

HABs at CDC: Historical Perspective

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Overview

- What CDC does (and does not do)
- How we got involved in HABS
- Current projects

CDC

- National focus for
 - Developing and applying disease prevention and control
 - Environmental health
 - Health promotion and education activities
- To improve the health of the people of the US

CDC Does Not:

- Make regulations
- Recommend legislation
- Impose programs

CDC: Mission

- To promote health and quality of life.
- Protect health and safety.
- Provide credible information to enhance health decisions.
- Promote health through strong partnerships.

National Center for Environmental Health: Mission

- Provide national leadership in preventing and controlling disease and death resulting from the interactions between people and their environment.

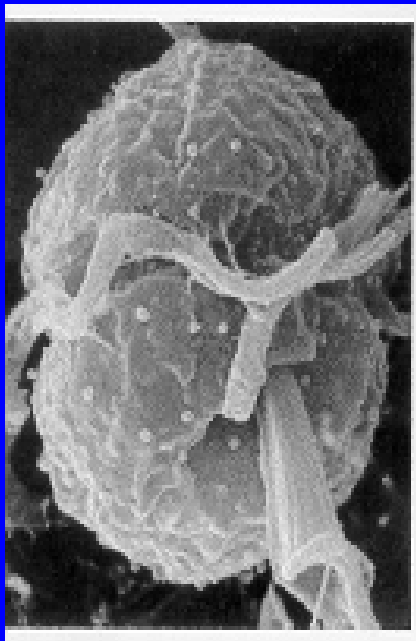
National Center for Environmental Health: Implementing our Mission

- Work with State and Local Health Agencies to identify, investigate, and prevent environmentally related illnesses in people.
- CDC has a presence in a state or local health agency at the specific request of the agency.

CDC Funding

- Mark-up
- Cooperative Agreements
- Grant Programs
- Other assistance to health agencies

Pfiesteria piscicida, Pocomoke River, MD



- **October 1996:** watermen report fish lesions
- **April 1997:** reports of fish lesions
- **May 1997:** watermen interviewed
- **August 1997:** Fish kill in Pocomoke River

U.S. NEWS

The cell from hell

Toxic algae that thrive on pollutants are killing fish, making people sick and spreading nationwide.

BY MICHAEL SATCHELL

Pollution spurs toxic algae outbreaks: Last year 25 million gallons of swine manure poured into one river.

news of the week

Scientists fish for chemical structure of Pfiesteria toxins

menhaden from the beaches. A outbreak wiped out 14 million fish, rarely closed parts of the Neuse and put 364,000 acres of shellfish off limits. Since then, the problem

government

PFIESTERIA HEALTH CONCERNS REALIZED

Federal and state agencies coordinate research on unusual toxic microorganism when human health problems arise



CDC's Public Health Response

- September 1997: CDC Workshop
- Created consensus “straw-man” definitions for exposure and outcome.
- November 1997: Congressional appropriation
- December 1997: CDC Workshop
- January 1998: Request for Proposals
- March 1998: Funding distributed to eastern states

Public Health Research Needs

- Investigation of *Pfiesteria*
- Characterization of toxins
- Routes of human exposure
- Investigation of similar organisms
- Clinical and epidemiologic studies

CDC-Sponsored Activities

- Over 14 workshops and program meetings
- Public education
- Site Visits
- Supported work to develop a biomarker of exposure
- Epidemiologic studies

Surveillance of Human Illness (Estuary-Associated Syndrome)

- Passive surveillance in 6 states
 - FL, MD, NC, SC, VA, DE
- Quantify the potential public health burden
- Provide a systematic triage of people reporting symptoms
- Provide a systematic management of public inquiries concerning *Pfiesteria*

Cohort Study of Potentially Exposed People

- Individuals recruited in 3 states (MD, VA, NC)
- Baseline medical evaluations; neurocognitive testing, specimen banking
- Neurobehavioral Evaluation System
- Follow-up contacts and testing
- Additional testing triggered by exposure or cluster

Research Concerns

- Public health problem?
- Epidemiologic issues
 - non-traditional surveillance criteria
 - epidemiology of small populations
 - need to link symptoms to exposure
- Scientific issues
 - Why was the toxin so elusive?
 - Why was only one lab qualified to culture the organism?

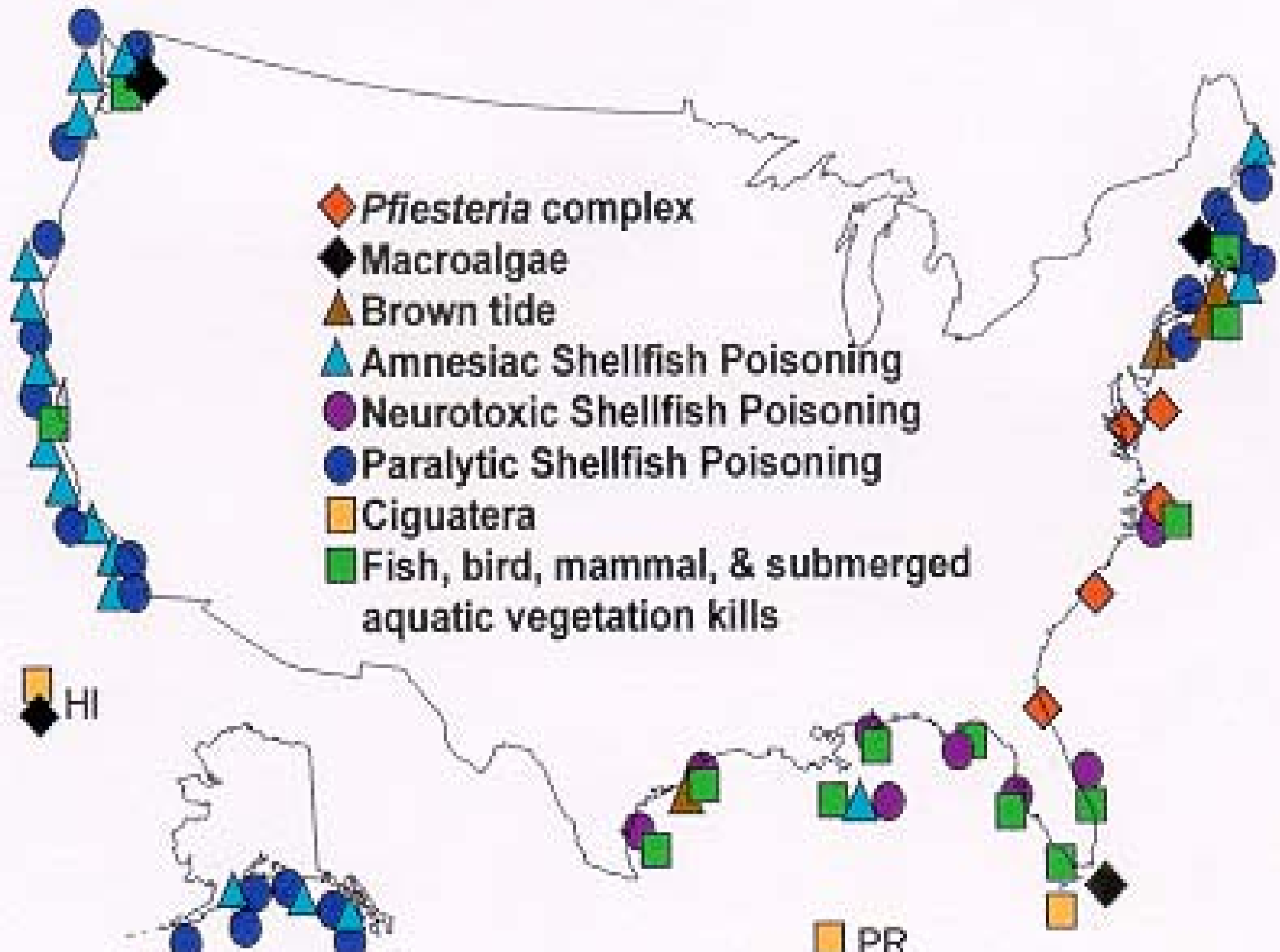
Concerns, cont.

- Economic/political issues
 - media
 - public perception
 - personalities/turf issues
- Administrative issues
 - short start-up time
 - new personnel

Pfiesteria piscicida and Public Health: Where Are We Now?

- Scientific advances limited
- No biomarkers of exposure
- No “case definition”
- However, some good things have happened

Major HAB-related Events in the Coastal U.S.



Pfiesteria piscicida Cooperative Agreements

- Human health impact of CAFOs
- Human exposure to HABs and other toxins



Pfiesteria piscicida Cooperative Agreements

- State-based research
- NCEH-sponsored research

Florida Department of Health

- Pfiesteria Cooperative Agreement
 - Florida DOH study of home filters
 - Health Effects of Exposure to Cyanobacterial Toxins—State of the Science
- Human exposure to aerosolized brevetoxins
- xHAB2002, 2004, 2006



Environmental Exposure to Aerosolized Brevetoxins

- National Center for Environmental Health, CDC
- NIEHS Marine and Freshwater Biomedical Sciences Center
- Lovelace Respiratory Research Institute
- Florida Department of Health
- Florida HAB Task Force
- Mote Marine Laboratory
- University of Miami School of Medicine
- Children's Hospital Medical Center
- Harbor Branch Oceanographic Institution
- Center for Marine Science Research
- National Institute for Occupational Health Sciences, CDC

Environmental Exposure to Aerosolized Brevetoxins



- Symptoms
- Pulmonary function tests
- Inflammatory response
- ELISA for brevetoxin in urine
- Response during exercise
- Environmental monitoring

Exposure to Microcystins in Recreational Waters: Bear Lake, MI August 2006

- National Center for Environmental Health, CDC
- Mote Marine Laboratory
- Loveless Respiratory Research Institute
- Greenwater Laboratory
- National Oceanic and Atmospheric Administration
- Grand Valley State University
- Wright State University

Exposure to Microcystins in Recreational Waters: Bear Lake, MI August 2006

- Study participants recruited at the Lake
 - Planning recreational activities
- Health data:
 - Pre-exposure symptoms
 - Post-exposure symptoms
 - Blood sample for microcystin levels
 - 10-day symptom follow-up

Exposure to Microcystins in Recreational Waters: Bear Lake, MI August 2006

- Environmental Data
 - Taxonomy
 - Water
 - Toxin levels
 - Water
 - Aerosols
- Current status
 - Data being analyzed
 - Plan to repeat study in other lakes

Exposure to Microcystins in Drinking Water

- Greenwater Laboratory
- Florida Regional Drinking Water Management Districts
- Mote Marine Laboratory
- University of Miami School of Medicine
- Wright State University

Exposure to Microcystins in Drinking Water

- Health data
 - Symptoms
 - Microcystins in blood
- Environmental sampling
 - Source water
 - Distribution system
 - Tap



Ciguatera Fish Poisoning: Diagnostic Biomarker

- Food and Drug Administration, Dauphin Island
- University of Miami School of Medicine
- USAMRID

Ciguatera Fish Poisoning: Diagnostic Biomarker

- Isolate and purify ciguatoxin metabolites
- Develop and test bioassays
- Identify biomarker
 - Ciguatera cases
 - Urine and blood for biomarker identification
- Clinical study



Pufferfish Poisonings: Indian River, Florida

- Florida Department of Health
- Florida Fish and Wildlife Conservation Commission
- Florida Marine Research Institute
- Food and Drug Administration
- New Jersey Poison Information Center

Pufferfish Poisonings: Indian River, Florida

- Disease surveillance
- Fish consumption ban
- Fish and shellfish testing



Future Challenges

- Improve people's health
- Prevent violence and unintentional injury
- Meeting health and safety needs of workforce
- Provide credible health information
- Protect individuals from emerging diseases
- Eliminate racial/ethnic disparities
- Foster safe, healthy environments
- Work with partners to improve global health

