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MARINE NOTES

SPOTLIGHT ON AQUACULTURE

What's Next for Fish Farmers?

Gauging the Future of a Fledgling Industry

By Merrill Leffler

TIMOTHY CLARK

Not far from Cambridge on Maryland's Eastern Shore and miles from the Choptank River, fish circle the confines of 40-foot rectangular tanks. Though separated from the docks and deadrisers associated with fishing on the Chesapeake, for Rick Sheriff these fish represent his catch, his form of food production. Clean water continually circulates through each of Sheriff's thirteen tanks, which sit in an out-of-the-way industrial park in Hurlock, Maryland. Water quality, if all works right, is completely under his control.

In each tank here at Delmarva Fisheries 12,000 gallons of water pass through clarifiers that remove solids and then through biological filters that break down chemical wastes and leave them harmless. Unlike the turbid waters of the Chesapeake, the water in these tanks, under the building's low roof and low lighting, looks nearly transparent.

By all appearances, this is the way closed-system farming is supposed to work. Sheriff gets fingerlings from hatcheries that raise juveniles in high numbers, then nourishes them with specially formulated feeds. Filtration is key to maintaining water quality, since contaminants can not only produce off-flavors, lowering the value of his product, but can also sicken or even kill the fish — and put a serious dent in Sheriff's investment. If all goes well, depending on the species, fish will be ready for market in six to seven months (for yellow perch and bluegills) or nine months (for tilapia) or a year (for hybrid striped bass).

Although the clean tanks at Delmarva Fisheries seem on track for producing a wholesome and valuable seafood product, the record for aquaculture that relies on recirculating systems has posted as many failures as successes. The reason: raising fish for profit depends on conquering a suite of challenges, and often raising fish is not the toughest part.

"Growing fish is the least of my problems," says Sheriff. In addition to watching the tanks, feeding the fish and cleaning the water, Sheriff, like other aquaculturists, has to worry about where the next crop of fingerlings will come from, and, with low-price imports from South America and Asia, about who will buy his fish once they're ready for market.

"I concentrate on fingerling supplies and marketing," Sherrif says.

According to Sea Grant Extension specialist Don Webster, that's the right thing to do. "More aquaculture fails because of business management than system management," says Web-

Andy Lazur

This 12,000-gallon recirculating tank, with an automated feeding system, teems with tilapia at feeding time. Systems like this one, located in a converted barn on an Eastern Shore fish farm, offer the control and economy needed to grow fish profitably.

Recirculating systems can be located anywhere and don't depend on expensive waterfront property or unpredictable water supplies pumped from a river or bay.

ster. Fingerlings, too, pose a major problem, according to Webster, since fish farmers must have a reliable supply of the fingerlings they want when they want to raise them.

"Rick's system can grow fish profitably," says Robert Butz, a dairy and grain farmer in western Maryland who is now farming fish in tanks, "but that's not the complete story. You need others to supply fingerlings — you need industry support when you get in trouble. This is still a frontier mentality."

Tough Times on the Frontier

The rearing of fish, shellfish and aquatic plants — known generally as aquaculture — may be the aquatic equivalent of land-based agricultural husbandry, but it lags far behind its terrestrial sibling.

Though slow to catch on in this country, the cultivation of fish is hardly new, going back at least 2000 years in China, which may be why, with its long head start, China far outpaces other countries in overall aquaculture production. That nation alone accounts for some 70 percent of farmed fish each year, while the U.S. trails far behind, a distant eighth at one percent of world production.

Most U.S. production comes from catfish grown in ponds in the Mississippi delta and salmon raised in floating cages off the coasts of Maine and Washington state. U.S. shellfish farmers also cultivate oysters on the northwest and northeast coasts, and mussels, crawfish and clams on the east and Gulf coasts. Still, all told, the U.S. imports a great deal more seafood than it exports, carrying an annual $5 billion seafood trade deficit. No wonder that the U.S. Department of Commerce's Aquaculture Plan calls for the nation to invest more of its research and expertise in raising domestic seafood products.

In Maryland and the mid-Atlantic, farmed fish production for consumption hardly registers — aquaculture's largest economic impact still comes from ornamental fish. In Maryland, the largest and most profitable aquacultural production comes from Hunting Creek in the western reaches of the state, which for eighty years has produced fish for the aquarium trade. Another important role of aquaculture in the Chesapeake region continues to be its use in proactive restoration efforts. Aquaculture has proven central to efforts to restore the Bay's shad and oyster populations, for example. At the University of Maryland Center for Environmental Science (UMCES), the Horn Point Hatchery has produced more than ninety percent of the disease-free spat used to reseed oyster bars in the Bay. Likewise, the Department of Natural Resources operates a hatchery where it has spawned some six million shad larvae for release into the Patuxent and Choptank rivers.

DNR is using "Reproboost" technologies, implants that release hormones over a period of time that induce fish to spawn in captivity. Developed at the Center of Marine Biotechnology (COMB), part of the University of Maryland Biotechnology Institute, these time-release implants have made it possible to produce large numbers of larvae that traditional spawning techniques could not deliver.

In addition to providing juveniles for stock enhancement, researchers use hatchery-reared strains to test for disease tolerance — in the effort, for example, to manage around the oyster diseases, MSX and Dermo. Beyond this, aquaculture is now playing an important role in education as well — numbers of Maryland elementary and middle and high school teachers are using aquaculture to teach students about biology and ecology by growing fish in tanks (see sidebar, "Aquaculture in the Classroom").

Despite these important and worthwhile roles for aquaculture, the bottomline for entrepreneurs like Rick Sheriff and Robert Butz remains financial. What they bank on is a more controlled method of farming fish — not in ponds and not in net-pens, where water quality and the problem of effluents can create environmental challenges — but in completely enclosed environments, recirculating tanks, that offer the kind of

The Science of Closed Systems

One of the country's leading research institutions in developing marine indoor recirculating systems is the University of Maryland's Center of Marine Biotechnology (COMB) in Baltimore's Inner Harbor. Led by Yonathan Zohar, COMB is taking a multidisciplinary approach for moving fundamental research from the lab to the farm. While Zohar's work involves analyzing the reproductive hormones and biochemical reactions that cause fish to become gravid, COMB researchers have been focusing on a suite of other issues as well, from nutritional needs of different life stages to new microbial communities that can make marine circulation systems more economically feasible. A major concern in aquaculture of carnivorous species is the use of fish meal in fish feed. As Zohar says, "we're taking fish to feed fish." That is one reason that they have begun studying new feed formulations that can reduce dependence on wild-caught fish.

John Consoli

Yonathan Zohar with sea bream.

More than a decade ago, Zohar came to the U.S. from Israel, which has a highly developed aquaculture industry. He and his colleagues in Baltimore have successfully spawned both striped bass and sea bream, a high value and popular European species farmed in netpens in the Mediterranean. Not only have they spawned them, but they have developed techniques to enhance their growth. While sea bream normally take about sixteen months to grow from fingerling stage to one-pound market size, in COMB's specially controlled recirculating marine systems, sea bream have been brought to harvest in a mere nine months.

Sea bream, notes Zohar, appear on the menus of numbers of seafood restaurants in this country, and he believes U.S. aquaculturists could raise sea bream in recirculating tanks and market them profitably. He admits, however, that upfront investment costs will likely prove sizeable, and that despite the high price that sea bream now commands, it may take a private aquaculturist a couple of years to realize profits. These are the kinds of considerations aquaculturists have to deal with as the industry continues to mature.

management and economy required for a profitable enterprise. Such systems, they argue, can be located anywhere — not only in rural areas like Hurlock or western Maryland, but in warehouses in cities like Baltimore, says Yonathan Zohar, director of COMB. They don't depend on expensive waterfront property or unpredictable water supplies pumped from a river or bay.

Pioneers like Sheriff and Butz hope to find niches in an aquaculture industry that will one day make fish production in Maryland as viable an endeavor as agricultural production has been for centuries.

On the Trail of Recirculating Systems

In research labs across the University System of Maryland, researchers are working to develop capabilities that could help turn the potential of aquaculture into a long-promised reality.

At a recent meeting at the UMCES Horn Point Laboratory, Webster and Sea Grant Extension aquaculture specialist Andy Lazur brought together university researchers with Maryland aquaculturists who hope to raise, in recirculating systems, species such as tilapia, yellow perch, hybrid bluegills and hybrid striped bass. There are other species to consider as well — including marine species like the sea bream. "What we wanted to learn," says Lazur, "were the major problems that growers face, so we could set out a course of assistance to help this fledgling industry."

The model for this kind of cooperation is well established. After all, determining research needs by bringing scientists together with farmers has been at the heart of agricultural development in the United States for more than 100 years. Aquaculture expert Reginal Harrell, Eastern Shore director of the Maryland Agricultural Experiment Station, explains it this way: "Research does the underwriting work, while Extension can demonstrate it and educate the work force." Industry then takes over, he says. "They need to make the tough decisions. But they can't afford to make the big investment and lose the animals to find out what the best answers are. Our job is to get scientifically credible answers."

Reducing the Risk of Failure

While fish farmers identified a number of problems, by far their biggest complaint was their inability to get fingerlings — their "seed" — when they needed them.

Part of solving this problem, according to Webster, is strategic. "The key to recirculating systems is flexibility," Webster says. "Growers can't focus on one species and expect to stay there. If one species becomes uneconomical, they better be able to move into something else."

And yet with the exception of a few species — tilapia in particular — growers have faced limits to their flexibility because hatcheries have not yet proven able to spawn different species on a regular basis.

Though researchers are making solid advances in university laborato-

ries, new technologies are only beginning to make their way to commercial hatcheries, and compared with land-based agriculture, aquaculture has a long way to go. Unlike farm animals that have been genetically bred, for example, most fish species are either captured in a gravid state from spawning grounds, or they are reared in hatcheries for a short time. An entire year's production of larvae may depend on the brief spawning period of captured fish. Though several hatcheries have mastered the ability to produce tilapia year-round, that is not the case for species such as yellow perch and hybrid bluegill.

Even year-round controlled spawning of high quality tilapia fingerlings does not secure success. Though a highly tolerant warm-water species that accommodates close quarters and fluctuating water quality, tilapia, like all cultivated species, whether on land or sea, still faces the vagaries of the marketplace. This lesson became clear several years back, when a reliance on tilapia left a number of businesses in jeopardy, as low-cost imports sent prices plunging. Because they could not ride out the loss or switch to another species, a number of growers were forced out of business.

Again, as marine agent Don Webster says, it's the business part that can prove the most difficult nut to crack.

Coping with Changing Markets

When the price of tilapia plunged, Rick Sheriff switched his operation to the more profitable yellow perch. A staple of weekend fish fries in the Great Lakes, perch promised good money, especially since wild harvests in that region had fallen from 40 million to 10 million pounds a year. "The demand was there," Sheriff says. "We just couldn't satisfy it."

That demand for cultured fish can exceed supply is good news for anyone considering the aquaculture business, but the ways of the market are complex. As one might expect, other growers also wanted to sell to that lucrative market. With increasing demand on limited supplies of finger-

Aquaculture in the Classroom

What do you think about when you think about aquaculture? Catfish in Mississippi ponds? Salmon in cages along the coast of Maine?

Educators like Adam Frederick and Bob Foor-Hogue think of ecology. And biology. They also think of calculus and physics, of water pressure and biofilters, of tanks that teachers can build themselves. They think of students learning about all these things, using live fish, and then they think of those same students releasing fish they have raised into Chesapeake tributaries, part of a statewide grassroots restoration effort.

Sandy Rodgers

Students in teacher Bob Foor-Hogue's science classes at South Carroll High School not only built this aquaculture system, but use it to raise fish to release into streams and rivers that lead to the Bay.

Frederick, a marine education specialist for Maryland Sea Grant Extension located at the Center of Marine Biotechnology, and Foor-Hogue, an award-winning teacher in the Carroll County Public Schools, have been working to create a network of "aquaculture educators" in Maryland. By partnering with local school systems, they are seeding a number of model programs that use aquaculture as a tool for teaching science.

Frederick and Foor-Hogue, along with Sea Grant educator Jackie Takacs, have organized a series of workshops entitled "Aquaculture in Action" to engage educators in "hands on" experience for six days to:

- learn techniques for designing, building and 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 incorporate a variety of Chesapeake Bay species
- learn techniques for monitoring and restoring local wetlands by field study of the South Carroll High School Wetland Restoration Project
- learn grant writing techniques

As part of the program, teachers and students have released fish — striped bass, for example, in Maryland's Sandy Point State Park — in cooperation with the Maryland Department of Natural Resources, using stripers provided by the UMCES Horn Point Laboratory. They have also learned how to maintain aquaculture tanks in their own schools, and how to write grant proposals for additional support for their science work. For more information, check the web at www.mdsg.umd.edu/Education/AinA/. Or contact Adam Frederick at frederic@mdsg.umd.edu.

For More Information

Skip Brown

For more information about aquaculture visit the following web sites:

Center of Marine Biotechnology, University of Maryland Biotechnology Institute, www.umbi.umd.edu/~comb/programs/aquaculture/aquacul.html

Horn Point Laboratory Fish Hatchery, University of Maryland Center for Environmental Science, www.hpl.umces.edu

Maryland Sea Grant Extension Program, www.mdsg.umd.edu/Extension/aqua_fish.html

University of Maryland College Park Aquatic Pathobiology, www.aquaticpath.umd.edu/

Virginia Polytechnical Institute, www.research.vt.edu/resmag/resmag2001/aquaculture.html

Southern Regional Aquaculture enter Publications on Recirculating Technology, www.msstate.edu/dept/srac/fslist.htm#40-459

Minnesota Department of Agriculture and University of Minnesota, Evaluation of Recirculating Systems, www.mda.state.mn.us/DOCS/MKTG/Aquacult/Recirc.htm

lings from hatchery producers, the price for juveniles went up — some five times more, Sheriff says, than what he originally paid. The profit margin grew smaller, and with tilapia prices on the rebound, he's since backed off yellow perch and has now returned to farming tilapia.

Clearly, flexibility and diversification of crops is as important for aquaculture as it is for agriculture.
For some fish farmers closed, recirculating systems will help remove some of the risk of otherwise uncontrolled variables, and give them the control they need to switch species when necessary.

What they do not yet have is an established industry, with easy access to supplies and materials — the farming infrastructure that has, over many years, grown up around land-based agriculture.

According to Robert Butz, it's not that recirculating systems such as his can't produce large numbers of fish. What causes him headaches is the lack of support services that can make farming fish profitable. "Look at how developed hog, poultry and cattle nutrition is," he says. "There is comparatively little development in fish nutrition compared with agriculture."

Despite the shortcomings, Butz sees fish farming itself as a form of diversification, which is why, earlier this year, he bought thirteen tank systems built by Sheriff's company. In raising fish he sees a means of diversifying his agricultural investments, and in recirculating systems he believes there is a chance to gain more control over production. Unlike raising fish in ponds or in netpens, he says, an aquaculturist using recirculating systems can better manage environmental conditions. He points out that he can raise non-indigenous species without worrying about their escape, and he doesn't have to worry about predators. He also feels that he can better manage water quality and disease.

Anytime you raise animals, says Butz, there is an environmental cost, but with closed system aquaculture that cost is very low. Though some water is discharged, he says, the amounts remain relatively small, especially when systems are properly maintained. To Butz, farming fish in recirculating tanks seems like a good way to respond to the vagaries of the marketplace, and he expects that others may well follow suit.

The Path Toward Profit

Growing fish well, say Webster and Lazur, means growing them profitably — the bottom line is what counts. To increase their potential for profitability, they say, growers need better management, a variety of species and alternative markets.

In addition to low-margin species such as tilapia, hybrid striped bass, yellow perch and bluegills, says Lazur, we have to look at higher value species such as sturgeon, sea bass and sea bream. And beyond that, he notes, the industry should not lock itself into food species. He points to attractive possibilities for raising ornamentals for the aquarium trade. What we need now, he says, is good market information that we can then link to economics.

Even beyond food production and ornamentals, there are important opportunities for aquaculturists, Lazur says — for instance, providing environmental benefits by using the natural filtering of shellfish, and perhaps integrating that with plants to treat a range of effluents. Creative use of aquaculture, he says, could lead to innovative ways to reduce nutrient loading into surface waters while producing a cash crop.

To chart the next moves for the aquaculture industry, researchers need to develop both improved means for raising a variety of species in captivity but also incisive market analyses for those species, whether food fish, ornamentals, baitfish or for restoration work. This is the information the industry needs up front, says Lazur, to know what directions make the most economic sense.

As the still-developing aquaculture industry moves into the future, Lazur cautions that everyone involved will need to keep their eye on true economic potential. "We're taking a comprehensive approach to address profitability," Lazur says. "We're in this for the long haul."

Summer Estuarine Fellowships Available

Sandy Rodgers

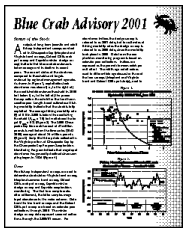
Maryland Sea Grant is currently seeking applications for its summer 2002 Research Experiences for Undergraduate (REU) fellowship program. Up to fourteen undergraduates will be selected to work with university scientists on major marine research programs that focus on the Chesapeake Bay.

As members of research, modelling and data analysis labs, students in the REU program work on individual research projects in areas that include estuarine processes, biogeochemistry, contaminants, chemical contaminant cycling, fisheries, physical oceanography, the benthic environment and submerged aquatic vegetation. Each student will work with a principal investigator at the University of Maryland Center for Environmental Science's Chesapeake Biological Laboratory — at Solomons, Maryland, or its Horn Point Laboratory, at Cambridge, Maryland — or at the Academy of Natural Science Estuarine Research Center in St. Leonard, Maryland.

The 12-week program runs from May 28-August 20 and includes dormitory costs, round-trip travel expenses and a stipend of $3,600. Applicants must have completed at least two years of study toward a bachelor's degree and still be undergraduates in the fall of 2002. Applicants must be U.S. citizens or permanent residents of the U.S. or its possessions.

For application details, visit the web at www.mdsg.umd.edu/Education/REU or call (301) 405-6371. Applications are due March 8, 2002.

Chesapeake Bay Blue Crab Advisory Report



The Chesapeake Bay Stock Assessment Committee's 2001 Blue Crab Advisory Report is now available on the web and as a printed leaflet. Released early each summer, the report summarizes the status of the blue crab resource and provides scientific advice for resource management decisions. The report uses data from five fishery-independent surveys to determine the status of the stock. The five surveys include the Virginia trawl survey, Maryland summer trawl survey, Calvert Cliffs crab pot survey, Baywide winter dredge survey, and Baywide zooplankton monitoring survey.

A review of data collected in 2001 indicates that: (1) there is a declining trend in recruitment in recent years; (2) age 1+ blue crab stock size is approaching a low not seen since the late-1960s; (3) adult female abundance is currently below the previous historical low set in 1968; and, (4) fishing mortality rate is well above the target, and may be increasing. The report may be viewed on the web at noaa.chesapeakebay.net/reports/BCARpage2001.htm. The CBSAC Technical Committee is comprised of scientists from Maryland, Virginia, and the NOAA National Marine Fisheries Service's NE Fisheries Science Center, SE Fisheries Science Center, and Chesapeake Bay Office (Derek.Orner@noaa.gov, (410) 267-5676).

Congress Funds Bay Education

As part of the Fiscal Year 2002 budget Congress approved $1.2 million in funding for a Chesapeake Bay education program administered through the National Oceanic and Atmospheric Administration's Chesapeake Bay Office, making it the first federal agency with a formally funded Chesapeake Bay education program. Funding will be available for environmental education efforts in states in the Bay watershed (MD, VA, PA, NY, DE, WV) and the District of Columbia.

Funding was supported by Senator Paul Sarbanes (D-Md.) and other members of the Congressional delegation in the Bay watershed, and passed as part of NOAA's annual budget. Of the total appropriation, $400,000 is intended to support the efforts of nonprofit environmental education programs, with the remaining $800,000 used to support and coordinate additional environmental education activities within the Bay watershed. A solicitation for education proposals is anticipated to be published in the early spring. For more information, contact Seaberry Nachbar, NOAA Chesapeake Bay Office, (410) 267-5660.

End Notes

Bi-State Crab Effort Continues

At a meeting in Richmond, Virginia on December 11, 2001 members of the Chesapeake Bay Commission's Bi-State Blue Crab Advisory Committee (BBCAC) assembled to address the future, both immediate and long term, of the Chesapeake's valuable blue crab fishery. The meeting was designed specifically for stakeholder input. Seafood processors like Jack Brooks, of Clayton's Seafood, warned that additional restrictions will further weaken a processing industry already dealing with imported crabmeat, labor challenges and changing markets.

Watermen from around the Bay, from southern Virginia to northern Maryland, also shared their observations on the 2001 crabbing season. Most agreed that while the season had started slow, the fall harvest took a decided turn for the better, fueling optimism for the future.

Researcher Rom Lipcius, Virginia Institute of Marine Science, reported that his trawl data, which has shown a dismal decline in spawning stock during the past several years, at last posted an increase this season. While welcome news, Lipcius pointed out that the level still remains quite low, and far below average. Still, some movement upward has sparked hope in researchers and watermen alike that the declining trend may be nearing its end, and that restrictions on harvest pressure may have begun to bear results.

Maryland Delegate John F. Wood, who co-chairs the bi-state committee with Robert S. Bloxom of Virginia, exhorted those present to continue to work together, and to find ways to stick to the goal set out by the committee's action plan, of doubling the blue crab's spawning stock. "We have a good plan," he said. "Let's stick to it."

Opportunities

■ **Chesapeake Bay Small Watershed Grants Available.** A Request for Proposals for the Small Watershed Grants Program has been issued to organizations working on a local level to protect and improve watersheds in the Chesapeake Bay basin, while building citizen-based resource stewardship.

Under last year's program, 59 projects from across the Bay watershed received grants ranging in size from $1,700 to $50,000 (average grant size is $25,000) out of 140 applications received. Under the 2002 Chesapeake Bay Small Watershed Grants Program, grants of up to $50,000 will again be awarded on a competitive basis.

In addition, the 2002 grants program is being expanded with the creation of the Community Legacy Grants program in which five grants of up to $100,000 will be awarded to truly innovative projects which either restore vital fish and wildlife habitats, develop locally-supported watershed management plans, or promote environmentally-sensitive development.

The Program is administered by the National Fish and Wildlife Foundation, in cooperation with the U.S. Environmental Protection Agency, Chesapeake Bay Program. Additional funding for the program is provided by NOAA Fisheries, USDA-Forest Service, and other sponsors. Grants must be postmarked no later than February 1, 2002. For more information, visit the web at www.nfwf.org/programs/Chspke_rfp2002.htm

■ **Bay Trust Seeks Nominees for Ellen Fraites Wagner Award.** The Chesapeake Bay Trust encourages the nomination of deserving individual or group volunteers for the 2002 Ellen Fraites Wagner Award. Nominees should exemplify the CBT mission of "promoting public awareness and participation in the restoration and protection of the Chesapeake Bay and its tributaries."

Named for Wagner, who worked closely with former Maryland governor Harry Hughes in establishing the Chesapeake Bay Trust, the award is a bronze statue of the Chesapeake Bay Trust's symbol, the blue heron.

To nominate a volunteer individual or group that has helped restore and protect the Chesapeake Bay and/or its tributaries, send a one to two-page letter detailing their efforts. Schools, churches, community groups and nonprofit organizations and individuals associated with them are eligible nominees. The deadline for receipt of nominations is 5:00 pm February 4, 2002.

For more information about the award or Bay Trust grants, call 410-974-2941 or visit chesapeakebaytrust.org.

Publications

■ ***The Waterman's Song: Slavery and Freedom in Maritime North Carolina*, by David S. Cecelski.** This new book from the University of North Carolina Press chronicles the world of slave and free black fishermen, pilots, rivermen, sailors, ferrymen and other laborers who, from the colonial era through Reconstruction, plied the inland waters of North Carolina from the Outer Banks to the upper reaches of tidewater rivers.

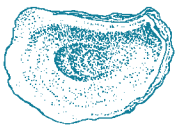
Demonstrating the vitality and significance of this local African American maritime culture, Cecelski also shows the essential role it played in local abolitionist activity, slave insurrections and other antislavery activism, as well as boatlifting thousands of slaves to freedom during the Civil War. Most important according to Cecelski, a professor at Duke University, is the insurgent, democratic vision black watermen developed in the relatively egalitarian work culture of the seafaring world, then carried into the political maelstrom of the Civil War and Reconstruction. For more information, visit the University of North Carolina Press at www.uncpress.unc.edu.

MSG Request for Proposals

Skip Brown

In mid-January Maryland Sea Grant College will issue a Request for Proposals (RFP) for its next proposal cycle which runs from February 1, 2003-January 31, 2005. The RFP solicits proposals with durations of one to two years. Those interest in submitting proposals should read the RFP carefully and direct any questions to the program early in the proposal process. Sea Grant support is offered on an open, competitive basis and is available to researchers at all academic institutions and research laboratories in Maryland. To read the online RFP and download forms, visit the web at www.mdsg.umd.edu/Research /RFP. If you don't have web access, or you'd prefer a paper copy, contact Rosalie Lynn at (301) 405-6371.

Comprehensive Oyster Plan



A new effort is underway by Chesapeake Bay Program partners to develop a comprehensive plan for managing the Chesapeake Bay's oyster resources. With the adoption of the Chesapeake Bay 2000 Agreement, a renewed and better-coordinated effort is underway to address the commitment of "achieving at a minimum, a tenfold increase in native oysters by 2010." Towards this end, the Bay Program is drafting a Comprehensive Oyster Plan (COP) with the ultimate goal of maintaining the valuable ecological role of native oyster populations, while continuing to support an oyster fishery. The Bay program is inviting public comment on COP concepts during January 2002; the draft is available on the web at www.chesapeakebay.net/cop.htm. The tentative timeline for completion of the plan is March 2002.

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