encourage and enhance biological cycles within the farming system and minimize all forms of pollution. They interact in a constructive, life-enhancing way with all natural systems to produce food of high nutritional quality. In their production they use, as much as possible, renewable resources in locally organized systems and consider the wider, social, ecological and economic impact of the production system.

Feeds for production of organically certified fish must use grains which are organically grown and minerals derived from naturally occurring mined products. Fish meal must be from one hundred

percent wild marine fish and kelp meal only from the ocean. Specific feeding practices are required for organic production.

Environmental factors are considered in the overall operation. Specific water quality and recirculating requirements apply, as do oxygen, shade, water exchange and waste regulations. Although some veterinary treatments are acceptable, there are prohibitions on chemicals, hormones, and antibiotics of any kind in the business.

During harvest, humane practices must be utilized and processing, handling, and storage functions must meet organic requirements. Food safety and hygiene standards are strictly enforced. The final product is audited through the product distribution channels through a lot numbering system.

If you would like more information on organic certification including information on who to contact about program requirements, call your Sea Grant Area Agent.

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Efficacy Of Phytase On Phosphorus Utilization

By Joseph H. Soares, Jr. and Kathleen P. Hughes
Department of Animal Sciences, UMCP

(*The following is adapted from the Proceedings of the 1995 Maryland Nutrition Conference for Feed Manufacturers held March 23-24, 1995 and sponsored by the Departments of Poultry Science and Animal Sciences, College of Agriculture UMCP; the Maryland Feed Industry Council, Inc.; and the American Feed Industry Association*)

Nutritionists are continually challenged to improve the efficiency of animal diets and a great deal of effort has gone into determining as closely as possible the dietary requirements of nutrients for the major livestock species. These efforts continue but are compounded by legal and ecological demands to reduce nutrient wastes that are discharged into, or intentionally introduced to, the environment. Phosphorus (P) has been determined to be one of the most limiting nutrients for plant growth. As such, its presence in the environment through leaching from soils or direct entry into waterways has a major impact on eutrophication.

Because of this, many state and local governments are enacting legislation to reduce phosphorus pollution. The State of Maryland has been very active in this regard in an effort to restore good water quality conditions to the Chesapeake Bay and its tributaries. In 1968, Nelson et al. published data showing that phytase isolated from *Aspergillus ficum* could hydrolyze over 90% of phytin phosphorus in selected feedstuffs. It has long been known that phytic acid salts are synthesized by plants and deposited in the aleuron/pesicarp portion of seed. Phytases occur naturally in fungi, yeasts, and certain plants. Reid *et al.* (1974) and Nelson *et al.* (1976) reported that ruminants via rumen microorganisms can hydrolyze phytates to produce available ortho-phosphate. Since two-thirds of the phosphorus from plant origin is in the form of phytates, significant improvement in phosphorus utilization could be made by the presence of phytase in the diet. Cereals are particularly rich in phytates and it is known that monogastric animals do not have the phytase enzyme to hydrolyze the bound phosphate to ortho-phosphate. This is especially important since typical corn-soybean meal diets contain enough P to satisfy the requirement for livestock such as pigs and chickens.

Commercially prepared phytase products are available in Europe and Canada but are not approved for use in the United States at this time. At least one product is a microbial phytase that has been obtained from genetically modified Aspergilli. Phytase is active at pH 2.5 and 5.5. Furthermore, Jongbloed *et al.* (1993) and Mroz *et al.* (1993) have established that the enzyme's action is mostly in the acid gastric mucosa of the stomach.

Although calcium (Ca) also forms weaker ionic complexes with phytate the bound Ca as well as other cations (Zn, Fe, Mg) are also poorly available to animals. The use of phytase in monogastric animal feeds has several potential advantages:

1. Phytase will hydrolyze bound P to make it bioavailable and reduce or eliminate the need for supplemental P.
2. It will also make other essential elements bioavailable.
3. Since P is better utilized, less will be excreted into the environment

Recent studies with broiler chickens and pigs have shown that dietary P utilization can be improved by dietary phytase. Piontillart (1991) showed that naturally occurring dietary phytase (Triticale vs corn) improved weight gains and bone mineralization in growing pigs. Recently Ketola (1994) and Riche *et al.* (1994) showed that rainbow trout had improved dietary P utilization when about 300 U/g phytase was added to the diet. Here is a summary of some recent publications:

Efficacy of microbial phytase on phosphorus bioavailability to several monogastric species

Phytase and P U/kg	Diet type	Species	Apparent Absorption	
			P	Ca
1000	practical	Broiler chickens	+60%	+26%
1000	practical	pigs (37 kg)	+24%	+16%
1450	practical	pigs (11-25 kg)	+56%	N.D.
500-1000	practical	pigs (26 kg)	+43%*	-
800	practical	pigs (45 kg)	+45%	+10%
1550	practical	pigs (70 kg)	+22%	-
$3200x10^3$	practical	Rainbow trout	+100%	-

*P availability based on bone strength

We are currently conducting studies with striped bass to evaluate phosphorus availability when a microbial phytase (Nantophos TM) is added to plant based diets. Fingerling striped bass were fed a diet containing only plant source phosphorus with 0, 600, 1200, 2400 U/kg phytase or Potassium monophosphate (1.3% of diet; o.5069 available P) for 14 weeks. Based on weight and length gains at 8 weeks, 2400 U/kg phytase supported growth significantly greater than the controls gains and equal to the Potassium monophosphate supplemented group.

It appears that phytic phosphorus can be made available to monogastric animals in sufficient quantity to significantly reduce or eliminate the need to add supplemental phosphorus to chicken and pig diets. Phytase additions may allow greater use of plant proteins in aquaculturally important fish diets thereby enabling nutritionists to formulate lower cost feeds. Additionally phytase may decrease fecal phosphate levels in livestock reducing soil and water accumulations of phosphorus that are harmful to the environment.

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Aquaculture Producers Sought For Survey

The Second Northeastern Regional Aquaculture Industry Situation and Outlook Report is to be produced soon and the researchers are looking for commercial producers who would like to participate. This publication is sponsored by the Northeastern Regional Aquaculture Center (NRAC) and supported by the US Department of Agriculture.

The report will update the first one which was produced in 1993 and will attempt to quantify the species produced in the region and the type of operations producing them, as well as the quantity and value of past, current, and future production. They will also be looking for information on the number of employees engaged in aquaculture, future industry needs, and your opinions on constraints facing the industry. The information provided by those who participate is kept strictly confidential and the authors stress that only aggregate data will be provided, with no specific reporting of individual responses.

The first report was very professionally done and has served to give a "snapshot" of the industry in our region. It has been very useful in showing policy makers what currently exists and what could be developed. We would urge all commercial producers to respond to their questionnaire when it arrives and, if you don't know whether or not you are on the mailing list, call or write your Sea Grant Area Agent and we'll make sure that your name and address are forwarded for the mailing list.

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Fishery Market News Available By FAX

By Don Webster

For many years, NOAA's National Marine Fisheries Service (NMFS) has provided information on seafood landings, receipts, and prices to the fishing industry. We used to get the mailed "blue sheets" (New England) and "green sheets" (New York) years ago and found a treasure lode of information in them. Now the Fishery Market News has gone high tech as NMFS has developed a fax on demand service to provide members of the seafood industry with up-to-date market information. Included are daily seafood prices from Fulton Market and the Boston auction prices, along with weekly trade leads and other seafood market information.

If you're interested in trying this service, call 301-713-1415 from a fax machine phone. At the mailbox prompt, enter 200 followed by the pound symbol, #. The menu will automatically be sent to your fax machine. While the service is free, bear in mind that long distance charges will apply.

One of the most critical needs in aquaculture is knowing who your competition is and what is happening to prices in the market place. This is a service that should be of interest to anyone in the business of producing seafood in the region.

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Aquaculture And The '95 Farm Bill

The 1995 Farm Bill will likely include aquaculture as an important component. It will call for reauthorization of the National Aquaculture Act of 1980 and the Regional Aquaculture Centers. Maryland scientists, extension agents, and industry members have long been associated with projects of the Northeastern Regional Aquaculture Center (NRAC) and all look forward to strengthening of them.

According to the Clinton Administration, "Aquaculture is poised to become a major growth industry", and it is considered to be one of the most promising segments of American agriculture. They add that, "The United States has an important opportunity to develop a globally competitive aquaculture industry to serve national needs and the international market.

"Sustainable, environmentally responsible aquaculture development holds particular promise for rural communities. New aquaculture technologies can create challenging, rewarding new jobs and foster rural economic development by stimulating new business ventures among small, rural and/or minority-owned companies," according to the proposal.

Meanwhile, Dan Glickman, the new US Secretary of Agriculture, says he is "committed to strong leadership by the Department of Agriculture of Federal programs to support the private US aquaculture industry." In a recently issued statement, the Secretary pointed out that government needed to maximize efficient use of all Federal programs to support the aquaculture industry. He noted that this can become an internationally competitive, sustainable industry and that his Department strongly supports cooperation and collaboration with other agencies in the development and implementation of programs and policies that can support private aquaculture.

The Secretary, who serves as the Chairman of the Joint Subcommittee on Aquaculture (JSA), is committed to fostering teamwork among Federal agencies, through the activities of the JSA, to stimulate development of the industry. The 1995 Farm Bill will be a primary vehicle for industry support activities to be developed and implemented.

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Blue-Green Algae Blooms

By Dan Terlizzi

Most of us are familiar with the cyclical pattern in ponds of alternating "blooms: of various species of algae. In the early spring we might find the water colored a golden brown from a bloom of diatoms of olive and green depending on the dominant species. Later in the season, after these

blooms of phytoplankton have been consumed by microscopic crustaceans--shrimp-like creatures-- and the nutrients they contain released back into the water, we may find extensive growths of mat forming algae. Healthy algal populations are as fundamental to the production rate of the pond as good pasture is to production of beef or dairy, however, excessive algal growth in any form can frequently present the pond owner with difficult management problems.

In this region when we discuss algae management in ponds we generally refer to the filamentous, mat forming algae or the typical microscopic forms called phytoplankton. However there is another important type of algae whose blooms can cause problems from off-flavor in pond raised fish to extensive fish mortality. I am referring to a group called blue-green algae. Many believe that blue-green algae should not be considered algae at all because many aspects of their cellular structure and metabolism are more similar to bacteria than algae. One of the conditions that favors blue-green algal blooms in ponds is eutrophication, or high levels of nitrogen and phosphorous, a condition that is fairly typical of ponds in the region, however not all ponds have high nutrient levels appears to be susceptible to blue-green algae. Factors other than nutrients play an important role in the growth of blue-green algae--high temperature coupled with still weather conditions often result in blue-green algal blooms.

Even the nutritional needs of blue-green algae cannot be stated without some hedging. For example some blue-greens can use atmospheric nitrogen to support growth so it is possible that even nitrogen poor environments can experience problems. Another condition that seems to favor blue-greens is water column stratification or the layering of warm water over cooler deeper water that is associated with the warmer weather of summer. High organic matter, a condition of particular concern to aquaculture ponds may also be a factor. As a generalization, the Mid-Atlantic doesn't appear to have problems with the blue green algae as severe as those encountered in the warmer southern states. However, some pond uses may increase the frequency of blue-green algal blooms in the region, particularly aquaculture, since fish culture increases nutrient levels and organic material often associated with blue-greens.

Blue-green algae are fairly easy to recognize. In spite of their name, their color can range from black to pale green. Most often in ponds they are a light green color that forms distinctive swirling patterns on the water surface. Often there is a distinctive petroleum-like odor associated with the bloom -- in fact the odor may be present even before the bloom become a problem. Unfortunately, aside from preventing conditions that may encourage blue-green algal growth there is very little that can be done about blue-greens. The only chemical treatment developed is Solricin 135 (potassium ricinoleate) a soap made from potassium hydroxide and castor oil. This product resembles inhibitors naturally produced by aquatic plants, however it has not been very successful in treating blue green algal blooms in aquaculture ponds.

Understanding blue-green algae may be particularly important for those of you that use ponds for watering livestock. Some blue green algae produce toxins that can cause digestive upsets even mortality in some cases.

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Maryland Aquafarmer Now On World Wide Web

Starting with the Spring issue, the Maryland Aquafarmer became available on the World Wide Web, allowing access to those who cruise cyberspace looking for useful information. You can access the newsletter directly by using the URL http://www.mdsg.umd.edu/Extension/Aquafarmer/. Comments on the newsletter or requests for additions or corrections to the mailing list may be directed to the editor at dw16@umail.umd.edu.

Maryland Sea Grant has been a leader in computer communications and offers a great variety of other information on the web that you will find useful as well. Their newsletter, Maryland Marine Notes, is available and it contains a wide variety of topics on research and the environment. Also available is the Mid-Atlantic Regional Marine Research Program's Research Plan in several formats. The URL for the Maryland Sea Grant web site is http://www.mdsg.umd.edu/.

If you have any problems with either of these connections, you may contact Dan Jacobs at telephone 301-405-6383 or at jacobs@mdsg.umd.edu.

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Biotechnology In Aquaculture

By Reginal M. Harrell

At the recent Aquaculture in the Mid-Atlantic and Aquaculture Expo meeting in Washington, DC, Maryland Sea Grant and the Sea Grant Extension Program hosted a workshop on the *Role of Biotechnology in Aquaculture*. As expected, several of the attendees were apprehensive about the workshop or didn't know enough about it to even ask questions. However, once they found out what the speaker's topics were, attendance to the entire workshop was excellent.

Many of you are probably like the attendees of the meeting in wondering ... "What in the world is Sea Grant Extension talking about now? Biotechnology indeed! I am finally getting comfortable with normal aquaculture terminology, and now you are going to throw something else at me! It's hard enough keeping up with aquaculture concepts like biofiltration, carrying capacity, and the like, and now you want me to start considering starwars-type concepts such as transgenic animals, recombinant DNA, and gene-splicing. Forget it! Enough is enough!"

Actually, although these latter concepts are a apart of the molecular aspects of biotechnology, all of the former everyday jargon such as controlled reproduction, ozonation, special formulated growth enhancement diets, founder stocks F1 hybrids, strain specific traits, as well as many others, are also part of aquaculture biotechnology. Did you realize that improving the efficiency of biofiltration systems and technology, hormonal inducement of spawning, determining efficacious disease treatments, and even simple cross-species hybridization all have their roots in what is now coined biotechnology? In fact, most aquaculture biotechnology accomplishments have come about without the type, excitement and frequent controversy that can be associated with some of the more esoteric "high tech" efforts we hear about today, such as fish that have some super gene inserted into them.

How the realm of biotechnology affects aquaculture is much broader than just direct food production issues. For instance, there is a possibility for aquaculture to play a prominent role in marine biomedicine or biotechnical products. Several medical as well as industrial products are now commercially produced as direct or natural byproducts of organisms taken from marine animals and plants, such as sponges, corals, and algae. Instead of harvesting these plants and animals from the wild, what is to prevent an enterprising culturist to devote their production efforts to supplying the raw materials needed for this aspect of biotechnology? Likewise, another aspect of marine biotechnology is involved in bioremediation of pollutants -- maybe there will be an effort directed to biologically converting aquaculture effluents into a less deleterious form.

In future issues of *Maryland AquaFarmer*, we will be addressing how biotechnology in aquaculture has worked to make your vocation (or avocation) more successful, some of the possibilities, and what the future may hold for the industry regarding technological advances.

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Farm Pond Management Tip

Summer is the time when farm pond owners should really be actively fishing their ponds. It is very easy for a pond to get "out-of-balance" from overpopulation of bluegill causing stunting of both bass and bluegill or other sunfish in the pond. Remember a general rule of thumb is for every pound of largemouth harvested you should be removing about 10 pounds of bluegill (sunfish). So don't throw those undersized bluegill back into the pond. Throw them on the pond bank or bury them.

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Maryland Oyster Recovery Partnership

By Donald Meritt

Armed with data that showed oyster harvests in Maryland had reached an all time low, and oyster diseases had reached into virtually all of the State's oyster populations, former Secretary of Maryland's Department of Natural Resources, Dr. Torrey Brown, convened the Maryland Oyster

Roundtable in 1994. This panel of 40 individuals included watermen, environmentalists, resource managers, scientists, politicians, and aquaculturalists. A series of meetings were held and through much discussion an Action Plan for oyster recovery was formulated and signed by each member of the Roundtable.

As part of this broad-reaching plan, the Maryland Oyster Recovery Partnership was formed. Based in the offices of the Maryland Watermen's Association in Annapolis this Partnership has begun the difficult task of coordinating and implementing the many and varied aspects of the Action Plan. The first major thrust of the plan is taking place this summer in the upper Choptank River.

A cooperative venture involving scientists from the University of Maryland, the Maryland Department of Natural Resources, and watermen, and coordinated by the Maryland Oyster Recovery Partnership, the project is preparing to plant some two and a half million seed oysters on a specially prepared area of Choptank River bottom. The area comprising approximately 10 acres received over 100,000 bushels of dredged oyster shell provided by the MDNR last summer in anticipation of this summer's experimental planting. The seed, produced in the University of Maryland's Horn Point Laboratory's oyster hatchery, have already begun to be deployed in an isolated nursery area located in the upper Choptank.

The Choptank River was chosen as one of several Oyster Recovery Areas (ORA's). The Choptank ORA's are divided into three zones (A,B,C). In zones A and B only disease free seed oysters can be planted. No harvesting can occur in zone A but harvesting is permitted in zone B. Zone C can receive seed oysters even if they are infected and harvest is also allowed. It is hoped that in doing this oyster seed will be grown to planting size without becoming infected with either of the two disease agents (Dermo or MSX) that have so severely decimated the Bay's natural oyster populations.

Hatchery produced seed oysters will be deployed after one or two months in the nursery and will be regularly monitored during the coming months for growth, survival, and disease infestation. These experimental oyster plantings should provide insight into new and innovative ways to rehabilitate Maryland's once abundant oyster resources and will provide valuable information to the growing number of potential oyster growers in the state.

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Aquatic Vegetation Management Tip

By the time summer rolls around, many of you are wondering what happened to my beautiful pond, where did all this algae come from, and what can I do to get rid of it? Unfortunately, by this time of the year it is too late to treat a pond for vegetation control unless drastic measures are bing considered. Good aquatic vegetation management and control has to start in early spring and continue throughout the summer into the fall to be effective. The effective means of controlling unwanted vegetation this time of the year is by direct chemical control or complete drainage and drying.

Remember that dying and decaying plants can cause severe oxygen depletions in ponds resulting in the death of the fish and other aquatic animals. If you have to chemically treat your pond for vegetation control in the summer, treat no more than one-fifth to one-quarter of the pond at the time, give the pond at least two weeks to recover from the decaying plant material then treat the next section. Monitor water quality, get your permits or have a certified applicator apply the chemical, keep records, and always use approved aquatic herbicides for the target species.

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