Perspectives on the Impact to Public Health from Harmful Algal Blooms (HABs)

Part 2: Summer Webinar Series to Build Awareness About Harmful Algal Blooms and Nutrient Pollution

Thursday, July 25, 2013
1:00pm – 2:30pm ET

Speakers:
Lorraine C. Backer, PhD, MPH Senior Scientist and Environmental Epidemiologist, National Center for Environmental Health (NCEH), Centers for Disease Control and Prevention (CDC)
Andrew Reich, MS, MSPH Program Coordinator, Aquatic Toxins Disease Prevention Program Public Health Toxicology Section, Florida Department of Health

Moderated by: Lesley Vázquez-Coriano, Dr.PH, MEH, Office of Science and Technology, US EPA
Today’s Schedule

• **Introduction and GoToWebinar Logistics**

• **Lorrie Backer**
  – Means of exposure
  – Data collection
  – Public health response

• **Andy Reich**
  – HAB-related illnesses
  – Communication resources

• **Polling Questions**

• **Q&As**

• **Final Announcements**
Webinar Logistics

- **To ask a question** — Type your question in the “Questions” tool box on the right side of your screen and click “Send.” Our panelists and moderator will respond to the entire audience.

- **To report any technical issues** (such as audio problems) — Type your issue in the “Questions” tool box on the right side of your screen and click “Send” and we will respond by posting an answer in the “Questions” box.

- **To find additional support online** — Refer to GoToWebinar’s website: http://support.citrixonline.com/GoToWebinar/ or call 1-800-263-6317 for toll-free support.
Today’s Topic and Speakers

Epidemiologic Studies and Surveillance

Lorrie Backer, PhD, MPH
• Team Leader and Senior Environmental Epidemiologist
  • National Center for Environmental Health, Centers for Disease Control and Prevention

HAB Illnesses and Public Communication

Andy Reich, MS, MSPH
• Aquatic Toxins Disease Prevention Program Coordinator
  • Public Health Toxicology Section, Florida Department of Health

#greenwater
Harmful Algal Blooms and Public Health

Lorraine C. Backer, PhD, MPH

Health Studies Branch
Division of Environmental Hazards and Health Effects
National Center for Environmental Health
Centers for Disease Control and Prevention
HAB Awareness Webinar, July 25, 2013
HABS – a Public Health Problem?

- Hazard definition
- Exposure routes
- Completed exposure pathways
- Health outcomes
- Public health response
Hazard Identification

Organisms and toxins in the environment

Karenia brevis
Exposure Routes and Completed Exposure Pathways

• Possible exposure routes
  – Food
  – Drinking water
  – Recreational waters
  – Aerosols

• Completed exposure pathways
Health Outcomes

- Food-born illness
- Dermatologic effects
- Respiratory effects

Photo courtesy of Andy Reich
HABs: What is our public health response?

• Epidemiologic studies
  – Outbreak investigations
  – Planned research studies

• Surveillance

• Prevention
HABs: What is our public health response?

• Epidemiologic studies
  – Outbreak investigations
  – Planned research studies
• Surveillance
• Prevention
Epidemiology

The study of disease occurrence and its relation to the characteristics of individuals and their environment
HABs: Public Health Response

- Epidemiologic studies
  - Outbreak investigations
  - Planned studies
- Surveillance
- Prevention
- Examples of recent advances
Planned Epidemiology Studies on HABs: Challenges

• Environmental concentrations often near the LOD
  – Need new analytic methods
• Body burdens likely to be extremely low
  – Need new biomarkers
• Biological effects occurring at the molecular level
Environmental Epidemiology = Interdisciplinary Research

- Organisms or agents
- Exposures
- Diseases/health outcomes
- Epi study design
- New technologies
- Sentinel Species
- Biomarkers
Target Populations

• Exposed via occupation
• Exposed via recreation
• Exposed and sensitive to environmental contaminants
What data do we need?

• Exposure data
  – Environmental measurements
  – Monitoring data
  – Weather data

• Outcome data
  – Medical records
  – Personal interviews
  – Laboratory & clinical tests
  – Biomarkers
  – Surveillance
Environmental Epidemiology Studies: Blue-greens and Red Tides

Something’s Amuck
Algae blooms return to Michigan shores

New York’s Toxic Algae Blooms
ESF Leads New Study

SUNY-ESF Home Catalog List Index
PUBLICATIONS

ALGAE ALERT: A Jack Russell terrier died July 25 after swimming through some blue-green algae in the South Fork of the Red River near Plasco. The Environmental Division of the Humboldt Department of Health and Human Services reported. Like three other dogs who died in the area in 2002, the terrier ingested some green material, had a seizure and died within 10 to 15 minutes of exiting the water. No cases of human illness caused by algae contact have been reported, but signs have been posted warning swimmers to...
Exposure to Microcystins in Recreational Waters

SUMMERTIME, AND THE SWIMMING IS QUEASY...
Collaborators

- National Center for Environmental Health, CDC
- National Center for Infectious Diseases, CDC
- Mote Marine Laboratory
- Greenwater Laboratory
- Lovelace Respiratory Research Institute
- Wright State University
- Other Federal Agencies (NOAA)
- State and local public health agencies
- Officials or others at study site
Field Study

• 13 study personnel
  – 2 local phlebotomists
  – Epidemic Intelligence Service Officer

• 3 boats

• 1 RV
Epidemiology Study Design

- Study population
  - Planning aerosol-generating recreational activities in lake with a HAB (exposed)
  - Planning recreational activities in lake with no HAB (control)
- Recruited in person
Environmental Data Collection

- Water samples
  - Water quality
  - Algal taxonomy
  - Microcystins
  - Viruses
Environmental Data Collection:
Air Samples & New Methods

• Air samples
  – 3 High-volume
    • Particle size
    • Microcystins
• 50 personal air samples
  – Microcystins
Health-related Data Collection

- Recruited 104 people
- Questionnaires
  - Pre-exposure
  - Post-exposure
  - Follow-up (7-10 days later)
- Post-exposure plasma samples
  - Microcystins
Outcome Measures

• Compare plasma levels of microcystins in control and exposed groups
• Compare symptom reports
## Results

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<th>Exposed</th>
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<tr>
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<td>N = 7</td>
<td>N = 97</td>
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<tr>
<td>Microcystin in water (µg/L)</td>
<td>&lt; LOD</td>
<td>3-5</td>
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<tr>
<td></td>
<td>LOD = 0.15</td>
<td></td>
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<tr>
<td>Microcystins in air (ng/m³)</td>
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<td>&lt; LOD – 0.14</td>
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<td>LOD = 0.0037</td>
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<td>Microcystins in blood (µg/L)</td>
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<td>&lt; LOD</td>
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<tr>
<td></td>
<td>LOD = 0.147 µg/L</td>
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<td>Symptoms</td>
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</tbody>
</table>
Exposure to Microcystins in Recreational Waters: Part 2
Collaborators

- National Center for Environmental Health, CDC
- California Department of Health
- Siskiyou County
- Mote Marine Laboratory
- Greenwater Laboratory
- National Center for Infectious Diseases, CDC
- Lovelace Respiratory Research Institute
- Karuk Tribe
- Pacific Corporation
Health-Related Data Collection

• Added nasal swabs
  – Microcystins
# Results

<table>
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<th>Exposed N = 88</th>
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<td>Microcystins in air (ng/m³)</td>
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<td>0.2 – 0.4</td>
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<tr>
<td>Microcystins in blood</td>
<td>&lt;LOD</td>
<td>&lt;LOD</td>
</tr>
<tr>
<td>Microcystins on nasal swabs</td>
<td>NA</td>
<td>&lt; LOD - 0.4 ng</td>
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<tr>
<td>Symptoms</td>
<td>No change</td>
<td>No change</td>
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</tbody>
</table>
What have we learned about microcystin exposure?

• Aerosols generated in lakes with blue-green blooms producing microcystins contain measurable concentrations of this toxin
• Potential for exposure
• Potential for public health impact
Epi Studies: Florida Red Tide

*K. brevis*, Charlotte Harbor, Charlotte Sun Herald, Paul Schmidt
**Science**

**Red tide spreads distress by air**

Fish-killing algae causing human breathing problems

By Elizabeth Veier

USA TODAY

Monsanto scientists have been researching the ways in which red tide-causing algae can affect humans. They have found that the same algae that kills fish can also cause respiratory problems in people who breathe the same air.

Once a year, the E. coli bacteria population in the skin of Florida fishermen can grow so large that they can cause respiratory problems. The scientists have been working on ways to reduce this problem.

The algae, called Karenia brevis, produces a particular neurotoxin that can cause respiratory problems. The scientists have been working on ways to reduce this problem.

Since following the first of the red tide deaths in 1987, the tide has been red and the red tide is at its peak. All at the water that flows into the Gulf of Mexico. There has been a red tide that has been reported in the last two years.

The algae, called Karenia brevis, produces a particular neurotoxin that can cause respiratory problems. The scientists have been working on ways to reduce this problem.

**Algal Toxin Linked to Marine Mammal Deaths**

When toxic blooms of the red tide bloom in the Gulf of Mexico, it can kill large numbers of dolphins and whales, according to new research. The findings may help explain the deaths of these creatures in Florida waters, even when no obvious algal blooms were ever noticed.

Florida is no stranger to harmful algal blooms, also known as red tides. The phenomenon occurs when populations of toxic microscopic algae explode, turning the sea red, brown, green, or purple. The organism responsible for red tides (Karenia brevis) produces a potent toxin called brevetoxin that kills fish and marine mammals.

Scientists have been studying the effects of red tides on marine mammals for years, but they couldn’t fully understand why the creatures continued to die long after the bloom had passed.

The search to find the cause of the deaths gathered greater urgency in 2002 when a Miami sufferer turned dead in southwest Florida. Two years later, 108 dolphins died. Although all of the animals showed relatively low concentrations of K. brevis, marine biologist Jerome Neal of the University of North Carolina, Wilmington, and colleagues found that the stomach tissues from the dead animals contained high levels of brevetoxin, suggesting the poison was introduced through food. Further testing showed that symptoms in the marine mammals were caused by brevetoxin.

Since then, small amounts of brevetoxin can kill fish. Lion’s kill would-be fish could accumulate and retain the poison. When he red tide is he bio- toxic clams and red tide algae with the tide, the fish stay healthy but accumulate the toxin in their tissues. The findings indicate that fish can become a reservoir of algae long after a red tide has dissipated, says Neal, whose team published its findings in the April issue of Nature.

**What is killing the manatees?**

To determine the cause of a mysterious disease, researchers are using DNA analysis. They have discovered that the manatees are infected with a new type of virus.

**The Boston Globe**

**Mon 28 Mar 2005**

**Tide’s toxins trouble lungs ashore**

By BYRTH DALY

Globe Staff

SARASOTA, Fla. - A massive red tide off the beaches of southwest Florida is causing an outbreak of wheezing, coughing and other respiratory symptoms in people who breathe the polluted air.

People have reported wheezing, coughing, difficulty breathing, and other respiratory symptoms.

New evidence suggests that the effects of an alcohol on these the tide produces may be more harmful for health officials have previously thought.

Since early January, a large algae bloom stretching from the mouth of Tampa Bay to St. Joseph Island has been

**Beaches littered with dead fish**

By Bruce Ritchie

**Florida Fish and Wildlife Conservation Commission**

Teens of thousands of dead fish Tuesday were left on some beaches in Franklin County, further raising concerns about red tide in the area.

Red tide is a toxic algae that has killed fish and other sea life in the state since January. Red tide was confirmed off the Taylor County coast last week and sustained in fish kills as far west as Port St. Joe.

There were reports Tuesday of dead fish at St. George Island, Bold Point, Alligator Point and St. Teresa. State wildlife officials said there were collecting water samples from the area to determine whether red tide was to blame.

The dead fish strand along St. George Island were accompanied by an odor that stung the eyes, nose and throat, island resident Steve Harris said.

"It seems there is a red tide," Harris said. "There is a lot of odor and irritation. And a lot of dead fish."

He said he couldn’t tell what species of fish were killed because they apparently had been

**TO REPORT A FISH KILL**

- Florida Fish and Wildlife Conservation Commission fish kill hotline: (888) 636-0211

**Phoce see RED TIDE, 28**

**Algae bloom keeps rolling in**

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**Phoce see RED TIDE, 28**
Collaborators

• Centers for Disease Control and Prevention
• Florida Department of Health
• Florida Department of Env Protection
• Florida Marine Research Institute
• Harbor Branch
• Lovelace Respiratory Research Institute
• Mote Marine Lab
• NIEHS
• South Florida Poison Information
• University of Miami School of Medicine
• University of North Carolina (Wilmington)
Occupational Exposure to Aerosolized Brevetoxins

Objective: To determine if occupational exposure to aerosolized brevetoxins induces acute adverse health effects.
Epidemiology Study Design: Occupational Exposure

- Recruit a study population: lifeguards
- On study days:
  - Conducted exposure assessments (environmental data)
  - Conducted symptom surveys
    - Before and after spending time on the beach when there is no red tide (unexposed) and again when there is a red tide (exposed)
- Compared results for unexposed and exposed periods
Data: Environmental Conditions

Lido Beach 9 Feb. 1999

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<th>Time</th>
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<th>Speed (MPH)</th>
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<td>1</td>
<td>0.2</td>
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<tr>
<td>12:54p</td>
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<td>0.6</td>
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<td>1:24p</td>
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<td>0.8</td>
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<td>2:30p</td>
<td>23</td>
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Temperature: -1, 1, 3, 5, 7, 9, 11, 13, 15
Humidity: 0
Wind Speed: 0.2, 0.4, 0.6, 0.8, 1.0
Max Wind Speed: 0
Air Samples

- Airborne particles captured on filters
- Brevetoxins extracted and analyzed using HPLC
Personal Air Samples
Water Samples

- Seawater samples collected from the beach
  - *Karenia brevis* cell counts
  - Brevetoxins extracted and analyzed using HPLC
Health Outcome: Lung Function

• Spirometry testing
  – Used American Thoracic Society Guidelines for data collection and interpretation
Individual Data Collection: Questionnaires

- Demographics
- Pulmonary health history
- Time spent on beach
- Symptoms
## Lifeguards—Health Effects?

<table>
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<tr>
<th>Parameter</th>
<th>Unexposed</th>
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<td>Respiratory symptoms</td>
<td>None</td>
<td>Eye irritation, congestion, cough, headache</td>
<td>Eye &amp; throat irritation, cough</td>
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<tr>
<td>Lung function (spirometry)</td>
<td>No changes</td>
<td>Slight decrease in some parameters</td>
<td>No changes</td>
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<tr>
<td>Personal air samplers (ng/m(^3))</td>
<td>&lt; LOD LOD = 1</td>
<td>&lt; 10 ng/m(^3)</td>
<td>&gt; 10 ng/m(^3)</td>
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<tr>
<td>Wind</td>
<td>1-4% onshore</td>
<td>0-58% onshore</td>
<td>0 -58% onshore</td>
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</table>
What have we learned about Florida red tide?

• Aerosols from Florida red tides have a public health impact
  – Acute symptoms and pulmonary effects
• Local conditions, particularly wind, critical in determining exposure
HABs: Public Health Response

• Epidemiologic studies
  – Outbreak investigations
  – Planned studies
• Surveillance
• Prevention
Surveillance

- The systematic collection, analysis, and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know... application of these data to prevention and control...
Harmful Algal Bloom-related Illness Surveillance System (HABISS)

• Purpose: To reduce the public health impact of HAB-related human illnesses
• Goals
  – Detection, mitigation, prevention
  – *Link cases of illness with environmental data*
HABISS Data

• Temporally and geographically related data describing:
  – Human illnesses
  – Animal illnesses
  – Local environment
HAB-related dog intoxications: 2007-2011

- 13 states reported
- 67 cases (suspected or confirmed)
- 58 (67%) from exposure to cyanotoxins
- 38 (54%) fatalities
HAB-related illness surveillance is moving!

• National Outbreak Reporting System (NORS)
  – Web-based outbreak data collection
  – Managed by
    • National Center for Emerging and Zoonotic Infectious Diseases: Waterborne Disease Prevention Branch, Enteric Diseases Epidemiology Branch
    • National Center for Immunization and Respiratory Diseases: Epidemiology Branch
  – Passive surveillance for outbreaks from
    • Water, food, environmental contaminants (e.g. HABS), person-to-person transmission, animal contact
HABs: Public Health Response

• Epidemiologic studies
  – Outbreak investigations
  – Planned studies

• Surveillance

• Prevention
Prevention

• Primary prevention
  – Monitoring
• Educate target populations
  – Industries
  – Consumers
  – Health care & public health workers
  – Sensitive subpopulations
Public Health Protection: Outreach and Education

Florida Red Tide: Part of the Local Ecosystem

By knowing the basic facts about Florida Red Tide, you can avoid problems from this natural phenomenon and enjoy the beautiful sun, surf and seafood of Florida’s Gulf Coast.

What is Florida Red Tide?
Florida Red Tide is caused by an overgrowth of a normal micro alga called Karenia Brevis. This microscopic, plant-like organism can “bloom” or grow like crazy, usually late Summer to early Fall. These blooms can last for weeks or even months and shift around depending on wind and ocean currents. These blooms have been reported in Florida as far back as 1844.

Why is Florida Red Tide a Problem?
The red tide organism releases a potent toxin that can kill fish, birds and marine mammals like manatees. This toxin can also be released into the air and carried ashore by the breeze. Boaters, beachgoers and waterfront residents can find these toxins cause them to cough, sneeze and have watery eyes. Most people feel better right away when they come indoors. People with lung disease or asthma should be especially cautious about avoiding exposure to these toxins. It is also unsafe to eat shellfish (mollusks and bivalves) from areas with an active Red Tide. You never have to worry about fish and shellfish served in restaurants, though, because commercial seafood is only gathered from safe areas.

How Can I find Out More About Red Tide?
To find out about current Red Tide conditions and the health effects associated with Red Tide, call the Florida Red Tide Health Hotline at 1-888-232-8635. This is a toll-free hotline available 24 hours and is staffed by health professionals. To report dead fish, call the Florida Fish and Wildlife Research Institute (FWRI) at 1-800-636-0511. You can also go to www.redtideonline.com for information and great links.

To speak to a health professional anytime, toll free, call the Florida Red Tide Health Hotline 1-888-232-8635

Breathe Easy During a Red Tide

This informational material was funded by the Florida Department of Health with cooperation from the Centers for Disease Control and Prevention.
HEALTH ADVISORY

AVOID WATER CONTACT IN IRON GATE AND COPCO RESERVOIRS

Pollution has resulted in high levels of blue-green algae that can produce harmful toxins. This has resulted in violations of the State’s water quality standards

- Do not use this water for drinking or cooking
- Fish from these waters previously tested positive for an algal toxin. Limit or avoid consuming fish as the risk to human health is being evaluated by public health agencies
- Do not consume fish innards, and wash fillets with drinking water

Children and pets are at greatest risk

For more information contact staff at:
North Coast Regional Water Quality Control Board
(707) 576-2220

From California

Animal Safety Alert
BLUE-GREEN ALGAE BLOOMS
When in doubt, it’s best to keep out!

What is a blue-green algae bloom?
Cyanobacteria, sometimes called blue-green algae, are microscopic organisms found naturally in all types of water.
- Blue-green algae grow quickly, or bloom, when the water is warm, stagnant, and full of nutrients. Algae blooms usually occur during the summer and fall. However, they can occur anytime during the year.
- When a bloom occurs, scum might float on the water’s surface.
- Blooms come in different colors, from green or blue to red or brown.
- As the bloom dies off, you may smell an odor like rotting plants.

What is a toxic bloom?
Sometimes, blue-green algae produce toxins.
- The toxins can be present in the algae or in the water.
- Swallowing water with algae that are producing toxins can cause serious illness.
You cannot tell if a bloom is toxic just by looking at it.
Warning:
Lifeguard, bacteriologist, microbiologist, toxicologist not on duty.
Swim at your own risk.
Questions?
Florida Department of Health’s Aquatic Toxins Program: Responding to Public Health Impacts from Harmful Algal Blooms

Andrew Reich, MS, MSPH
Coordinator
Aquatic Toxins Program
Florida Department of Health
Tallahassee, Florida
Public Health
Protect and Promote Safety and Health of People
Susceptible Populations?

- Elderly
- Immuno-suppressed
- Underlying disease: Asthma
- Pregnant women, fetus
- Children
- People with extended exposure periods
Harmful Algal Blooms (HABs)

Microscopic organisms, *mostly*
- Dinoflagellates
- Diatoms
- Blue-green algae

Blooms
- Exuberant growth

Toxins
- No taste or smell
- Heat, Acid stable
Major HAB-related Events in the Coastal U.S.

- Cyanobacteria
- Neurotoxic Shellfish Poisoning
- Paralytic Shellfish Poisoning
- Amnesic Shellfish Poisoning
- Ciguatera Fish Poisoning
- Pfiesteria complex
- Brown Tide
- Macroalgae proliferation
- Fish, bird, mammal & submerged aquatic vegetation kills

Source: WHOI / NOAA
Potential Exposure Pathways

- Direct Skin Contact
- Ingestion of Food
- Incidental Ingestion
- Drinking Water
- Inhalation of Aerosols
Marine HAB-Related Illness

- **Paralytic Shellfish Poisoning (PSP)**
  Saxitoxin (*Pyrodinium bahamense*)

- **Neurotoxic Shellfish Poisoning (NSP)**
  Brevetoxin (*Karenia brevis*)

- **Diarrheic Shellfish Poisoning (DSP)**
  Okadaic Acid (*Prototheca spp*)

- **Amnesiac Shellfish Poisoning (ASP)**
  Domoic Acid (*Pseudonitzschia spp*)
Marine HAB-Related Illness

- Ciguatera Fish Poisoning
  Ciguatoxins (*Gambierdiscus toxicus*)

- Puffer Fish Poisoning
  Saxitoxins (*Pyrodinium bahamense*)

- Respiratory Illness
  aerosolized Brevetoxins (*Karenia brevis*)
Fl. Fish and Wildlife HAB Data, 2011

Sample Information

- **Date**: 11/23/2011
- **Agency**: FWC-Fish and Wildlife Research Institute
- **Location**: Bartell Bay, 20.7 miles W of
- **Latitude-dd**: 26.05333
- **Longitude-dd**: -82.0631
- **County**: Collier
- **Karenia brevis**: High
Regulated Shellfish Harvesting Areas
Neurotoxic Shellfish Poisoning (NSP)

- From recreationally harvested shellfish
Ciguatera Fish Poisoning

(*Gambierdiscus toxicus*)
Fish Types Implicated in Outbreaks

Source of Fish
Saxitoxin Puffer Fish Poisoning

(Pyrodinium bahamense)
Freshwater HABs

Blue Green Algae (Cyanobacteria)

*Microcystis, Cylindrospermopsis, Anabaena, Planktothrix*

*Aphanizomenon, Lyngbya wolfei, Oscillatoria, others?*
Cyanobacteria Blooms in Florida
Florida’s Surface Drinking Water Resources

10-15% of Florida’s population utilizes surface water supplies for drinking water.

Floridan Aquifer unable to meet projected demands for 2020.
Olga Water Treatment Plant,
Caloosahatchee River, Lee County
Gulf of Mexico Harmful Algal Bloom Bulletin
Region: Southwest Florida
Monday, 15 July 2013
NOAA National Ocean Service
NOAA National Weather Service

Conditions Report
*K. brevis* (commonly known as Florida red tide) ranges from not present to background concentrations along the coast of southwest Florida, including the Florida Keys. No respiratory irritation is expected Monday, July 15 through Monday, July 22. Check http://tidesandcurrents.noaa.gov/hab/beach_conditions.html for recent, local observations.

Analysis
Two recent samples, one collected at Mullet Key in Pinellas County and the other at Panama City Beach in Bay County, contained background concentrations of *K. brevis* (FWRI, 7-6-9). All other samples collected alongshore and offshore southwest Florida, from Pinellas to Monroe County, including the Florida Keys, did not indicate the presence of *K. brevis* (FWRI, MMSL, 7-8-710).

MODIS Aqua imagery has been obscured by clouds alongshore southwest Florida over the last several days limiting analysis. MODIS Aqua imagery from July 12 (shown left) does not indicate elevated levels of chlorophyll alongshore the visible portions of Sarasota County. Harmful algal bloom formation alongshore southwest Florida is not expected today through Monday, July 22.

**Wind Analysis**
Southwest Florida: Easterly winds (5-15 km, 3-8 m/s) today through Wednesday. North- easterly winds (10 km, 5 m/s) Thursday and easterly winds (5 km) Thursday night South- easterly winds (5 km) Friday becoming southeasterly in the afternoon.

To see previous bulletins and forecasts for other Harmful Algal Bloom Bulletin regions, visit http://tidesandcurrents.noaa.gov/hab/bulletin.html

Inland HABs Conditions Report: Jan. 27, 2013

- Lake Apopka (Orange and Lake Counties) and Lake Hancock (Polk County) displayed high estimated elevated chlorophyll-a concentrations.
- Lake Harris and Lake Eustis (Lake County) displayed medium estimated elevated chlorophyll-a concentrations.

Microcystins Round Robin Study Available at FDEP

http://www.dep.state.fl.us/labs/biology/hab/index.htm

On the right side of the webpage, see "Highlights". The report is the second from the bottom on that list, "Microcystins Round Robin Study #2". The laboratories that participated in this round robin did so at their own expense and E-mail them for their contribution to this effort. Please contact Lori Wolfe, Environmental Manager, at loretta.wolfc@dep.state.fl.us if you have any questions or comments related to these studies.

Marine Update: *K. brevis* bloom off SW FL and the FL Keys

Red Tide Update - FWRI/FWC (Jan. 30): A bloom of *K. brevis* persists alongshore of SW Florida, with the highest concentrations detected alongshore and offshore of Charlotte County. Very low to medium concentrations were also detected alongshore of Sarasota and Collier counties and background to very low concentrations were detected in Tampa Bay (Pinellas and Manatee counties). Fish kills and respiratory irritation continue to be reported from Sarasota County south through Lee County.

See http://myfwc.com/media/2462760/midweek0130.pdf

NOAA Conditions Report (Jan. 31): Very low to high concentrations of *Karenia brevis* (commonly known as Florida Red Tide) are present along- and offshore southwest Florida from southern Pinellas to Collier County, as well as offshore the gulfside of the lower Florida Keys ... Over the past few days, reports of respiratory irritation were received from Sarasota and Charlotte counties. Reports of dead fish were received from Charlotte and Lee counties. To read the full NOAA conditions report, visit: http://tidesandcurrents.noaa.gov/hab/bulletins.html.
**Interpreting Moderate Resolution Imaging Spectroradiometer Data**

- The Moderate Resolution Imaging Spectroradiometer (MODIS) is deployed by NASA onboard the Terra (EOS AM) and Aqua (EOS PM) satellite. It passes over the earth, collecting new imagery every 1-2 days.

- This imagery is used as a surveillance tool. Data collected by the MODIS sensor are used to generate a chlorophyll-a index which is used to forecast harmful algal blooms. The results are not specific to any one HAB species and should be followed-up with onsite field observations. Data is only suggestive of a potential HAB event.

- MODIS uses a spectral band which is much coarser than MERIS, therefore only select larger water bodies in FL are visible using this technology.

- MODIS is better at depicting low to medium chlorophyll-a concentrations so once a potential bloom is depicted, a switch in algorithms may used to improve the visibility. MODIS has a few spectral bands which have higher resolution are more comparable to MERIS although these bands do not cover all of FL.

- Several environmental factors may affect how results can be interpreted. For example, areas with abundant aquatic vegetation may present with a high Chl-a index resulting in a false positive bloom reading.

- The sensor identifies biomass near the surface (in the upper few feet of water). As a result, it may underestimate the total biomass for blooms that are mixed or dispersed through the water column.

- While patches of red or warm colors may indicate higher chlorophyll-a concentrations, these data have not been verified in most cases using ground-truth methods.

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**Weather Conditions: 1/22/13 to 1/28/13**

- Temperature and Precipitation

To review HABs satellite reports in the Gulf of Mexico and marine waters visit the NOAA Harmful Algal Bloom Operational Forecast System bulletin archive at: [http://habsandcurrents.noaa.gov/hab/](http://habsandcurrents.noaa.gov/hab/)

**For Individual Weather Station Data**


**Questions about the bulletin or suggestions:** Contact

Andrew Reich, MS, MSPH
050-245-4107
andy_reich@doh.state.fl.us

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**January 27, 2013**

**MODIS True Color Image**

**Climate Maps for Temp and Precip**
Surveillance Tools

- Florida Poison Information Centers
  Tampa, Jacksonville, Miami

- Florida Reportable Disease System
  (Merlin)

- EpiCom

- Essence
  Syndromic Surveillance
  Includes Emerg. Dept, Urgent Care Centers
  Searchable via Chief Complaint Data
Florida Poison Information Centers

1-800-222-1222

- Staffed by doctors, nurses and pharmacists
- Speak with a poison specialist
- Free, confidential service: 24/7, 365
- 3 Centers receive 550-600 total calls/ day
- > 25,000 calls since 1998 on Aquatic Toxins
Section 381.0011 FS
Aquatic Toxins “Forum”
ESSENCE Participating Hospitals

Hospital Emergency Departments and Urgent Care Centers Reporting Data to Florida ESSENCE, 1/4/2011 (N=170)

- Reporting Hospitals
- Counties with Reporting Hospital(s)
  - YES
  - NO
“Feet on the Ground”

9 FDOH Regional Environmental Epidemiologists

4 FDOH Regional Consultant Epidemiologists

67 FDOH county offices!
Nursing, Physicians, Environmental Health, Epidemiology
Resource Guide for Public Health Response to HABs in Florida

## County Specific Information

### County Corner

#### Tackle Box for CHD HAB Response Development

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http://def.sharepoint.doh.ad.state.fl.us/DEH/default.aspx
Current Funding Acknowledgements:

- **CDC Cooperative Agreement to Enhance Surveillance of Risk Factors and Health Effects Related to Harmful Algal Blooms, #1 U38 EH000334-01**

- **National Science Foundation: Modeling the Dynamics of Harmful Algal Blooms, Human Communities, and the Social Choice of Behavioral and Policy Responses along the FL Gulf Coast, Award # 1009244**

- **NOAA/NASA: Monitoring and Forecasting Cyanobacterial Blooms for Public Health Protection and Response**
Questions?
Contact Information

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Centers for Disease Control and Prevention  
Phone: 770- 488-3426  
Email: lbacker@cdc.gov  

NCEH: [http://www.cdc.gov/nceh/hsb/hab/default.htm](http://www.cdc.gov/nceh/hsb/hab/default.htm)

Andy Reich, MS, MSPH  
Aquatic Toxins Disease Prevention Program  
Florida Department of Health  
Phone: 850-245-4187  
Email: Andy_Reich@doh.state.fl.us  

Aquatic Toxins Program:  
[http://doh.state.fl.us/environment/medicine/aquatic/index.html](http://doh.state.fl.us/environment/medicine/aquatic/index.html)
If you would like to obtain a participation certificate, type the link below into your web browser:


You can type each of the attendee’s names into the PDF and print the certificates.
Additional Resources

EPA HABs website: http://www2.epa.gov/nutrientpollution/harmful-algal-blooms

Facebook: https://www.facebook.com/EPAWaterIsWorthIt

Twitter: @EPAWater

Flickr: http://www.flickr.com/photos/usepagov/sets/72157634706332559/

State of the Environment blog: http://blog.epa.gov/epplocations/