

# REPORTER



C. Dalpra

The immense stand of plants near the Woodrow Wilson Bridge on the District border, seen here in 1991, has been a shadow of its former self during the last two years.

## Potomac in 2004: High Flows Dominate Environment

For a second straight year, above-average precipitation brought high river levels that influenced many aspects of the Potomac River in 2004. The increased runoff that brought plentiful nutrients and sediments also was a product of normal to above normal groundwater levels that helped keep the ground saturated and less able to absorb and filter stormflows.

The high levels of nutrients carried from the land to the river helped exaggerate problems, the most visible being the blue-green algae blooms that fouled the river downstream of Washington, D.C., beginning in May and lasting through much of the summer. A stormy

summer resulted in above-average flows for the season, punctuated by the September storms, which boosted monthly flow to about 520 percent of average. While not as extreme as the previous year, 2004 Potomac annual flow averaged about 149 percent of normal. The nutrients carried into the system, as well as sediment and nutrients moved about the river from high flows, could contribute to more algae blooms this spring.

The algae blooms, decreases in the amounts and types of submerged plants in parts of the river, and other symptoms remind us that the river environment and ecology are fragile. The river's resilience provides hope that with continued efforts,

***Our mission is to enhance, protect and conserve the water and associated land resources of the Potomac River and its tributaries through regional and interstate cooperation.***

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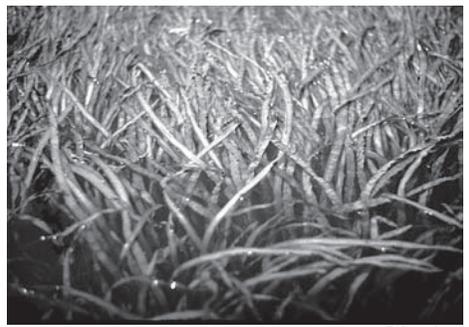
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Commissioners and their alternates are appointed by the state's governors, the mayor of the District of Columbia, and the President of the United States.



D. Loveland

Stands of wild celery grew well in some areas in 2004.

the region can restore and improve the river and its tributaries.

The following provides a sketch of how some of the Potomac's important resources fared during 2004.

### **Submerged Vegetation**

The wet spring and summer of 2003 ushered widespread decreases of submerged aquatic vegetation in most sectors of the Potomac, both in density and diversity. Many of those areas, particularly in Washington, D.C., showed little recovery in 2004, noted Nancy Rybicki, a U.S. Geological Survey scientist who has monitored submerged plants in the Potomac for many years. The large stand of hydrilla, along with other plants that formed a large plot of plants near the Woodrow Wilson Bridge, has been absent for two seasons. Stands in the tidal Anacostia have declined, and there was little visible recovery upstream in the Potomac at Algonkian Park upstream of Great Falls, according to Rybicki. Large stands of water stargrass, particularly at Point of Rocks, Md., did not return in 2004.

Some of the change in plant types or the absence of beds may have to do with the particular plant species. Some species have multiple methods of reproduction, including seeds, tubers left in the riverbed after the plants die off in the fall, or regeneration of stems that break off the plant. These multiple means of reproduction can help a species survive despite poor environmental conditions. Tubers from hydrilla, for example, may sprout new plants several seasons after their deposition. Other plants, such as the water stargrass prevalent at Point of Rocks, do not leave tubers and may take some time reestablishing after a hard season. Various species of plants also have different sensitivities to changes in local conditions, so that changes can favor one species over another.

Although the findings of the 2004 survey are preliminary, plant populations also looked generally lower in the river downstream of Washington as well, according to Rybicki's USGS colleague, Julie Baldizar. She noted some bright spots however, with increases in vegetation in some of the tributaries. Dogue and Aquia creeks on the Virginia side of the river held

dense beds of vegetation. As is usual, the reasons for this are elusive. The high flows may have made for more-favorable conditions in some of the creeks.

The algae blooms in the tidal river which can coat its surface, blocking sunlight, have less impact on aquatic plants later in the growing season after plants have established for the season, Rybicki noted.

### Fisheries

The biggest news story of the year in the Potomac was the discovery of the **northern snakehead** fish in the tidal Potomac. The capture of the first few of the foreign species captivated anglers, although not as much as it captivated the press and public. The capture of a juvenile fish late in the season has convinced most fisheries managers that the introduced species is now reproducing in the river. While there are plenty of reasons to be concerned about the introduction of the toothy, aggressive species to the river, no one is sure what will happen. Some of the worst fears involve the fish competing successfully against native fish, such as largemouth bass, possibly changing the makeup of fish species in the river. Yet, it may be that the fish will establish itself in part of the river without drastically affecting the existing ecology. Captures of the fish have centered around the area of Mattawoman and Dogue creeks, where the fish seem to prefer the dense stands of aquatic plants in shallow water that provide food and cover for spawning and protecting hatched fry.

For fisheries managers, the introduction of the species has been at least a management headache, as they dropped or decreased other efforts to focus on the new species. Perhaps the only silver lining for managers has been the added publicity that the snakeheads have lent to the growing problem of introduced exotic species to the watershed, including other invasive plants and animals, such as purple loosestrife and the nutria, a rodent overrunning Maryland's tidal wetlands. Interest and exposure to snakeheads will likely pick up next spring, when anglers return in force to the river.

In the upper Potomac, many anglers complained about the poor **smallmouth bass** fishing. Maryland Department of Natural Resources (DNR) Fisheries Biologist Ed Enamait acknowledged that the fishing was poor, but thinks that smallmouth bass populations in the river are in generally good shape. Enamait thinks that the higher flows that decreased aquatic vegetation and clouded the water during the summer may have moved fish out from the angler's usual "hot spots" to other areas where they were harder to find.

Summer surveys of adult and juvenile smallmouth bass "looked pretty normal" and the spawn was described as fair.

Enamait was encouraged by the fall survey, where he found that the fish hatched earlier in the year had survived in good numbers and seemed to be in healthy condition as they prepare for winter.

The discovery of smallmouth bass displaying both male and female characteristics in the South Branch Potomac in 2003 was followed by finding similar fish downstream in 2004. In the South Branch fish, males were found to also contain eggs. Known as "intersex," the condition is likely related to pollution in the river, possibly types of hormonal chemicals not removed from the waste stream by wastewater treatment plants. Some types of pesticides and other chemicals that are molecularly similar to hormones can also cause the problem.

The intersex South Branch fish were discovered after researchers collected fish to investigate several fish kills. Recently, smallmouth bass taken from the Dargan area of the Potomac downstream of Antietam Creek also exhibited the problem. Each of the nine male fish examined were found to have eggs. Enamait anticipated finding intersex bass elsewhere in the river system, but was surprised that the condition was present in all the males taken from the second location. He noted that the Dargan area is downstream from several wastewater treatment plants. "Nobody really knows the long-term impact on the fishery from the problem, or how long the fish have been affected," Enamait said. He added that there is no reason for the effect to be specific to bass, and plans to capture some suckers (a common fish easily sampled) during the winter for further testing. He noted that assessment is expensive, and that if the problem proves to be more widespread, funding will be needed to continue studies.

The presence of hormones and similar contaminants are a growing concern nationally, both for their effect on the ecology and potential contamination of drinking water. Area drinking water utilities are keeping aware of nationally-based research on the contaminants, and will share information through the Drinking Water Source Protection Partnership that ICPRB began coordinating in 2004. The group is comprised of water utilities that use the Potomac River, along with governments and other agencies with water quality responsibilities.

**Walleye** populations continue to grow, Enamait noted, citing the past season as the second best walleye hatch observed (the best was in 2001). Periodic stocking by DNR last occurred in 2000. A particularly strong hatch is seen about every third year, Enamait noted, and the future of the species looks bright. The fish, prized for its fight and flavor, congregate in spring, and are found in greatest numbers in the Washington County, Md. segment of the river, between



S. Owens/VDGIF

The Potomac's northern snakehead population has gained a notoriety far beyond its numbers--for now.

C&O Canal dams 3 and 5. Enamait is encouraging anglers to get out this spring to experience catching the fish.

While the ICPRB **American shad** stocking program concluded in 2002, researchers continue to monitor the rapidly growing populations in the Potomac. The American shad once was one of the kings of the river, with a huge commercial fishery dating back to colonial times. By the mid-1970s, pollution, heavy fishing pressure, and the blocking of spawning habitat had decimated the migratory fish, which come far up the Potomac to spawn. At about the same time that the stocking program got underway in 1995, the number of fish returning to the Potomac to spawn began to grow. Assisted by ICPRB's restocking effort (which placed more than 15.6 million shad fry in the Potomac) and the installation of a fish passage at Little Falls Dam in 2000, the fish's fortune has changed dramatically. Surveys of the fish in 2004 by ICPRB and DNR found record numbers of fish in the Potomac, dwarfing the numbers found collectively in the rest of the Chesapeake Bay region. "We caught more fish in one evening this year than we got in all of 1995," said ICPRB's Jim Cummins. Eric Durrell, a DNR biologist, noted that surveys revealed "incredibly high numbers of young-of-the-year American shad in the Potomac this fall...That's more shad than I have ever seen in one place on the bay."

Fish captured during the surveys of the last two years were used to harvest eggs and milt for the restocking of the Rappahannock River in Virginia. Cummins expects the Potomac population to grow exponentially in the future, and hopes to see the fishery reopened to harvest.

A similar project to restore river herring to the Anacostia and Rock Creek finished its fifth year. Managers are hopeful that the more than 13-million fry stocked in the Anacostia over the course of the project will take advantage of the removal of nearly all of the many of the blockages that have restricted the upstream spawning travel of the migratory fish. Both the shad and river herring projects have brought school groups and volunteers into the process.

A very limited commercial harvest

currently takes place in the Potomac, where watermen are allowed to keep some American shad found in pound and gill nets. It allows use of the captured fish, and is another tool to help gage the shad population's health, noted Kirby Carpenter, executive secretary for the Potomac River Fisheries Commission (PRFC), the bi-state (Maryland and Virginia) regulator of fishing in the tidal Potomac downstream of Washington, D.C.

The PRFC also regulates and monitors the river's shellfish. Carpenter noted that **blue crabs** did not venture as far upriver as usual because the wet weather kept saltier bay water from pushing upstream. The Potomac's slightly higher minimum size (5.5 inches) is credited with the harvest of some large crabs in September and October. "We saw some of the largest crabs anyone can remember," Carpenter said. Carpenter noted that the higher size limit allowed crabs to molt one more time before harvest, when they can add one-third to their weight.

Potomac **oyster** populations weathered another season "among the worst on record," Carpenter said. About 200 bushels were landed in 2003, and 2004 "won't show quite that many," he said. The lower salinities in the river experienced this year help to reduce the effects of the chronic oyster diseases MSX and Dermo, but also result in lower reproduction. The dismal state of oysters has many watermen, scientists, and politicians talking about prospects for introducing the Asian oyster into the bay and its tributaries. The PRFC is involved in preparing the environmental impact statement needed to help make a decision on whether to release the foreign oyster. Working closely with Maryland and Virginia, PRFC's studies are comparing population age, growth, and size of the Asian and native oyster. Other research is aimed at how the Asian oyster fares against the diseases that have ravaged the native population. Introduction of the Asian oyster remains contentious. Some researchers and environmentalists think that years of study are needed before responsible introduction into the Chesapeake, while others feel that answers can be found in a shorter time frame. Asian oysters may be



C. Dalpra

School students get a hands-on experience with river herring on the bank of the Northeast Branch of the Anacostia.

stormwater from the streets and sewage share the same system of pipes. During significant rains, the pipes quickly fill to capacity, and the excess mixture of sewage and stormwater overflows directly into the river. In a normal year, the system discharges about three billion gallons of sewerage into the Anacostia and Rock Creek. The problem is recognized as one of the biggest for the District's stretch of the Anacostia.

The problem is an old one, and various ideas for removing or reducing this impact have been proposed or tried for decades. An agreement reached after private and federal lawsuits has cleared the way for the District's Water

introduced into the bay as soon as 2005.

**Striped bass** have been reproducing well since a harvest moratorium was lifted in 1995. The 2004 survey of juvenile striped bass was average for the bay as a whole, and below-average for the Potomac, and average numbers of fish, rather than records, may be the best thing. Research is showing that striped bass mortality has risen. A significant number of adult striped bass suffer from lesions due to a bacterial infection, and are undersize for their age. Some researchers think that the population is stressed from a poor food supply that is shared by the record numbers of fish. The state of Maryland is working toward regional conservation measures for **menhaden**, an important forage fish for striped bass and other top predators. More research is being conducted to determine whether menhaden, which also filter algae from the water for food, are being over fished.

**Fish consumption advisories** in the Potomac and its tributaries are numerous, and most are specific to particular species in certain river segments. Complete lists for each state can be found on state natural resources websites. Some jurisdictions have statewide advisories for a range of freshwater fish due to mercury levels. These newer advisories were implemented due to administrative changes in allowable mercury levels, rather than large increases in mercury levels found in fish.

### Controlling Pollution

As noted, the wet weather and increased river flows load waterways with pollutants from runoff, or nonpoint source pollution. Precipitation also affects the combined sewer systems of older communities and wastewater treatment plants themselves.

About a third of the Washington, D.C., sewer system (primarily serving the Anacostia watershed and Rock Creek) uses older **combined sewers**, where

and Sewer Authority (WASA) to implement a \$1.9-billion 20-year Long Term Control Plan expected to achieve a 96 percent reduction in sewer overflows. Past efforts have reduced the flows by more than 20 percent, and the project plans call for a 40 percent reduction in just a few years. In 2001, the federal government contributed nearly \$85 million to the project. Without further federal funding WASA officials note, customers could be facing a 300 percent rate increase 20 years from now.

Other wastewater treatment plants made news in 2004 because of poor performance, and, increasingly, lawsuits or the threat of them aimed at cleaning them up. Plants in Hagerstown, Md., and Charlestown, W.Va., are under notice of filing, noted Ed Merrifield, the Potomac Riverkeeper. The nonprofit organization, a part of the national riverkeeper network, has been examining the performance of wastewater plants around the basin. We started looking at illegal pollution and trying to stop it," Merrifield said, "but 'legal' pollution also is a big problem. These treatment plant violations impact great recreational waters, in addition to other values."

The threat of legal action had a hand in accelerating a new agreement reached among the Chesapeake Bay jurisdictions and the U.S. Environmental Protection Agency to reduce nutrients discharged by wastewater treatment plants. Jurisdictions will now include numerical limits in treatment plant permits, and reduce nitrogen by 17.5 million pounds and phosphorus by one million pounds annually. The plan will affect more than 350 municipal and industrial facilities.

These treatment plant upgrades, when completed, can have a large positive effect on the health of local waterways, and collectively, on the Chesapeake Bay. As conditions improve, the ecosystem will be better able to resist impacts due to weather and runoff.

## River Critters

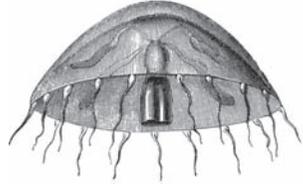
# Plankton Are Base of Potomac's Aquatic Ecosystems

Plankton, microscopic organisms found throughout the Potomac's waters, are the base of the river's food web. They are some of the most important food sources for fish, crabs, mussels, jellies, and other aquatic animals as well as producing much of the planet's oxygen. Plankton populations fluctuate seasonally, but in recent summers, some have been soaring to bloom levels, changing the Potomac's ecosystem.

Plankton include both plants (phytoplankton) and animals (zooplankton) that are free-floating during at least one stage of life. Rotifers, copepods, dinoflagellates, larval fish and insects, and algae are types of plankton. Blue-green algae, one of the most harmful forms of phytoplankton when found in large numbers, are also part of this vast food web. Increases in the amount of sediment and nutrients entering waterways encourages harmful algae growth and unbalances the other communities living in the same aquatic space. In this way, changes in plankton communities can dramatically affect many other species, such as striped bass.

The ICPRB's Claire Buchanan and Jacqueline Johnson have worked with other experts on the Plankton Restoration Goals Project to quantify a healthy plankton community in the Potomac River and Chesapeake Bay. The project has not only helped define healthy plankton communities, but also how healthy communities might positively affect the rest of the food web. Based on desirable water quality characteristics defined by the Environmental Protection Agency's Chesapeake Bay Program and analysis of program monitoring data, the project's experts have found that phytoplankton experience many fewer "blooms" and "busts" in improved water quality. Characteristics like chlorophyll, a plant pigment used in photosynthesis, and the mix of species in the phytoplankton community also change in desirable ways.

Species diversity is important because plankton are part of the larger Chesapeake Bay food web, which operates as a system. "The alteration of aquatic communities can have repercussions throughout the entire ecosystem," said Richard Lacouture, a principal investigator for the Academy of Natural Sciences Estuarine Research Center. Lacouture also noted that the bay and its tributaries go from a highly diverse plankton smorgasbord to a smaller, selected menu during periods of heavy algal growth such as the Potomac experienced last summer. About 90 percent of the plankton



community in a summer bloom consists of only one or two species, depriving higher trophic levels, organisms higher on the food chain, of valuable nutrition.

At the base of the food web, phytoplankton are some of the best indicators of water quality. "Several of the more than 700 species found in the Potomac and Chesapeake Bay are well-known harmful 'algal bloom species' associated with fish kills and shellfish poisoning. When these species appear in significant numbers in monitoring samples, managers take note," said Buchanan. As water quality improves, variability of the plankton population density decreases, making the food web more stable. A significant research finding was that the average quantity of phytoplankton (biomass) in desirable water quality conditions is as high as, and sometimes higher than, average quantities in degraded waters. "This suggests management actions to reduce nutrient levels in tidal waters will not ultimately starve the ecosystem," said Buchanan. Analysis of zooplankton samples from desirable conditions suggest densities of copepods, an important fish food, may increase. Numbers of the ubiquitous ctenophores, or comb jellies, may go down, which could relieve predation pressures on both zooplankton and larval fish.

At the root of the problem are abiotic factors that we can change. Though there is often a focus on restoring oyster reefs or submerged aquatic vegetation, a holistic approach--restoring habitat and food sources at the same time--will be more effective. Lacouture noted that sediment and nutrient reduction is a good starting point for improving aquatic communities. "Atmospheric nitrogen from burning fossil fuels makes up about 20 to 25 percent of the problem," said Lacouture. He also noted that lawn fertilizers were another major contributor of excess nutrients in the waterways. Previous studies by ICPRB have shown a significant and beneficial change in the Potomac's water quality in response to implementation of biological nitrogen reduction at the Blue Plains Waste Water Treatment Plant in Washington, D.C. Changing these factors will go far to balance the unstable base of the food web and every person in the watershed is responsible for living in balance with our aquatic neighbors.

# New Commissioners Appointed to ICPRB

The past year brought new federal, West Virginia, and Pennsylvania commissioners. Mel Baughman, the newest federal alternate commissioner, shares a lifelong commitment to the environment through his work and recreation. He is an avid birdwatcher and consults and writes bird guides for National Geographic. A hunter and fisherman, Baughman understands the importance of appreciating the river and its resources for all they have to offer. "Nothing is more basic than clean water," Baughman said. "Water is a commodity that we all take for granted." Baughman noted the importance of educating the public and its leaders about the significance of the Potomac and its tributaries. In his term, Baughman would like to take advantage of the staff's energy and knowledge to help gain more funding to sustain and grow the conservation effort.

Marten Jenkins, ICPRB's newest West Virginia commissioner, is the executive director of Natural Capital Investment Fund, Inc., a non-profit institution that provides financing for natural resource-based businesses to advance sustainable economic development throughout West

Virginia. He serves on the Steering Committee for the Central Appalachian Network, a multi-state network working to build a healthy regional economy in Central Appalachia. Jenkins also served as a U.S. Peace Corps volunteer in the Philippines and as a research assistant for the World Bank in the Environmental Policy and Research Division.

The ICPRB also re-gained the expertise of Pennsylvania Commissioner John Hines. He has extensive experience with other river basin commissions, including the Susquehanna, Delaware, and Ohio. Hines, a manager for the state's Department of Environmental Protection, was recognized in 1999 by the Interstate Council on Water Policy and the Great Lakes Commission for his efforts in establishing the *Partnership for the 21<sup>st</sup> Century*, an agreement among river basin commissions nationally. His knowledge of interstate water resource issues is invaluable to ICPRB and will continue to foster cooperation among all the commissions. Hines hopes to keep the broader goals of the commission in perspective so that "all the states can benefit from ICPRB's efforts." Hines replaces Cathleen Curran Myers.

The ICPRB's new Pennsylvania alternate commissioner, Lori Mohr, also has extensive experience in the water resources field. She



## Watching the River Flow

Potomac River flow levels remained above normal during October, despite below normal precipitation, according to the U.S. Geological Survey (USGS). Above normal precipitation in November continued the high flow trend.

Provisional data collected near Washington, D.C., for October showed excessively high flow for the Potomac, despite below-average rainfall. Historical precipitation for October averages about 3.22 inches, but only 1.74 inches fell this October, which allowed stream levels to drop from 13 times the norm at the beginning of the month to about twice the normal levels by the end of the month. October flow soared above the long-term

average of about two billion gallons per day (bgd), with daily flows averaging about 7.1 bgd, or about 351 percent of normal. Daily extremes ranged from a high of about 41.4 bgd on October 1 to a low of about 3.7 bgd on October 20. Water withdrawn for drinking use averaged about 401 million gallons per day (mgd), about three percent less than in October 2003. Freshwater inflow to the Chesapeake Bay averaged about 44.8 bgd, 61 percent above the historical average of 27.9 bgd for October and about four times lower than in September. The Potomac contributed about 20 percent of the total.

Normal November precipitation is 3.03 inches. With actual rainfall at 4.5 inches, November flows were about 7.7 bgd, higher than the norm of about 5.3 bgd, or about 145 percent of the normal flow. Flows ranged from a low of about 3.8 bgd on November 1 to a high of about 19.1 bgd on November 30. Water withdrawn for drinking use averaged about 371 mgd, about two percent less than November 2003. Freshwater inflow to the Chesapeake Bay averaged about 51.78 bgd, about 32 percent above the normal flow of 39 bgd. The Potomac contributed about 19 percent of the total.

has worked as an environmental planner, a policy specialist for the Office of River Basin Cooperation, and currently serves in the

Water Planning Office at the Pennsylvania Department of Environmental Protection. Mohr replaces John C. Booser.

## ICPRB Hosts Open House

A collection of interactive displays showing how ICPRB works in the community were on exhibition at an open house at ICPRB's new offices on December 6. About 50 people, including ICPRB commissioners, representatives of government agencies, and the public attended the event. A working rain barrel, live chironomid larvae, and a geology display were among the many exhibits that the public was invited to discover.

Throughout the year, ICPRB begins and completes many projects in cooperation with non-profit organizations, citizen groups, and local, state, and federal groups.



C. Dalpra

Staff and guests chat about the display of basin rocks and geology at the open house.

The open house allowed ICPRB staff to explain the issues and commission projects that affect the basin's citizenry.



Potomac Basin

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