

CDC grant funds *Pfiesteria* research

South Carolina was recently awarded \$160,000 as part of a six-state, \$3.2 million grant provided by the Centers for Disease Control and Prevention's (CDC) National Centers for Environmental Health. Along with Delaware, Florida, Maryland, North Carolina, and Virginia, experts in South Carolina have been charged to use the funding to track the human health effects posed by the toxic marine alga *Pfiesteria piscicida* and perhaps several other dinoflagellate species that look like *Pfiesteria*.

The grants were awarded in part due to recent outbreaks of *Pfiesteria* along the East Coast linked to fish kills and some human illness. Most toxic algae reach people through contaminated seafood. Not so for *Pfiesteria*: it seems to affect people only when its probable toxins are absorbed through the skin from direct water contact. "This is a potentially new route of exposure to an algal toxin," says Adam Karpati, medical epidemiologist at the CDC.

The CDC and southeastern state researchers have linked exposure by watermen to estuarine waters laden with *Pfiesteria* to symptoms that include confusion, memory loss, learning disorders, skin rashes, and respiratory irritation. Epidemiologists have characterized these environmental and symptom criteria as Possible Estuary-Associated Syndrome (PEAS).

In October, a site visit to South Carolina was made by CDC officials, who noted in their follow-up report: "We found our visit to be very infor-

mative and useful and were impressed by the high caliber of the personnel involved, by their openness, and by their obvious interest in this project." The final report noted only two minor recommendations for change.

Pfiesteria and like organisms (PLOs) occur naturally along the Atlantic coast from Delaware to southern Florida and may also exist elsewhere. Researchers at USC have confirmed that *Pfiesteria piscicida* and at least one closely related dinoflagellate species are present in South Carolina's estuarine waters. Although no *Pfiesteria* blooms or confirmed cases of PEAS have been reported in the state, awareness and vigilance is needed. The South Carolina coastal zone is projected to experience rapid development and significant population growth over the next several decades. This growth

is projected to substantially increase the amount of nutrients in our estuaries and may consequently increase the incidence of harmful algal blooms.

Alan Lewitus, researcher at USC Belle Baruch Marine Laboratory, said, "South Carolina estuaries may not have been affected by *Pfiesteria* in its active toxic form because the state's estuaries are generally better flushed by tides and less severely affected by runoff than some estuaries in other southeastern states." Officials say protecting South Carolina's estuaries from excessive runoff may be the best way to avoid problems with *Pfiesteria* or other toxic algae.

In the meantime, the CDC grant has provided resources through the S.C. Department of Health and Environmental Control's (DHEC) central office, district offices, and coastal county health departments to study

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A typical season in South Carolina

In 1998, the first year of extensive monitoring for *Pfiesteria piscicida* in South Carolina, there were no outbreaks of this toxic alga. Though a number of fish kills occurred in estuarine waters, none of the kills were related to *Pfiesteria*. Most fish kills occurred in impoundment environments and were attributed to low levels of dissolved oxygen in the water. Fourteen phytoplankton analyses were conducted this season. Alan Lewitus, researcher at USC Belle Baruch Marine Laboratory, said, "*Pfiesteria*-like organisms were found in nearly every sample but in very low numbers—well below the toxic levels established by North Carolina research." There were no Potential Estuarine Associated Syndrome (PEAS) cases in South Carolina.

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and provide information about *Pfiesteria* to concerned citizens, healthcare providers, and environmentalists. The grant has also helped bring together experts while expanding scientific knowledge about *Pfiesteria* found in South Carolina coastal waters.

Robert Ball, project director for the *Pfiesteria*-Related Illness Surveillance and Prevention Program, said that a number of state agencies have been involved in developing educational materials about *Pfiesteria*, performing environmental testing and surveillance, and training staff to respond to individuals with possible symptoms and make proper referrals for medical assistance. Additionally, Natalie Scruggs, Program Coordinator, has developed a detailed reporting and surveillance system.

State officials now are aggressively investigating all reports of fish kills. The S.C. Department of Natural Resources is also regularly monitoring menhaden for lesions. In about 7,000 menhaden sampled from June through September in the Charleston harbor estuary system, DNR has found 322 lesions. These fish sores are consistent with effects of *Pfiesteria*, but also with effects of viruses, bacteria, and fungi. According to Vicki Blazer of the U.S. Geological Survey, 95-100 percent of the lesions she examined on menhaden from fish kills in Maryland are linked to a species of fungus called *Aphanomyces*.

Additionally, educational programs are being designed for physicians to aid accurate diagnosis of Possible Estuary Associated Syndrome. Public education programs will describe

common-sense measures for the public to follow. "If you see a fish kill, don't go in the water," said DHEC state epidemiologist Jerry Gibson.

"The grant represents a strong collaborative effort among DHEC staff and also with personnel at the Department of Natural Resources, the Medical University of South Carolina, the University of South Carolina, and other agencies," Ball said. "We are also coordinating with the S.C. Task Group on Toxic Algae, through the S.C. Sea Grant Consortium, and other partners for additional activities."

Despite all the attention paid to *Pfiesteria* in South Carolina, Rick DeVoe, executive director of the S.C. Sea Grant Consortium, said, "Our waters are safe to swim in, our seafood is safe to eat, and we, working together, want to keep them that way."

Researcher awarded grant to study *Pfiesteria* in South Carolina

Are excess nutrients linked to *Pfiesteria* toxic outbreaks? If so, what types of nutrients stimulate and maintain *Pfiesteria* blooms?

Alan Lewitus, marine scientist at USC Belle Baruch Marine Laboratory, will attempt to answer such questions as a member of a multi-disciplinary team of researchers. A five-year, \$3-million study will examine and compare mechanisms that contribute to blooms of *Pfiesteria* and other dinoflagellates in Delaware, Maryland, North Carolina, and South Carolina. Lewitus is responsible for field efforts in South Carolina waters.

The researchers hypothesize that *Pfiesteria* and related dinoflagellates have the ability to use various sources of nutrients and energy for their growth and survival. Many of these dinoflagellates graze on vegetation like animals, but they can also become photosynthetic by absorbing the chloroplasts of their phytoplankton prey. So *Pfiesteria* could be stimulated

directly by nutrients when they are photosynthetic. Or they could be stimulated indirectly by nutrients, which increase abundance of their food sources.

Led by Patricia M. Glibert of the University of Maryland Horn Point Laboratory, the regional study is funded by the ECOHAB program

(ECology and Oceanography of Harmful Algal Blooms), and co-sponsored by the National Science Foundation, National Oceanic and Atmospheric Administration, Environmental Protection Agency, Office of Naval Research, U.S. Department of Agriculture, and National Aeronautics and Space Administration.

Web Sites on *Pfiesteria*

NC State University of Aquatic Botany Laboratory *Pfiesteria* Page:
www2.ncsu.edu/unity/lockers/project/aquatic_botany/pfiest.html

S.C. Department of Environmental Control:
www.state.sc.us/dhec/fspfies.htm

Woods Hole Oceanographic Institution:
www.redtide.whoi.edu/hab/

University System of Maryland:
www.mdsg.umd.edu/fish-health/pfiesteria

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