



For tiny creatures, they pack a painful punch. And that's if you're human. Fish aren't as lucky and can die by the hundreds or thousands. This past summer and fall, fish in several Chesapeake Bay rivers in Maryland and Virginia fell victim to the organism known as *Pfiesteria piscicida*, while people playing or fishing in infested waters suffered from respiratory irritation, headaches, memory loss and painful skin lesions.

Residents worried while experts flocked to the affected sites to collect samples and study *Pfiesteria's* toxic effects. Was this yet another sign of the Bay's deteriorating health, further proof that coastal overdevelopment and runoff from farms, parking lots and chemically-treated suburban lawns is killing one of the nation's most vital marine resources?

It's nothing quite so simple, says Daniel Dauer, associate director of Old Dominion's Benthic Ecology Laboratory in the university's Department of Biological Sciences, and a senior scientist in the state's Chesapeake Bay Restoration program. In several key areas, the Bay's ecological health appears to be slowly improving. Dauer believes *Pfiesteria's* effects will likely be temporary and limited to those tributaries that don't benefit from tidal cleansing.

Dauer explains that most researchers believe the microscopic, mucous-covered *Pfiesteria* is an ancient life form with a complicated life cycle that includes 24 discrete stages. Only one of those stages is dangerous to marine and human life. Like most species, *Pfiesteria* is designed by nature to make optimal use of favorable conditions, which can be summarized in one word: food.

Pfiesteria's toxic manifestation, Dauer points out, has occurred in warm weather in small, poorly flushed rivers located near areas where animal manure is stockpiled. Storm runoff or leaching of the manure into nearby creeks or streams can carry nutrients such as nitrogen and phosphorous into the tributaries. More food translates to a resurgent *Pfiesteria* population, ready to transform into its deadly stage when it senses chemicals excreted by abundant schools of nearby fish. With the onset of cold weather, *Pfiesteria* converts to another, non-malignant stage.

"It's like Dr. Jekyll and Mr. Hyde," Dauer says. "During the winter we expect this thing to disappear. [*Pfiesteria* toxicity] is certainly a cause for concern. But it's not a cause for panic."

BAY SAVING

BY JAMES SCHULTZ

MODEST PROGRESS IS BEING MADE TO RESTORE THE BAY TO SOME PORTION OF ITS HISTORICAL VITALITY.

(Top) East Coast Salt Marsh in Smithfield, Va. (Above) Red tide dinoflagellate closely related to the *Pfiesteria* dinoflagellate. Photos courtesy of Daniel Dauer.

CONTINUING THE CLEANUP

Assessing human-induced damage to Bay flora and fauna is a complex, time-consuming process. And what has taken decades, or centuries, to degrade may take at least that long to repair. Dauer does believe, however, that modest progress is being made to restore the Bay to some portion of its historical vitality.

"We've seen improvements in the Bay," he contends. "In some areas, we're seeing some increase in sea grass: hopeful, but not spectacular. Striped bass — rockfish — have come back from near disaster to abundance. But we're nowhere near creating the original fecundity."

The chief problem involves human activity on the land and near the coast. Homeowners and farmers use fertilizers, herbicides and pesticides to keep lawns green and croplands productive. Storm runoff cannot naturally drain through acres of asphalt parking lots and roadways, and so is funneled into drains and ultimately into the Bay. Airborne pollutants are taken up into the atmosphere and descend in the form of rain, hail and snow.

"The problem with the Chesapeake Bay is too much enrichment and too much runoff," Dauer says. "It's more than Nature can handle. It's the legacy of civilization. We're out of balance and we're trying to move things back."

MANAGED BAY, CLEAN BAY

Beyond lobbying for legislation that limits the worst effects of coastal development, beyond restocking the Bay with depleted marine species, beyond controlling what substances are allowed to drain into waterways, restorers want to enable natural systems to repair themselves. Part of that effort includes planting sea grass, which cleanses Bay waters and incubates and shelters scores of small creatures vital to the marine food chain.

Sea grass is one of many indicators of the Bay's vitality that Old Dominion observes under contract to Virginia's Department of Environmental Quality. Dauer is a senior scientist involved in the program and one of Virginia's representatives to regional, national and international environmental bodies. He says that Old Dominion's water quality and resources monitoring program continually

rates the progress of Bay restoration, an effort that led to the university's development of the Chesapeake Bay Index of Biological Integrity. Dauer says managers increasingly use novel approaches such as the Bay Index to refine ecosystem restoration programs.

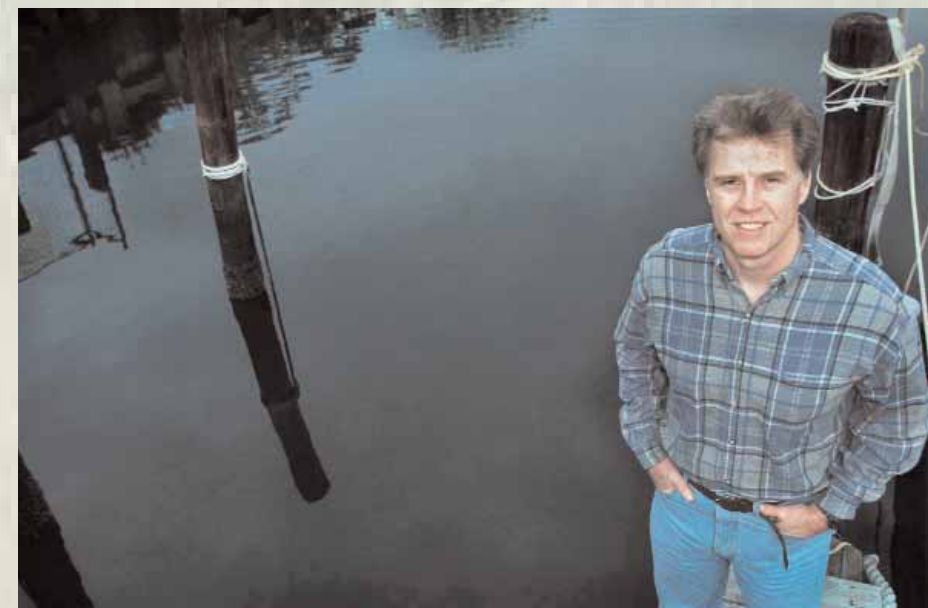
"I grew up enjoying being outside," he recalls. "As a citizen, I feel an obligation to be involved in the Chesapeake Bay. I want to provide the environmental managers in Virginia the best information in the best possible way I can, so they can make the best decisions."

Ecosystem restoration can succeed. As one example, Dauer points to the Potomac River which, in the 1960s he says "was green pea soup [and] it smelled bad." Today the Potomac's health continues a decades-long rebound.

No one, not advocate, scientist, critic or manager, sees the Bay as returning to its pre-European-settlement state. But Dauer says that many people are gradually becoming partners with and not exploiters of natural systems.

"People want to see a Bay that's rich in living resources," Dauer asserts. "They want to see geese, ducks, spot, croaker, drum and rockfish. And they don't want to be in water that stains them and smells bad."

"We've degraded the natural system for a long time. Can we improve it? Sure. It's a matter of how much we're willing to pay or willing to accept."



Daniel Dauer has a vested interest in the Chesapeake Bay. Associate Director of Old Dominion's Benthic Studies Program and a senior scientist in Virginia's Chesapeake Bay Restoration program, Dauer has also written numerous articles covering the ecology and environmental health of the Bay and has received many grants to study these topics.