MARYLAND

Research, Education, Outreach *May-June 1997*

MARINE NOTES

SPOTLIGHT ON RESEARCH

Smart Farming for a Cleaner Bay

BY MERRILL LEFFLER

Researchers have been trying to determine the most effective practices for keeping fertilizers on farms and out of surface and groundwater

Kathy Gugulis

"With cover crops and no-till farming, the Chesapeake Bay Program could meet its goal of reducing nitrogen 40 percent by the year 2000," says Russ Brinsfield.

A bold assertion from the director of the University System of Maryland's Wye Research and Education Center but one that is based on nearly a decade of research on test plots and demonstration farms.

While nutrient runoff from suburban development of once-rural areas is on the rise and presents an increasing challenge, farming still accounts for the largest use of land in Maryland. Farm acreage in the state dropped nearly 40 percent between 1965 and 1996 — nevertheless, more than two million acres, over 3,000 square miles, are still in agriculture.

Because the application of fertilizers and manure in regions of intensive farming threaten nitrate contamination in groundwater and phosphorus build-up in soils, researchers at the Wye have been trying to determine the most effective practices for keeping fertilizers on farms and out of surface and groundwater.

Though nitrogen and phosphorus are key to the Bay's rich productivity — they stimulate algal growth at the base of a bountiful estuarine food chain — their massive runoff from the land has also been key to the Bay's decline.

In a pattern that has become common to many coastal waters, nutrient overloading leads to algal growth far greater than a more balanced food web can assimilate. In early spring and summer, blooms of algae will blanket surface waters, choking off light below. As unconsumed algae decompose and rain down onto sediments below, they deplete oxygen in bottom waters — the observable effects can become evident in the loss of underwater vegetation, in fish kills and in the death of bottom-dwelling organisms such as oysters and mussels.

While some farms drain directly into the Bay's main stem, many more border the river and stream systems that eventually empty into the Bay.

To reach the Bay Program's 40 percent reduction goal and maintain it at those levels in the years ahead means stemming nutrient runoff from these systems — for example, from the Potomac and Patuxent watersheds on the western shore, and the Choptank and Nanticoke watersheds on the Eastern Shore. Stemming nutrient flow into the rivers depends on curbing runoff to hundreds of feeder creeks and streams.

Please turn page

A Maryland Sea Grant Publication

Farming, continued

It is for these reasons that in 1992, the Chesapeake Bay Program moved its efforts upstream — upstream is where the farms are, where population is increasing, where land is being cleared, where housing and business development is occurring, where more septic systems are being installed. Upstream is where the Tributary Strategy and Citizen Implementation Teams for meeting the Chesapeake Bay restoration were born. It is where we have to meet the challenge that both changing and traditional land uses have on the future of the Chesapeake.

Nutrients and Tributaries

The Tributary Strategy consists of specific plans for major Bay tributaries to achieve the 40 percent nutrient reduction — these plans include point by point recommendations for meeting the goal. Teams of 25 to 30 members appointed by the governor for each tributary — and representing business, agriculture, academia, environmental concerns, and government — are asked to ensure that the Strategy works equitably.

Lauren Wenzel, Manager of the state's Tributary Strategies Program, says, "The idea behind the Tributary Strategy was not a blue print but a goal or plan, a starting point. One of the most helpful things," she says, "is for the teams to look at goals and to ask if they are realistic. Are they on track? What are the resources?" We are depending on these teams, she says. "If we were doing everything, we wouldn't need them."

The concept, says Mauro Chiaverini, Jr., chair of the Lower Potomac Tributary Team, is brand new. "It hasn't been tried before anywhere in the country. We're making it up as we go." Chiaverini, an officer in a land development company, says "these teams have brought together a lot of people who don't ordinarily get together in a civil environment. Usually it's an 'us and them mentality,' with both sides at odds."

Maryland identified ten tributary watersheds — for each a set of nitrogen and phosphorus reduction caps were calculated so that when summed they would add up to the statewide 40 percent reduction goal. This means a decrease from 27 million pounds of phosphorus and 353 million pounds of nitrogen in 1985 to 17.7 million pounds of phosphorus and 276 million pounds of nitrogen by 2000. The Patuxent watershed, for example, has an annual cap of 330,000 pounds of phosphorus and 3.5 million pounds of nitrogen, while the Choptank watershed has a phosphorus cap of 200,000 pounds and a nitrogen cap of 2.8 million pounds.

"Our focus on nutrient management is the biggest change in agriculture in Maryland."

In certain watersheds on the western shore, curbing nutrient flow from farms will contribute significantly to staying below their cap. On the Eastern Shore farming will be a major nutrient contributor: in all three watersheds — the upper Eastern Shore, the Choptank River and the lower Eastern Shore — nonpoint loading of nitrogen and phosphorus far outweigh point source discharges. This is because the region is so heavily dominated by row crop agriculture and poultry farms. While improvements in waste treatment plants to remove phosphorus and nitrogen from direct discharges to the Choptank will reduce loading, the benefits of such reductions pale in comparison with those that will result from keeping fertilizer and animal waste on the land.

For such reasons, says Russ Brinsfield, research at the Wye Research and Education Center has concentrated on improving farming practices that could simultaneously maintain crop yields while minimizing impacts on the Bay. These efforts have engaged University scientists, the Maryland Department of Agriculture and farmers themselves.

Keeping Nutrients on the Farm

"The state and University have made enormous progress," says Brinsfield, "in working with farmers." Richard Hutchison, an Eastern Shore farmer, says that "many farmers have been applying nutrients in a more timely manner — when plants are going to use them, and in some cases," he adds, "they are applying less."

According to the Chesapeake Bay Program, average nitrogen and phosphorus applications in Maryland, Pennsylvania and Virginia have dropped by 20 to 30 pounds per acre per year during the past decade. Soil specialists no longer recommend 120 to 130 pounds an acre to get an expected yield of 100 bushels of corn. Today, nitrogen recommendations average about 100 pounds an acre.

Assessing fertilizer applications and tailoring them for each farm and type of soil is part of Nutrient Management Planning, a program that aims at minimizing nutrient pollution. First begun in 1989 with assistance from the University's Cooperative Extension Service, the program accelerated in 1992 when the Maryland Department of Agriculture began an accreditation program for training private consultants who can then provide recommendations on managing crop nutrients such as commercial fertilizers, animal manure and other organic sources such as waste treatment sludge.

"Our focus on nutrient management is the biggest change in agriculture in Maryland," says Lewis Riley, Secretary of the Maryland Department of Agriculture. "Although managing nutrients has always been part of farming, we now are more closely monitoring factors such as yield results and soil fertility to increase efficiencies."

Maryland's is the first such volunteer program in the country. To date, more than 800,000 acres of state farmland is under nutrient management. The goal by the year 2000 is about 1.3 million acres.

"These plans also show farmers

ways to save money," says Brinsfield. And saving money speaks loudly. "It's an economic factor," says Rich Hutchison. "It costs money to put fertilizer on, so if you can get the same crop yield for less cost, it makes sense."

Despite the number of acres now under nutrient management, these effects have yet to show up in the form of nutrient reduction in the river. "They haven't translated themselves through the flow system," says Brinsfield. That delay results from the tremendous lag time, he says, between introducing fertilizers, or curbing them, and their slow movement beneath the root zone and, for nitrogen, into groundwater. "It could be five to ten years before we see measurable changes," he says.

Major practices that are especially important in keeping nutrients on the land are no-till farming and cover crops, says Brinsfield — without them and other Best Management Practices, he says, we cannot reach the 40 percent goal.

With no-till, sediment losses are significantly lower, though the practice often leads to elevated levels of dissolved phosphorus. Brinsfield recognizes the problem. "We need to find a way to preserve the value of no-till but deal with those higher [phosphorus] levels," he says. One hope is to make sustainable reductions in phosphorus by reducing fertilizer application rates to levels less than the crop removal rates.

Though no-till and other practices such as terracing sloped landscapes — more applicable to western shore topography than the flat Eastern Shore landscape — reduce soil erosion and runoff of phosphorus, these practices often fail to curb nitrogen, since nitrates dissolve and move with flowing water, even when sediments are stopped.

Even with reducing the amount of nitrogen fertilizer (and applying fertilizers at the best times), the most farmers can get from corn uptake is about 65 percent of the nitrate. This leaves considerable excess nitrogen in the soil.

And it is here that cover crops offer the greatest promise.

The Case for Cover Crops

Cover crops are small grains such as rye or barley or winter wheat that are planted without fertilizers, immediately after harvesting corn or other row crops. If planted early enough, cover crops can use nitrates in the root zone before they seep through into groundwater or creeks and rivers.

Ken Staver and Brinsfield have found that when a grain like winter wheat is planted soon after corn or soybean harvests, it can take up a good deal of that residual nitrogen and prevent it from reaching groundwater.

Sandy Rodgers

Both farmer and researcher, Russ Brinsfield has been tracking nutrients and testing cover crops to keep fertilizers out of the Bay.

In test plots planted with soybeans at the Wye farm between October 1994 and April 1995, Staver and Brinsfield calculated a five-fold reduction in nitrate, from 36 pounds an acre to 7 pounds an acre.

So why aren't farmers flocking to cover crops? Economics. "In the short term," says Brinsfield, "cover crops cost the farmer extra dollars."

For several years, the state provided farmers with a $30-an-acre subsidy to plant cover crops. The result: farmers seeded some 25,000 acres statewide with winter grains. However, when the state eliminated the cost share program, many farmers stopped planting them. Very few participate voluntarily. According to Betsey Krempasky, chairman of the Choptank Tributary Strategy Team, only 2,718 acres were planted in that watershed in 1996.

And yet, says Brinsfield, planting cover crops is one of the most effective means for removing the greatest amount of nitrogen per dollar. Should the government provide a subsidy if it can help reach the 40 percent nutrient goal? Some point out that poultry and cattle farmers are eligible for cost share programs to build structures to contain animal waste, and the Choptank Strategy team believes that cover crops should also qualify — and has written the governor requesting his support.

Brinsfield also believes that the state should pass special legislation to provide cost share. "We could exceed the 40 percent reduction goal [on agricultural lands] with them and with other Best Management Practices," he says. But he has a caveat as well. While we need state support, we also need an initiative that would phase out cost-share. "We need to expand our research to figure how we can reduce costs and how these programs can pay for themselves," he says.

A starting point may be aerial seeding. In the upper Eastern Shore, the Tributary Strategy Team has received a grant that will look at the effectiveness of planting seed from an airplane: they are contracting with farmers for seeding 1,000 acres throughout the basin. If successful, it could help in reducing planting costs, which could help overcome resistance to voluntary adoption or perhaps reduce potential cost-share.

Another possibility is pollution trading — instead of employing advanced waste treatment in areas where its effects are minimal, that money could go toward funding cover crops if their potential benefit in reducing nutrient pollution were greater.

One thing is certain — curtailing nutrient runoff from farmland is a key to restoring and protecting the Chesapeake. Whatever works to keep excess nitrogen and phosphorus out of the Bay will likely prove the best action to take.

Preserving Maryland's Open Land

BY JACK GREER

Sandy Rodgers

As the Chesapeake region nears the 21st Century, it faces a double bind. On the one hand, the Bay continues to suffer from nutrient overload — especially nitrogen — from fertilizers and animal (including human) waste. On the other, the Bay's watershed is experiencing rapid growth in many areas, leading to a proliferation of parking lots and other impervious surfaces, and to the disappearance of open lands and natural habitat.

Farm fields lie squarely in the middle of the conundrum. They send large amounts of nitrogen and phosphorus into the Bay and its tributaries every year, contributing to the estuary's number one problem: overenrichment. But farms also represent a major resource in terms of natural open space and habitat, and farmland shapes the very landscape many Marylanders are striving to save.

The question is how to protect farms on the one hand, and to reduce their impact on the Bay on the other.

"We need Smart Farming," says Russ Brinsfield, director of the University System of Maryland's Wye Research and Education Center, and himself a farmer, "just as we have Smart Growth."

Given that a number of efforts are underway to encourage Best Management Practices and especially nutrient management, farming may be "smarter," but one wonders whether farm land will survive at all.

Protecting agriculture alone was not enough.

The key, say Brinsfield and others, will be a better approach to using the land we have left.

"If we don't think about how we use the land, all the gains we've made will be lost," says Brinsfield, who points to the growing impacts not of farming but of atmospheric deposition from car exhaust and nutrients from leaking septic systems. These growing nonpoint problems result directly from expanding population and development in the region.

Programs for Natural Lands

Farmers have always been the largest land owners in the Chesapeake watershed, and there have long been programs to help preserve farming — such as the Agriculture Land Protection Program — and programs to help farmers adopt progressive methods for tilling their land. But a gathering realization in the state has put an additional value on farm land — as open space, as habitat for wildlife, as part of the region's cultural, economic and natural legacy.

"Farm land preservation has been based directly on agriculture," says Russ Brinsfield. While good, this has resulted in a "scatter-shot" approach, he says. This year the Maryland legislature moved to improve on that approach, by passing a program entitled "Rural Legacy."

Farms include much more than crop lands, Brinsfield says. They include timber, wetlands, and a large amount of edge areas, where woods meet open ground. The beauty of the Rural Legacy program, says Brinsfield, is that it both insures the preservation of agriculture and protects large contiguous areas as habitat.

The new Rural Legacy Program is designed to protect farms against development, and to protect the Chesapeake watershed against the impacts of losing the natural benefits of open lands.

According to George Maurer of the Chesapeake Bay Foundation, "What we like about [Rural Legacy] is its approach to multiple resources." In other words, rural legacy aims at conserving more than farm fields. Built into the legislation is the role of open lands as habitat for wildlife, as buffers

for streams — lands left largely in a natural state.

It was, according to Maurer and others, the inclusion of natural habitat that made the Rural Legacy Program politically powerful. Brinsfield agrees. "Protecting agriculture alone was not enough, " he says.

The legislation was not without its detractors.

Funding the preservation of open lands involved a debate over Program Open Space, which derives its funds from a 5% transfer tax. The tax is collected from real estate sales, and is intended to fund parks and other forms of open space throughout the state. According to Bill Castelli, Director of Governmental Affairs for the Maryland Association of Realtors, "The Maryland Association of Realtors opposed the legislation as it was written." This, according to Castelli, was largely because the program depended on funds from the 5% transfer tax.

The real estate industry has never been happy with the transfer tax, says Castelli, since it adds an additional burden to the sale of property. Further, he says, the use of the tax has expanded over the years. "The Heritage Program and Ag Land Preservation Program already get funds from the transfer tax," says Castelli. Over time he worries that tying support of a number of programs to the transfer tax could eventually mean greater pressure to raise that tax.

Aside from the tax issue, Castelli finds much of the Rural Lands and Smart Growth approach "logical." "We were concerned about how designation [of a Rural Legacy Area] would affect individual farmers," says Castelli, who worried that farmers would be "coerced" into making a decision. As it stands, though, he says that using the carrot of incentives is much better than the stick of rigid zoning. "This is much better than drawing a line in the sand and saying that everything past this line cannot change."

In one sense, he says, the Rural Legacy Program represents a healthy competition between state preservation programs on the one hand and free-market developers on the other — with the individual farmer making a choice based on financial options and personal values.

What effect this will have on Maryland's real estate market only time will tell, says Castelli. "We'll find out what kind of impact this will have on property values further down the line," he says.

Achieving "Smart Growth"

To Rob Etgen's way of thinking, "This is all good news."

Etgen is the director of the Eastern Shore Land Conservancy, an organization dedicated to the preservation of natural lands. "The Rural Legacy Program puts Maryland back at the forefront of sophistication," says Etgen. "We've been using tools developed years ago — tools other states have copied — now we have taken a significant leap forward with the Rural Legacy Program."

According to Etgen, "The Rural Legacy Program says, 'Let's get over the hump so we'll have these lands for the next century.' "

Etgen agrees with Maurer that what sets the Rural Legacy Program apart is the "partnering" between farmland protection and natural resource protection, in a growth management context. "Usually these have been completely separate programs," says Etgen. "There was little synergy and leveraging before — together they will be a huge asset."

The Eastern Shore Land Conservancy is now working with about five counties on the Eastern Shore in support of a regional plan. Bringing separate counties together behind a common goal will prove a challenge, he admits, but he is delighted that "we have raised the stakes to a statewide level."

"Land use issues are all knitted together," he says. "Both [farm preservation and natural resource] programs will learn a great deal."

According to Russ Brinsfield, in terms of real costs to the state the Rural Legacy and Smart Growth initiatives are on the right track. "Until the true costs are paid for things like transportation and air pollution, sprawl will continue," he says. "The Governor's Smart Growth package is an excellent move," he adds. "It could prove as important as Governor Hughes' original Bay legislation."

The Rural Legacy Program

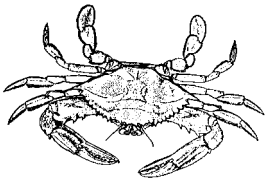
According to the Department of Natural Resources, "the Rural Legacy Program will provide the focus and funding necessary to protect large contiguous tracts of farms, forest, and natural areas through cooperative efforts among state and local governments and land trusts." Land trusts, according to Grant Dehart of the Maryland Department of Natural Resources, are expected to play a particularly important role.

Protection will be provided through the voluntary acquisition of interests in real property, including easements and fee estates. Additional natural resource protection will be provided on farms as part of purchased easements, where necessary, to protect Maryland's rural legacy.

For fiscal years 1998 through 2002, Governor Parris N. Glendening and the General Assembly have authorized the Rural Legacy Program to be funded with $23 million in General Obligation Bonds, $18.3 million from a scheduled 10% increase in the existing real estate transfer tax revenue for open space available to Program Open Space, and $30 million from the stateside land acquisition budget of Program Open Space, for a total of $71.3 million. Of these funds, $2 million per year may leverage an additional $18.2 to $70 million in Zero coupon U.S. Treasury notes to purchase easements, depending on the demand for these funds.

In addition, current land preservation and enhancement programs — Program Open Space and the Maryland Agricultural Land Preservation Program — remain the same. If funding and programs are continued at this level, the state could protect up to 200,000 acres of resource lands by the year 2011, helping to maintain Maryland's balance between open space and developed land.

Blue Crab Stocks Steady



The Chesapeake blue crab is holding its own. This is the central message of a report released in early May by the Chesapeake Bay Stock Assessment Committee, a state-federal group that involves resource managers in Maryland and Virginia, and is coordinated by the National Oceanic and Atmospheric Administration's Chesapeake Bay Office.

According to NOAA, the report represents the first full Bay-wide stock assessment of the blue crab — or any Bay species, for that matter. The Bay-wide tracking of crab stocks began in 1995 (see "The Blue Crab in Winter," *Marine Notes*, February-March 1994).

The report concludes that:

• Current stocks are at the long-term average measured since the 1950s. The committee found no conspicuous declining trend in abundance, or any "demonstrable" differences between male and female trends.

• The blue crab juvenile population has increased during the past decade, currently riding above the long-term average measured since the 1950s.

• There appears to be no sign of "overexploitation" — the Bay's crab stocks are considered to be "moderately" to "fully" exploited.

• Fishing effort for the Chesapeake blue crab has increased five-fold since 1945. According to the report, the actual number of crabs captured has remained relatively constant because of a saturation of gear. An initial decline of "catch-per-unit effort" from 1945-70 has flattened since 1970.

• Because of this gear saturation, the Bay blue crab fishery is "severely overcapitalized," the report holds, and the Bay-wide fisheries (in both Maryland and Virginia) are operating at "extremely low levels of economic efficiency," with a relatively constant harvest divided by an increasing number of takers.

Based on these findings the committee recommended no new actions, but advised that current "precautionary and conservative approaches" to managing the crab stocks be continued.

The Stock Assessment Committee is chaired by Elizabeth Gillelan, director of the NOAA Chesapeake Bay Office, and its Technical Subcommittee is chaired by Louis Rugolo, Maryland Department of Natural Resources. For additional information call the NOAA Bay Office at (410) 267-5660.

Food Safety Video for Processors

Many poultry and seafood processing workers in the Chesapeake Bay region read very little English, so educating them about food handling and preparation practices designed to reduce contamination can be a challenge. Faculty from the University System of Maryland and the University of Delaware have developed videotape and training materials to meet the needs of entry-level, low-literacy English- and Spanish-speaking workers in the food processing industry.

Produced with a grant from the U.S. Department of Agriculture (USDA), the video and accompanying educational materials focus on food handling practices that reduce the risk of foodborne illness. "There is a great need for educational tools such as these, especially in the Delmarva area," says Thomas Rippen, seafood technology specialist with Maryland Sea Grant Extension, who is working on the project with Dr. Charles Wabeck, poultry products specialist with the Maryland Cooperative Extension Service; Doris Hicks, seafood technology specialist with Delaware's Sea Grant Marine Advisory Service; and Dr. Sue Snider, food and nutrition specialist with Delaware Cooperative Extension. "Industry cooperators who have seen draft versions of the videotape are already clamoring for it."

The complete educational package will be pilot tested soon in two poultry and two seafood processing plants in Maryland and Delaware. Following post-training evaluations, a review by USDA and possible modification based on the pilot test, the materials will be available for purchase by the food industry in the fall. For more information, contact:

Thomas Rippen, (410) 651-6636
Charles Wabeck, (410) 651-9111
Pam Townsend, (301) 405-4595

In Memoriam

We were saddened to learn of the death this past April of Dr. Ned A. Ostenso, former Assistant Administrator for Oceanic and Atmospheric Research. Dr. Ostenso, who retired from federal service in January of 1996, had a long and distinguished career. He began his federal career in 1969 as an Assistant Presidential Science Advisor. Following his position as Deputy Director and Senior Oceanographer, Office of Naval Research, he came to the Department of Commerce, NOAA in 1977 as Director of the National Sea Grant College Program.

From 1989 until he retired, Dr. Ostenso served as Assistant Administrator, Office of Oceanic and Atmospheric Research. He also served as NOAA's Acting Chief Scientist from October 1989 to December 1990.

For his extraordinary service to geophysics, Ned was awarded this past December the Waldo E. Smith Medal by the American Geophysical Union. He published over 50 scientific papers on solid-earth and marine geophysics in North America, Africa, Europe, and Antarctica. A mountain in Antarctica as well as a seamount in the Arctic are named after Dr. Ostenso.

End Notes

Publications

■ Maryland's Coastal Bays

Today's Treasures for Tomorrow: An Environmental Report on Maryland's Coastal Bays. This attractive 36-page report from the Maryland Coastal Bays Program summarizes the environmental health of Maryland's coastal bays.

The Maryland Coastal Bays Program brought together dedicated citizens, businesses, non-profit organizations, state and federal agencies, scientists and community groups to help develop this report, which presents collected scientific and technical data and information that the diverse group has agreed should be the basis for future actions to preserve coastal bays.

Included in the report are an Executive Summary and sections on Maryland's Coastal Bays and their Surroundings, Living Resources, Eutrophication, Habitat Loss and Disturbance, Chemical Contamination, Pathogen Contamination, and Next Steps.

Each report also includes a large full-color illustrated poster of "The Flora and Fauna of Maryland's Coastal Bays." To order a copy of this publication, contact the Maryland Coastal Bays Program, 9609 Stephen Decatur Highway, Berlin, Maryland 21811, (410) 213-BAYS. Request publication MCBP 97-02. To find out more about the Coastal Bays Program visit their web site at: http://www.gacc.com/ dnr/mcbp.

■ Marine Science Careers

Marine Science Careers: A Sea Grant Guide to Ocean Opportunities, a publication from Maine/New Hampshire Sea Grant and Woods Hole Oceanographic Institution Sea Grant, has proven so popular around the country that it has been reprinted. This comprehensive guide to careers in marine biology, oceanography, ocean engineering, and closely related fields is available from the 29 Sea Grant programs in U.S. coastal and Great Lakes states.

Single copies of the guide are available for free from Maryland Sea Grant, though the supply is limited. Call (301) 405-6376 to order. Otherwise the publication is available for $5.00 per copy from Maine/New Hampshire Sea Grant; call (603) 749-1565 in Maine and (205) 581-1440 in New Hampshire.

■ Urban Watersheds

Watershed Protection Techniques, published by the Center for Watershed Protection, focuses on urban watershed restoration and protection tools. Hard science and "real world" applications are combined in articles prepared by experts and working professionals. Each issue features a series of technical notes that summarize BMP performance and longevity, wetlands research, and various other watershed protection tools. Feature articles summarize research in terms of its application to various locales, and an open forum section provides lively discussion on controversial watershed issues.

For a sample of their offerings, visit their website at http://www.pipeline.com/~mrrunoff/ or contact the Center for Watershed Protection by phone: (301) 589-8745, fax: (301) 589-8745, or write: 8737 Colesville Road, Suite L-105, Silver Spring, Maryland 20910. The Center for Watershed Protection is a nonprofit (501(c)(3)) corporation "dedicated to finding new, cooperative ways of protecting and restoring watersheds."

■ Susquehanna River Basin Commission

The Susquehanna River Basin Commission, celebrating 25 years in 1997, has produced an anniversary issue of its annual report. Included in the report are highlights of the Commission's 1996 activities as well as general facts and data about each sub-basin, from the headwaters of the Susquehanna down to the Chesapeake Bay. A special section called "The Year in Flooding" chronicles the devastating basinwide flash flood that took place in January of 1996.

To order a copy of the report, call the Commission at (717) 238-0423.

On the Web

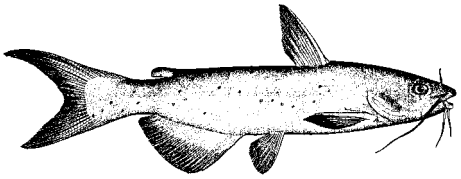
■ Aquaculture Bibliography

http://www.mdsg.umd.edu/NSGO/research/aquaculture/

A Comprehensive Bibliography of Aquaculture Publications Funded by The National Sea Grant College Program is now available on the world wide web. This bibliography of National Sea Grant-sponsored literature is current and is intended for anyone who is interested in aquaculture, mariculture or polyculture. It was created by Neil H. Thompson

The bibliography, which is searchable by any search string as well as by keyword, list author(s), the year of publication, the title of the article or book, the journal or publishing agency where it's located, the number of pages of text, and the document number (-DN-) assigned to it by the National Sea Grant Depository. Literature for which the author was not available is also included.

Printed versions of the bibliography are available from Sea Grant programs around the country and from the National Sea Grant Depository. In Maryland, call (301) 405-6376 to order.



Name Change

As a result of legislation passed by the Maryland General Assembly during its most recent session, the University of Maryland at College Park is now known as the University of Maryland, College Park or simply the University of Maryland. The eleven institutions in the state universities and college system that merged in 1988 will now be part of the University System of Maryland (formerly referred to as the University of Maryland System). In addition, the Center for Environmental and Estuarine Studies is now the University of Maryland Center for Environmental Science.

Calendar

July 20-26 — Coastal Zone '97
Boston, Massachusetts. Coastal Zone '97: The Tenth International Symposium on Coastal and Ocean Management. The theme for this year's program is "Charting the Future of Coastal Zone Management." For further information, contact Chantal Lefebvre, Urban Harbors Institute, UMASS-Boston, (617) 287-5576; e-mail: Lefebvre@umbsky.cc.umb.edu.

September 5-6 — Fisheries Conference
New Orleans, Louisiana. The Magnuson-Stevens Act: Sustainable Fisheries for the 21st Century? A Critical Examination of Issues Associated with Implementing this New Federal Fisheries Law. The conference, co-sponsored by Tulane University Law School and Louisiana Sea Grant, will address such issues as what implementation of the amended Magnuson-Stevens Act will mean for fishing in the next century as well as hypoxic zones, coral reefs and marsh management. The entire agenda, with registration form and hotel contacts, is accessible on the world wide web at: http://www.law.tulane,edu/ildi/brochtxt.htm. For more information contact Sharon Stevenson at Tulane Law School by phone, (504) 865-5925 or e-mail at srsteven@law.tulane.edu.

Marine Notes on the Web

An electronic version of this issue, as well as back issues, is available on the World Wide Web at: **http://www.mdsg.umd.edu/MDSG/Communications/MarineNotes/index.html**

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