MARYLAND

Research, Education, Outreach *Volume 17, Numbers 1-2*

MARINE NOTES

SPOTLIGHT ON THE ENVIRONMENT

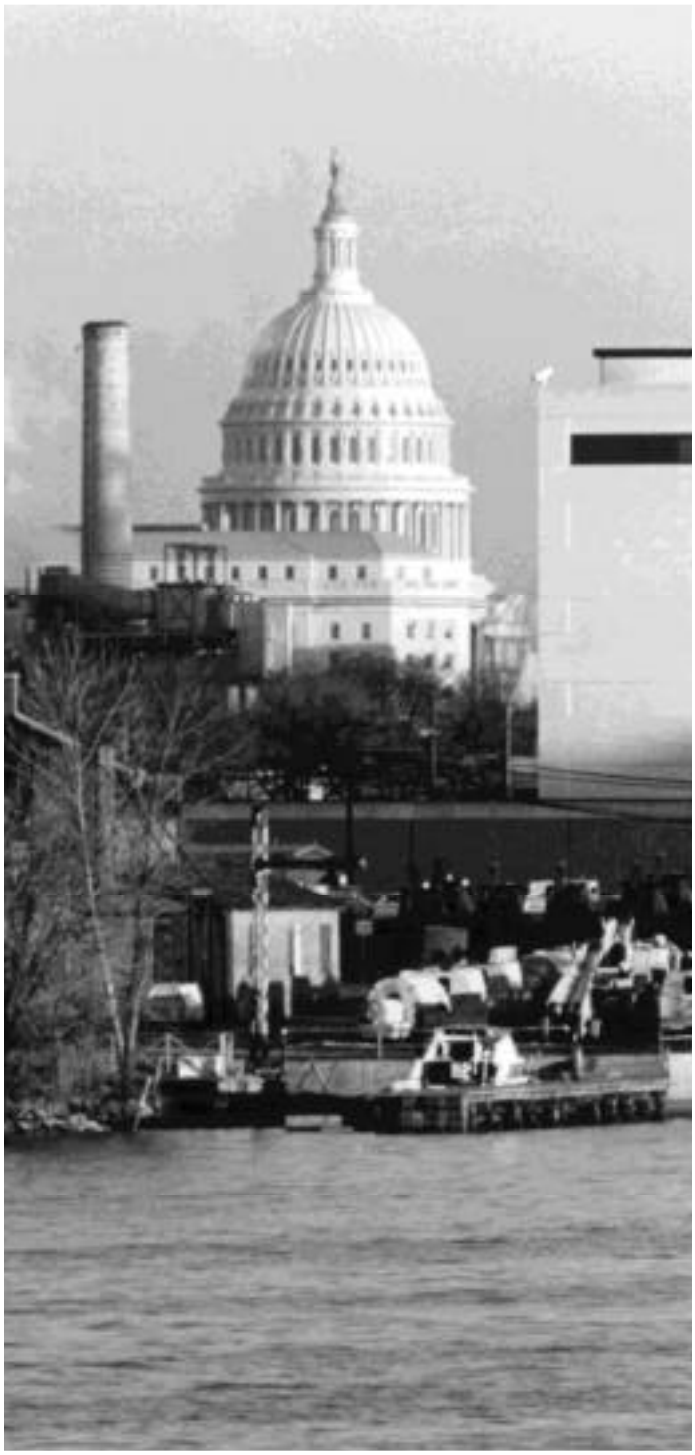
Bringing the Anacostia Back

BY MERRILL LEFFLER

It has been called Washington's "forgotten river." It has also been called a national disgrace. Mention of the Anacostia River brings up images of blight — floating trash, buried tires, chemical contamination, health advisories that warn against eating fish caught there. Those images hardly tell the whole story — while human abuse has plagued the river for nearly 200 years, human efforts have been underway recently to return the Anacostia to some measure of health.

The evidence of those efforts can be seen throughout the Anacostia system, a system which includes not only the eight-mile tidal river but its important tributaries — dozens of feeder streams and creeks that run through Montgomery and Prince George's counties in Maryland. Kenilworth Marsh, a few miles south of the river's headwaters in Bladensburg, Maryland, is one proud example of reclamation. In the early '90s, the Army Corps of Engineers, working with the District of Columbia, the Metropolitan Council of Governments and the National Park Service, converted 32 acres of nearly-dead mudflats into verdant wetlands that are "humming with life," says Robert Boone, head of the Anacostia Watershed Society, an environmental organization that has helped catalyze citizen action and cleanup of the river.

There are scores of other examples, from shoreside tree plantings and stormwater projects that help minimize runoff to the removal of weirs and dams, which for decades have blocked spawning grounds for river herring, perch and other migratory fish. A recent project by the Army Corps and Prince George's County opened five miles of fish passages along sections of three tributary streams, helping fish past impediments constructed in the 1950s to control flooding in newly developed areas. According to Ira Palmer, Chief of Fisheries and Wildlife for the District of Columbia, "there have been significant improvements in the diversity and abundance of fish, waterfowl and turtles." Today, eight species of fish can be found in the tidal



Anacostia Watershed Society

Anacostia, continued

river, he says, compared with only three a decade ago.

Help for a T roubled River

Any hope for reclaiming the health of the tidal river depends on improving the water quality of its tributary waters — two-thirds of the Anacostia watershed lies within Montgomery and Prince George's counties. Both of these counties have been making significant efforts to improve the quality of water and habitat in the streams that feed the Anacostia. In fact, support for restoration of the Anacostia River started in 1987 when Prince George's and Montgomery Counties joined the District of Columbia, the State of Maryland and the Army Corps of Engineers in signing the Anacostia Watershed Restoration Agreement. This commitment is being reaffirmed by the District and the state of Maryland in May 1999. In 1990, a Corps study identified two major causes of the river's degradation over the last century: the lack of environmental controls during the region's extensive urbanization, and what are now seen to be the harmful flood control methods of the Corps itself. It was this and subsequent reports, together with citizen activism, especially Boone's Anacostia Watershed Society, that drew increasing federal attention.

Based on a 1992 report by the Environmental Protection Agency that highlighted the extent of the Anacostia's pollution, President Clinton designated the river as one of seven ecosystems nationwide that required priority attention. Two years later, the Chesapeake Bay Program targeted the Anacostia, Baltimore Harbor and the Elizabeth River in Norfolk as the three most highly toxic regions in the Bay watershed and therefore requiring special treatment.

While the Anacostia may seem unimportant compared with Baltimore Harbor and the Elizabeth River, two of the east coast's major ports, high levels of toxic compounds and the proximity of a dense human population make it a key cause for concern. Why now? Why was the Anacostia ignored for so long? Many believe the river's neglect derives from its course through low-income minority neighbohoods. Times are changing. An embarrassing public health hazard, the Anacostia has been designated as one of the most polluted rivers in the country and a stain on the image of the nation's capital.

Anacostia Watershed Society

Josh Green

"If you flush a toilet in D.C. while it's raining, chances are it will end up in the Anacostia or the Potomac or Rock Creek."

The Burden of Rain

While rainfall feeds the Anacostia, it can also bring a poisonous diet. In a recent study to determine the effect that chemical contaminants and nutrients in stormwater runoff have on the Anacostia's water quality, David Velinsky and colleagues found that after "rainfalls of some six-tenths of an inch there is a significant effect." A researcher at the Patrick Center for Environmenal Research, part of the Academy of Natural Sciences in Philadelphia, Velinsky reports that "total PCBs increased at many of the sampling stations, as did trace metals such as lead." Though it is difficult to pinpoint specific locations, Velinsky says, "the data indicate that the nontidal watershed [the tributaries] provides a large input to the upper tidal waters within 24 hours of the rain, while runoff from the urban core of the District of Columbia is the source of contaminants to the lower river." This slug of pollutants occurs because stormwater drains go directly to the river and into "dual-use" pipes that also carry sewage to the Blue Plains Wastewater Treatment Plant.

In rainfalls of only a half-inch, says Ted Graham of the Metropolitan Washington Council of Governments (MCOG), the increased volume of stormwater entering the dual-use pipes can easily overwhelm delivery to the treatment plant. When such rainfalls occur — and they do on average 30 to 40 times a year — the system is designed to shunt raw sewage and stormwater from Blue

Plains so that it can go to overflow pipes that discharge directly into the river.

As Robert Boone says caustically, "if you flush a toilet in D.C. while it's raining, chances are it will end up in the Anacostia or the Potomac or Rock Creek."

Dealing with problems from combined sewer overflows (or CSOs as they are commonly known) and stormwater drainage is a major challenge for Washington, D.C. as it is for all cities with antiquated sewers. Some 30 stormwater drains and six CSOs discharge into the lower Anacostia. The high density of the city's impervious surfaces fails to absorb rainwater or slow it down — quite the contrary: buildings, streets and parking lots act like sluiceways where fast-running water scours pollutants from land and streets, ferrying them into storm drains and into the river.

While there is no easy fix to the problem of combined sewer overflows in the District — projections for controlling them through new construction are estimated at more than $2 billion — a recent report from the Chesapeake Bay Program outlines a series of recommendations for short-term actions that could help improve the current system. They range from repairing malfunctioning equipment to ensuring that Federal agencies in the watershed are implementing pollution prevention requirements. Rebecca Hamner of EPA believes that 50 percent of the CSO flow could be controlled just by making needed repairs and upgrades to existing equipment.

Even if such short-term actions would reduce bacterial loads to the river, it is questionable whether those reductions could be nearly enough. Moreover, says Ted Graham, these technical "fixes" don't come to grips with the problem of stormwater runoff into the Anacostia and its tributaries. When engineers designed many of these waterways at the turn of the century, treatment wasn't an issue, says Graham. "They just moved the rain water into the river." It was assumed then that "dilution was the solution to pollution." We have

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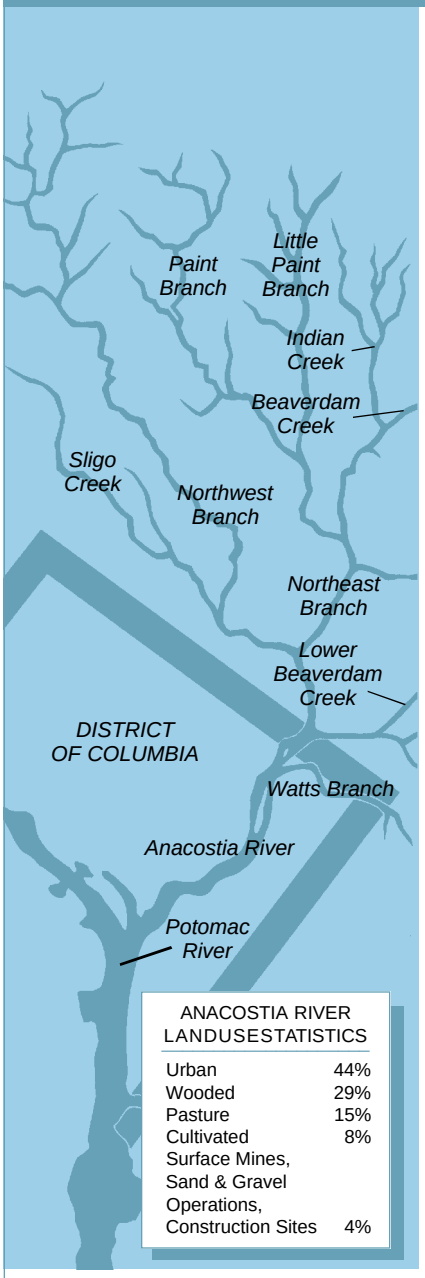
Anacostia: *River of Contrasts*



Alliance for the Chesapeake Bay

Anacostia Watershed Society

Flowing down through the suburban neighborhoods of Montgomery and Prince George's counties, two large stream systems join at Bladensburg to form the Anacostia. The Northwest Branch gathers the waters from creeks such as Sligo Creek, while the Northeast Branch receives the flow from several creeks, including Paint Branch, Little Paint Branch and Beaverdam. These tributaries are both the branches and the roots of the Anacostia watershed — the trunk of which is the tidal river itself.

Once deep enough to carry ocean-going sailing ships with cargos of tobacco as far as the port of Bladensburg, the river began silting in by the beginning of the nineteenth century as the richly-forested lands were cleared for agriculture. For the last 150 years, the Anacostia has been on the receiving end of sediments and heavy loads of pollutants from its urban and suburban watershed. Now the river boasts tidal flats and marshes, limited though they are, including Kenilworth Aquatic Gardens, as it flows past Fort Dupont Park, Anacostia Park and the National Arboretum.

Although it flows through parks, the Anacostia becomes an urban river before it reaches the Potomac, and carries with it the burdens of heavy development — from the sediments that first came from cleared farm fields to the metals and waste that have come from industry and population. The Anacostia is also a cradle of culture and, as some have pointed out, of racism (see, for example, "Crossing the River: Race, Geography and the Federal Government" on the web at http://xroads.virginia.edu/~CAP/ANACOSTIA/cover.html).

From the freshwater streams that flow through the northern suburbs to the tidal reaches of the urbanized river, the Anacostia is, after all, one river. Though small in size, in some way it connects the suburban with the urban, expensive neighborhoods with industrial and military sites, wealthy with disenfranchised. Like all rivers, it offers a powerful symbol of connection.

Anacostia, continued

known for some time now that this is hardly so. Contaminants eventually end up in the sediments and are passed through the food web, from bottom-dwelling organisms to fish such as perch, carp and catfish, which concentrate them. Frequent advisories warn against eating those fish because toxic concentrations can become too high.

Tributaries Critical to the Anacostia

Like all troubled coastal systems, many of the Anacostia's problems originate on the land, in the erosion of soils from farms and suburban areas, in the runoff of contaminants in stormwater and in the airborne pollutants that fall onto the watershed.

"One of the most continuing intractable problems is the legacy of land runoff from farming and urbanization," says MCOG's Graham. There has been major damage to riverine habitats which have been buried in contaminated sediments. And contaminants are continuing to accumulate, he says. This accumulation is a chronic condition of runoff, which picks up the lingering presence of PCBs, hydrocarbons and pesticides such as chlorodane (used to kill termites) from the streets.

There are estimates that 85 percent of the sediments from the Anacostia's tributaries are trapped in the tidal river — that is why controlling runoff from Montgomery and Prince George's counties, as well as the District, is so critical. Soils and contaminants that run into Indian Creek or Northwest Branch end up in the tidal Anacostia — the problem remains how to curtail this runoff, especially when so much land was developed with inadequate stormwater controls.

Land clearance, agriculture, housing and road development, flood control projects, all have changed hydrology — the way water flows off the land — and mostly for the worse. Trees and pastures slow runoff and filter pollutants before they enter tributary streams or the river. With the elimination of forests, first by agriculture in the eighteenth century and then by rapid urbanization, water has been running unimpeded directly into streams and carrying along whatever lies in its path.

How do you counter the problem of erosion and runoff, especially in highly developed areas? Cameron Wiegand in Montgomery County and Larry Coffman in Prince George's have become national leaders in developing innovative approaches to reversing the effects of stormwater runoff.

In Montgomery County, says Wiegand, "our main emphasis is stream habitat restoration because we feel that the biggest problem in the Anacostia tributaries is the sheer volume and force of runoff." To counteract this impact, he says, "we've been putting in wetlands, we've been cutting off storm drains and intercepting runoff by manmade wetlands and bleeding the water into the creeks more slowly. Our goal," he says, "is to make adjustments by recreating habitat that was lost, if it is possible to do that."

In Prince George's, says Coffman, our aim is to "mimic predevelopment characteristics of the watershed. We need to replicate those hydrological regimes throughout the watershed." While new developers must now meet stormwater regulations, he points out, those requirements don't exist for older development. "We have a huge watershed that is heavily developed, much of which was done without stormwater controls. We're dealing with a huge problem of retrofitting." What we need to do, says Coffman, is to slow water down enough to get more absorption and evaporation before it is discharged to the stream.

New developments can create ponds and dams to do this, he says, but developed areas have no room for such containment. We need to design site-specific approaches, he adds,

Anacostia Watershed Restoration Agreement

In May 1999, the District of Columbia, the state of Maryland and Montgomery County are signing the Anacostia Watershed Restoration Agreement, a six-goal contract that calls for the District and Maryland to commit financial resources and work together toward restoration of the river and 176 square miles of surrounding land.

Goal No. 1: Dramatically reduce pollutant loads in the tidal estuary to measurably improve water quality conditions.

Goal No. 2: Restore and protect the ecological integrity of degraded urban Anacostia streams to enhance aquatic diversity and encourage a quality urban fishery.

Goal No. 3: Restore the spawning range of anadromous fish to historical limits.

Goal No. 4: Increase the natural filtering capacity of the watershed by sharply increasing the acreage and quality of tidal and non-tidal wetlands.

Goal No. 5: Expand the forest cover throughout the watershed and create a contiguous corridor of forests along the margins of its streams and rivers.

Goal No. 6: Make the public aware of their role in the Anacostia cleanup and increase citizen participation in resoration activities.

"Our main emphasis is stream habitat restoration because the biggest problem in the Anacostia tributaries is the sheer volume and force of runoff."

approaches that are referred to as "low impact development."

"The traditional thought among sanitary engineers," says Allen Davis, a Professor of Civil Engineering at the University of Maryland, "was to get water off the property as fast as possible. In low impact development, a key is to keep the water on the property as long as possible."

In one project, Davis worked with Coffman to construct a "bioretention system" in a parking lot at Beltway Plaza in Greenbelt, Maryland. While unknowing passerbys would see only lush growing plants and high grasses, this site-specific system is designed to slow water and filter pollutants. In such a system, says Davis, "if you can retain the water, organics such as gasoline, oil and petroleum will be broken down by bacteria and eventually metabolized into carbon dioxide, water and byproducts." If nitrogen and phosphorus coming off the soil flowed directly into the streams, they would promote algal growth and eventually deplete dissolved oxygen. In terrestrial plants, though, the more these nutrients are absorbed the more they can lead to better plant growth.

The bioretention system in the Greenbelt parking lot creates an intermediate "treatment" before the remaining unabsorbed water drains into a sewer pipe. By the time the water does filter through, it has shed many of its pollutants, pollutants that would otherwise end up in a stream and eventually in the Anacostia. This parking lot project represents only one example, and a small one, of trying to "mimic predevelopment characteristics of the watershed," says Coffman.

Coffman believes that low impact technology can also be developed for cities like Washington. We have to think innovatively, he says. At a recent meeting of urban planners, he says, "people were saying there is nothing we can do in urban areas and we should just write them off." Coffman reacts strongly. There are numbers of innovative tacks you can take, he argues. Rooftop storage and rain gardens — using plants that grow well in slowly draining rainwater — are only a couple that can have a positive impact. "The combined sewer overflow problem itself can be solved by using low impact development approaches," he says, "to reduce the frequency of discharges to storm drains."

> ***"When you embark on this kind of restoration effort, you have to be in it for the long haul."***

How successful are these projects in reducing the sediment load to the Anacostia? It is extremely difficult to get a firm measure, says Wiegand. "Our streams have been impacted by more than two centuries of agriculture and, more recently, by intense urban development." In effect, he says, "there is a bedload of sediment and contaminants from the last two hundred years." During a rainstorm, it has proven difficult to measure what's coming from new runoff — and what is resuspended. "How do you isolate the bedloads and what's coming from a runoff surface today?" he asks rhetorically.

To gauge the impact of all of this sediment and runoff, "we can look at the benthic invertebrates, the habitat and fish," Wiegand says. "They give us quantitative measures that can be used as an index of biotic integrity of fish and aquatic insects. We can measure our progress against that index" and, he adds, "we're seeing progress." The difficult question that remains: How is this progress upstream affecting the tidal Anacostia?

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Anacostia, continued

Looking Ahead

By nearly all accounts, restoring the Anacostia system so that fish are healthy to eat, its waters swimmable, its sediments are free of contamination, its bottom waters flush with oxygen will take years of sustained funding. "When you embark on this kind of restoration effort," says one manager, "you have to be in it for the long haul." But it will also take more than funding — it will take a more informed basis for establishing priorities and making management decisions based on such priorities. It will take a capability for assessing the results of management actions in the tidal river and the tributaries. Currently, it is not possible to ask, "If I control X amount upstream, how much will be transported downstream?" There is a need then for sophisticated modeling that could enable decision makers to compare the potential outcomes of different management strategies.

The same goes for understanding chemical contaminants. "We need to have a better measure of toxics," says Ted Graham. "The Council of Government is working with the Navy to get funding to do a toxic assessment — where they're coming from, what the concentrations are." Such an assessment could set the stage for coming up with better plans. "We don't have a good handle on the dimension of the problem," says Graham, for instance, "of PCBs from old transformers that are still degrading, from pesticides, or from hydrocarbons."

Put another way, while there is a reasonably good understanding of what the major problems are, there is a need for predictive models that would enable researchers to consider sediment loading, for example, and to determine whether 25 stormwater retrofit systems will be enough to make certain reductions or whether another 20 are needed. Decisions today are generally based on a "gut" estimate and the amount of available funding.

While the prospects for reclaiming the Anacostia are promising, they are not assured — nor may it be possible to restore the Anacostia in ways that will satisfy everyone. The city, county, state and federal partnerships that have grown over these last ten years, together with increasing citizen interests, may have to forge not only new agreements about priorities, but a new vision of what restoration means. Such a vision may have to delineate just what will constitute success. As one resource manager observed, we may have to make difficult decisions about just what levels of success will satisfy us.

Kate Folk contributed to this article.

Anacostia Watershed Society

Environmental Information on the Web

Anacostia Watershed Society
www.anacostiaws.org/
Montgomery County
http://www.co.mo.md.us/services/dep/DEP/Contents/contents.html
Prince George's County
www.gmu.edu/bios/anacosti/eopb/index.htm
Metropolitan Council of Governments
www.mwcog.org/dep.html
Chesapeake Bay Program
www.chesapeakebay.net

Exotics in the Chesapeake

Across the nation, resource managers and others have grown more concerned about the potential impacts of exotic species — plants and animals introduced to this country either intentionally, as food or ornamentals, or by accident. While the Chesapeake region has not yet seen an invasion as dramatic as the influx of zebra mussels in the Great Lakes, numbers of other species have appeared in the Bay and its tributaries, with uncertain impacts. Some exotics — like the floating plant hydrilla — are easy to spot, while others — like the Asiatic clam or the newly discovered Rapa whelk — live out of sight, affecting the food web in ways we do not fully understand.

To help answer a growing number of questions about the presence of exotic species in the Bay, Maryland Sea Grant has teamed up with the Smithsonian Environmental Research Center (SERC) to produce a series of informational fact sheets, entitled, "Exotics in the Chesapeake." Produced with support from the U.S. EPA Chesapeake Bay Program, these fact sheets provide information about exotic plants and animals that have made their home in the Bay — from the beautiful but aggressive mute swan to plants like purple loosestrife and Eurasian watermilfoil.

Written by Dan Terlizzi and Jack Greer, with assistance from Paul Fofonoff, Greg Ruiz and others at SERC, the fact sheets are intended to provide general background for a broad audience. Included are useful web sites — an extensive Chesapeake Bay web site is being developed by SERC — as well as selected primary sources. For a copy of the fact sheets, write the Maryland Sea Grant College, 0112 Skinner Hall, University of Maryland, College Park 20742 or order by phone, (301) 405-6376; fax, (301) 314-9581; or e-mail, connors@mdsg.umd.edu. The fact sheets will soon be placed on the Sea Grant web

site as well, at: www.mdsg.umd.edu/exotics.

The fact sheets form part of an exotics outreach effort funded in part by the National Sea Grant College Program, with assistance locally from the U.S. EPA Chesapeake Bay Program. In addition to the fact sheets, Maryland Sea Grant has produced a half-hour documentary about exotic species entitled *Alien Ocean*, as well as two short reversionings of that video for more specific audiences.

The first short video, *Alien Estuary: Exotics in the Chesapeake*, focuses specifically on the Chesapeake Bay, while the second, *Alien Rivers: Stopping Zebra Mussels*, focuses on what boaters can do to avoid spreading exotic species like zebra mussels from one body of water to another. For ordering information, call (301) 405-6376 or check the web site above.

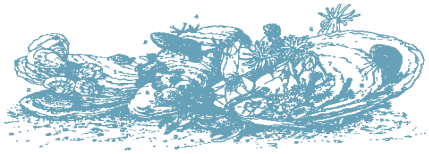
Fellowships

The Knauss Marine Policy Fellowship Program, begun in 1979 and coordinated by NOAA's National Sea Grant Office, provides graduate students across the nation with an opportunity to spend a year working with policy and science experts in Washington. Over the years, fellows have worked in the legislative and executive branches of the federal government in locations such as the offices of U.S. Senators and Representatives, on Congressional subcommittees and at agencies such as the National Science Foundation and NOAA. Fellowships run from February 1 to January 31, and pay a stipend of $30,000. The application deadline for year 2000 fellowships is September 8, 1999.

Any student who is enrolled as of September 30, 1999 in a graduate or professional degree program in a marine-related field at an accredited institution in the United States may apply through the director of his or her state Sea Grant program. To apply, students and residents of the state of Maryland should contact Susan Leet, Maryland Sea Grant College, 0112 Skinner Hall, College Park, Maryland 20742; phone (301) 405-6375; e-mail, leet@mdsg.umd.edu.

End Notes

Noteworthy



■ **Oyster Gar dening.** We all want to bring oysters back to coastal areas devastated by overharvesting and disease, but what can one person do? One answer is "oyster gardening." By raising oysters on a small scale in nearby estuarine waters, school groups, civic groups and individual citizens can learn firsthand about raising oysters while doing their part to enhance dwindling oyster populations. As part of its outreach and education effort, Maryland Sea Grant is cooperating with other partners in the Oyster Alliance to offer technical support to oyster gardeners and has published a helpful guide, "Oyster Gardening: For Restoration and Education." The guide is authored by Maryland Sea Grant Extension Specialist Donald Meritt and William Goldsborough, fisheries expert at the nonprofit Chesapeake Bay Foundation. It will be available next fall on the Maryland Sea Grant web site.

The Oyster Alliance brings together a cooperative group that includes the Chesapeake Bay Foundation, the University of Maryland Center for Environmental Science, the Oyster Recovery Partnership and the Maryland Sea Grant Extension Program. For more information, contact Don Webster at Maryland Sea Grant Extension Agent (dw16@umail.umd.edu).

■ **Chemistry Lab Named for Fowler.** The University of Maryland Center for Environmental Science (UMCES) Chesapeake Biological Laboratory in Solomons renamed its Coastal Chemistry Laboratory the "C. Bernard Fowler Laboratory" in honor of former state senator C. Bernard "Bernie" Fowler at a special ceremony in November. Senator Fowler has a long history of service and leadership in southern Maryland as well as a close relationship with the Chesapeake Biological Laboratory for many years, relying heavily on the laboratory's scientific research to help enact progressive environmental legislation for Maryland He is famous for his dedication to the Chesapeake Bay restoration effort, paying particular attention to the Patuxent River watershed. The Coastal Chemistry Laboratory, completed in 1994, has taken the lead in identifying the more subtle effects that toxic contaminants, including those transported by the airshed, have on coastal systems like the Chesapeake.

Publications

■ ***Striper 2000: Research Advances on Striped Bass and Its Hybrids.*** This program summary collects abstracts of presentations from a meeting in June 1998 that brought the nation's leading researchers on striped bass together at the University of Maryland. Summaries cover the current state of research on genetics, reproduction and growth, nutrition and feeding, production and technology, disease and utilization. To obtain a copy of the 36-page publication, contact Maryland Sea Grant at (301) 405-6376, send an e-mail request to Jeannette Connors: connors@mdsg.umd.edu, or check the web at: www. mdsg.umd.edu/Pubs/

■ **New Satellite Map of Chesapeake Watershed.** A poster produced from satellite images of the Chesapeake Bay watershed, with the watershed outlined in white, will aid a multistate effort to restore and manage the Bay's resources, according to the U.S. Geological Survey. The image mosaic, composed of LandSat thematic mapper scenes collected from 1990 through 1994, will be the most complete and current basinwide image to date for the Chesapeake Bay. For more information about the map, call (800) 435-7627. For more about USGS science in the Chesapeake Bay watershed, check the web at http://chesapeake.usgs.gov/chesbay.

Calendar

June 17-21 — Biology Society Meeting

College Park, Maryland. The annual meeting of the Society for Conservation Biology will take place at the University of Maryland. This will mark the first time in three years that the Society has met in the United States and conference planners expect this to be the largest gathering of conservation biologists in history, with attendance anticipated at around 1200. The Department of Biology along with the Smithsonian Institution will co-host the international scientific meeting. The central theme of the conference is "Integrating Policy and Science in Conservation Biology."

The conference will include two plenary sessions in Tawes Theater, symposia, contributed papers and posters, field trips and social events. There will also be exhibitors and a closing awards banquet at the National Zoo. For more information and online registration, visit the meeting website at www.inform.umd.edu/SCB.

July 24-30 — Coastal Zone 99

San Diego, California. Program and registration information is now available for the upcoming CZ99 conference at the Town and Country Resort. This year's conference, entitled "The People, the Coast, the Ocean — Vision 2020," will explore issues related to coastal management and planning, engineering and technology, public participation, dispute resolution, and program and policy evaluation, to name a few. Contact the Coastal Zone Secretariat by phone, (617) 287-5577; e-mail, cz99@gemini.cc.umb.edu; or on the web at omega.cc.umb.edu/~cz99.

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