

# HARMFUL ALGAL BLOOMS

## REDUCING THE IMPACTS OF HARMFUL ALGAL BLOOMS ON PUBLIC HEALTH, THE ECONOMY AND COASTAL ECOSYSTEMS

Harmful algal blooms (HABs) have been increasing in prevalence in the United States for the past 30 years, and now occur along most of our coastlines. The impacts of these blooms are felt in many ways — human health is placed at risk; ecosystems are altered; marine mammals are injured or killed; and the fishing, aquaculture and recreation industries suffer substantial economic losses. The economic

impacts of HABs in the U.S. for the period 1987-1992 have been estimated conservatively at \$49 million annually. Other single HAB events may approach or even exceed those costs; for example, the 1976 red tide event in New Jersey was estimated to have caused losses of about \$1 billion in today's dollars.

The recent National Science and Technology Council (NSTC) report, *National Assessment of Harmful Algal Blooms in U.S. Waters*, observed "there are currently no national research initiatives to promote efforts in prevention, control and mitigation (PCM) of HABs and their impacts.

Targeted funding is needed for a program focused on prevention, control and mitigation and should be separate from, and complement, funding for ECOHAB [Ecology and Oceanography of Harmful Algal Blooms] or other ecology programs."

Sea Grant is ready to put together just such a comprehensive program to increase our

understanding of harmful algal blooms to a level where we can provide the tools to coastal communities and managers that will enable them to reduce the impact of these events.

### Why Sea Grant?

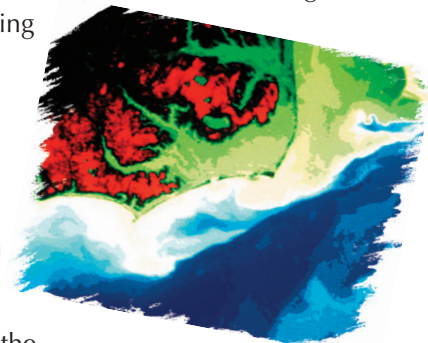
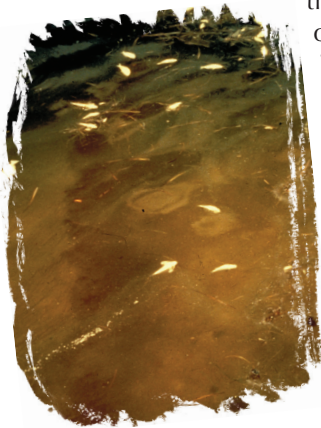
There is a Sea Grant program in every coastal state. No program is better suited to address this problem than Sea Grant because it requires a breadth of scope that only Sea Grant can provide—research, outreach and public educa-



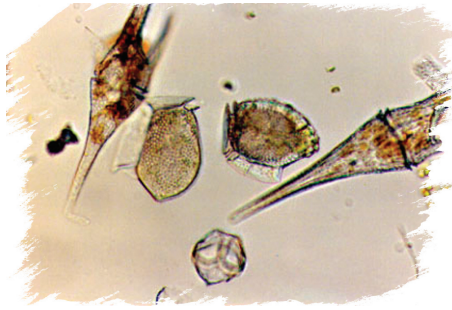
tion on all coasts; for all age groups; for government, private businesses and private citizens; and on issues ranging from biology to economics to the physical sciences. Research alone will not solve this problem, yet we must develop a better arsenal of weapons than currently exists.

### Sea Grant's Impact

- Sea Grant biotechnology research is already providing new means to detect potentially toxic organisms and monitor the development of harmful algal blooms. There is the promise of further rapid advances. For example, when *Pfiesteria* was first discovered, the identification and verification process was cumbersome, took two to three weeks, and could be performed only by a few highly trained researchers. Sea Grant researchers were able to develop the first molecular probe for *Pfiesteria*, shortening the verification time to 24 to 48 hours, which allowed rapid and informed management responses enabling the analyses to be done at lower cost and with much less training.
- Paralytic shellfish poisoning (PSP) resulting from consuming shellfish harvested in the wild is responsible for illness and, occasionally, death in Alaska each year. However, there has been no rapid method to test for the causative algae. Additionally, because of the vastness and remoteness of the Alaskan coast, routine monitoring of all potential shellfish areas is not possible. Sea Grant researchers joined with a small business to develop an assay kit. It now is being field-tested along the Alaska coast by other Sea Grant researchers. The hope is that eventually these kits may make it possible for individual shellfish harvesters to detect toxic events in locations too remote to justify routine monitoring.
- A survey of 3,500 coastal residents from New York to



the Carolinas carried out by Sea Grant Extension staff showed that *Pfiesteria* outbreaks could dramatically affect consumers' travel choices, reducing tourism in an affected area by at least 40 percent, with a significant impact on coastal communities as well as seafood sales. These results are targeted to help state and local management agencies develop their plans for rapid response to new outbreaks of harmful algae.



remove 80 to 90 percent of the toxins in a short time.

## Expectations: 2004-2008

The recent Sea Grant report to Congress, *Prevention, Control and Mitigation of Harmful Algal Blooms: A Research Plan*, outlines a forward-looking research, outreach and public education program that would provide the means for academic, government and industry scientists and engineers to combine their efforts with those of coastal communities and managers in order to lessen the impacts of HABs on our nation's coasts. The program will reduce the impact of HABs by integrating research findings into effective, and complementary HAB management strategies for **prevention** – avoiding the occurrence of blooms or reducing their extent; **mitigation** – minimizing HAB impacts on human health, living resources and coastal economies when they do occur; and **control** – actions that directly reduce or contain the bloom population.

For further detail, the 2001 Sea Grant Report to Congress, *Prevention, Control and Mitigation of Harmful Algal Blooms: A Research Plan*, is available electronically at [http://www.nsgo.seagrant.org/research/habPCM\\_HAB\\_Research\\_Plan.pdf](http://www.nsgo.seagrant.org/research/habPCM_HAB_Research_Plan.pdf).

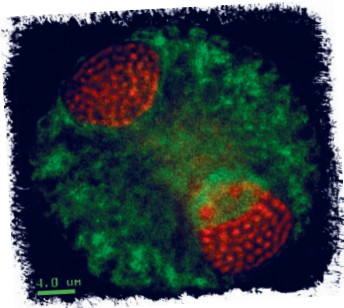
Sea Grant is requesting Congress to fully fund its Harmful Algal Blooms authorization for FY 04 in the amount of \$3 million.

poisoning (PSP) had never been recorded. When state agencies began monitoring those sites, PSP toxicity was detected and, in response, annual shellfish testing programs were established to provide protection to shellfish consumers.

Sea Grant Extension, in collaboration with the state's Cooperative Extension, has established a citizen volunteer network to monitor 37 coastal sites in Maine for the presence of harmful algal blooms. The volunteers enable limited agency staff to focus their efforts on locations where biotoxins are most likely to accumulate. The result has been an increase in the effective coverage of the coastal monitoring and the identification of areas for closure that might otherwise have been missed.

Sea Grant researchers are even beginning to test potential methods of controlling ongoing HABs. In one study, clay particles mixed with seawater and sprayed over an algal bloom bound with the algae and sank to the bottom. In laboratory experiments meant to mimic field conditions, results showed that the clay was able to

- Targeted research conducted by experts from Maine to Maryland has identified a number of environmental factors that are likely contributors to the recent harmful algal blooms in Long Island bays. The results from the past six years' of research are being synthesized to suggest potential management strategies that should minimize the impact of this harmful algal bloom on the



local economy and environment.

- Sea Grant researchers discovered toxic dinoflagellate cysts in areas of Connecticut and Long Island where paralytic shellfish



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