Florida Red Tide (and Other Harmful Algal Blooms)

Project Findings, Respiratory Impacts and Public Health Response Strategies

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Water Toxins Program

Florida Department of Health Mission: To protect, promote and improve the health of all people in Florida through integrated state, county and community efforts.

Suncoast Pulmonary Symposium 2014

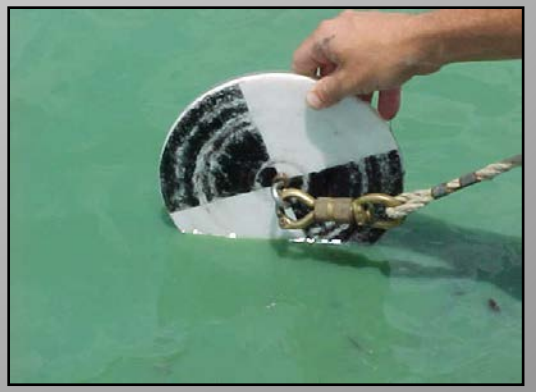
Public Health

Protect and promote health and safety of people

- Children
- Elderly
- Individuals with underlying illness
- Pregnant women, unborn 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



Potential Exposure Pathways

- Direct skin contact

- Ingestion of food

- Incidental ingestion

- Inhalation

Marine HAB-Related Illness

- Paralytic Shellfish Poisoning (PSP)*
  - ✓ Saxitoxin (*Pyrodinium bahamense*)
- Neurotoxic Shellfish Poisoning (NSP)*
  - ✓ Brevetoxin (*Karenia brevis*)
- Diarrheic Shellfish Poisoning (DSP)
  - ✓ Okadaic Acid (*Protocentrum* spp)
- Amnesiac Shellfish Poisoning (ASP)
  - ✓ Domoic Acid (*Pseudonitszchia* spp)

*Occurred in Florida

Florida HEALTH

Marine HAB-Related Illness

- Ciguatera Fish Poisoning (CFP)*
  - ✓ Ciguatoxins (*Gambierdiscus toxicus*)

- Puffer Fish Poisoning*
  - ✓ Saxitoxins (*Pyrodinium bahamense*)

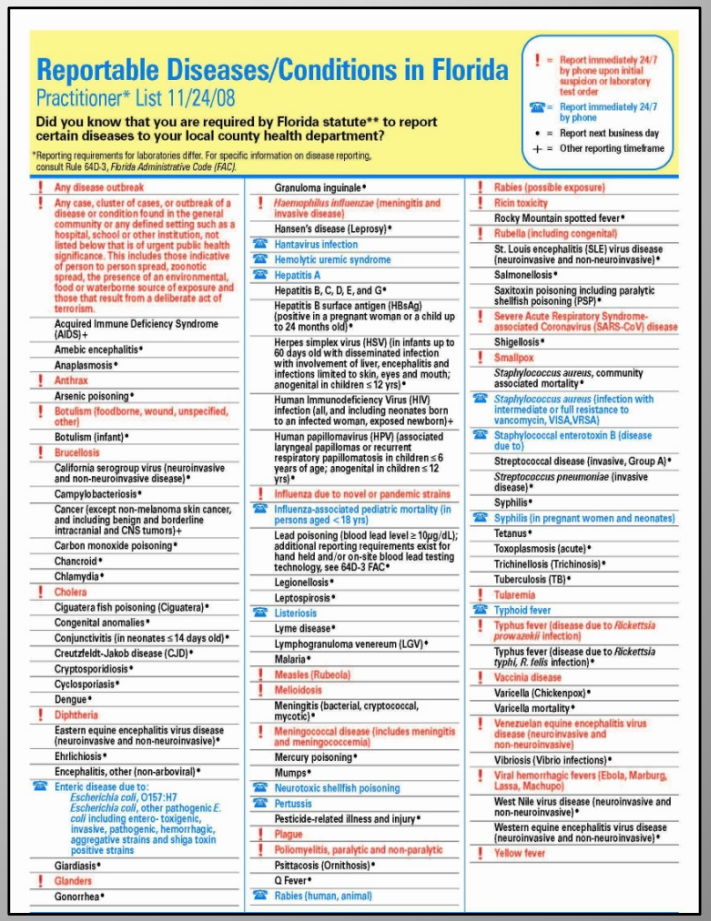
- Respiratory Illness*
  - ✓ Aerosolized Brevetoxins (*Karenia brevis*)

*Occurred in Florida

Florida HEALTH

Merlin: Reportable Diseases

- Authority in 381.0011 *F.S.*
- 3 HAB-related illnesses
  - ✓ CFP
  - ✓ NSP
  - ✓ PSP



Reportable Diseases/Conditions in Florida

Practitioner* List 11/24/08

Did you know that you are required by Florida statute to report certain diseases to your local county health department?**

*Reporting requirements for laboratories differ. For specific information on disease reporting, consult Rule 64D-3, *Florida Administrative Code (FAC)*.

! = Report immediately 24/7 by phone upon initial suspicion or laboratory test order
☎ = Report immediately 24/7 by phone
• = Report next business day
+ = Other reporting timeframe

- ! Any disease outbreak
- ! Any case, cluster of cases, or outbreak of a disease or condition found in the general community or any defined setting such as a hospital, school or other institution, not listed below that is of urgent public health significance. This includes those indicative of person to person spread, zoonotic spread, the presence of an environmental, food or waterborne source of exposure and those that result from a deliberate act of terrorism.
- Acquired Immune Deficiency Syndrome (AIDS)+
- Amebic encephalitis*
- Anaplasmosis*
- ! Anthrax
- Arsenic poisoning*
- ! Botulism (foodborne, wound, unspecified, other)
- Botulism (infant)*
- ! Brucellosis
- California serogroup virus (neuroinvasive and non-neuroinvasive disease)*
- Campylobacteriosis*
- Cancer (except non-melanoma skin cancer, and including benign and borderline intracranial and CNS tumors)+
- Carbon monoxide poisoning*
- Chancroid*
- Chlamydia*
- ! Cholera
- Ciguatera fish poisoning (Ciguatera)*
- Congenital anomalies*
- Conjunctivitis (in neonates ≤ 14 days old)*
- Creutzfeldt-Jakob disease (CJD)*
- Cryptosporidiosis*
- Cyclosporiasis*
- Dengue*
- ! Diphtheria
- Eastern equine encephalitis virus disease (neuroinvasive and non-neuroinvasive)*
- Ehrlichiosis*
- Encephalitis, other (non-arboviral)*
- ☎ Enteric disease due to: *Escherichia coli*, O157:H7 *Escherichia coli*, other pathogenic *E. coli* including entero- toxigenic, invasive, pathogenic, hemorrhagic, aggregative strains and shiga toxin positive strains
- Giardiasis*
- ! Glanders
- Gonorrhea*
- Granuloma inguinale*
- ! *Haemophilus influenzae* (meningitis and invasive disease)
- Hansen's disease (Leprosy)*
- ☎ Hantavirus infection
- ☎ Hemolytic uremic syndrome
- ☎ Hepatitis A
- Hepatitis B, C, D, E, and G*
- Hepatitis B surface antigen (HBsAg) (positive in a pregnant woman or a child up to 24 months old)*
- Herpes simplex virus (HSV) (in infants up to 60 days old with disseminated infection with involvement of liver, encephalitis and infections limited to skin, eyes and mouth; anogenital in children ≤ 12 yrs)*
- Human Immunodeficiency Virus (HIV) infection (all, and including neonates born to an infected woman, exposed newborn)+
- Human papillomavirus (HPV) (associated laryngeal papillomas or recurrent respiratory papillomatosis in children ≤ 6 years of age; anogenital in children ≤ 12 yrs)*
- ! Influenza due to novel or pandemic strains
- ☎ Influenza-associated pediatric mortality (in persons aged < 18 yrs)
- Lead poisoning (blood lead level ≥ 10µg/dL); additional reporting requirements exist for hand held and/or on-site blood lead testing technology, see 64D-3 FAC*
- Legionellosis*
- Leptospirosis*
- ☎ Listeriosis
- Lyme disease*
- Lymphogranuloma venereum (LGV)*
- Malaria*
- ! Measles (Rubeola)
- ! Melioidosis
- Meningitis (bacterial, cryptococcal, mycotic)*
- ! Meningococcal disease (includes meningitis and meningococcemia)
- Mercury poisoning*
- Mumps*
- ☎ Neurotoxic shellfish poisoning
- ☎ Pertussis
- Pesticide-related illness and injury*
- ! Plague
- ! Poliomyelitis, paralytic and non-paralytic
- Psittacosis (Ornithosis)*
- Q Fever*
- ☎ Rabies (human, animal)
- ! Rabies (possible exposure)
- ! Ricin toxicity
- Rocky Mountain spotted fever*
- ! Rubella (including congenital)
- St. Louis encephalitis (SLE) virus disease (neuroinvasive and non-neuroinvasive)*
- Salmonellosis*
- Saxitoxin poisoning including paralytic shellfish poisoning (PSP)*
- ! Severe Acute Respiratory Syndrome-associated Coronavirus (SARS-CoV) disease
- Shigellosis*
- ! Smallpox
- *Staphylococcus aureus*, community associated mortality*
- ☎ *Staphylococcus aureus* (infection with intermediate or full resistance to vancomycin, VISA,VRSA)
- ☎ Staphylococcal enterotoxin B (disease due to)
- Streptococcal disease (invasive, Group A)*
- *Streptococcus pneumoniae* (invasive disease)*
- Syphilis*
- ☎ Syphilis (in pregnant women and neonates)
- Tetanus*
- Toxoplasmosis (acute)*
- Trichinellosis (Trichinosis)*
- Tuberculosis (TB)*
- ! Tularemia
- ☎ Typhoid fever
- ! Typhus fever (disease due to *Rickettsia prowazekii* infection)
- Typhus fever (disease due to *Rickettsia typhi, R. felis* infection)*
- ! Vaccinia disease
- Varicella (Chickenpox)*
- Varicella mortality*
- ! Venezuelan equine encephalitis virus disease (neuroinvasive and non-neuroinvasive)
- Vibriosis (Vibrio infections)*
- ! Viral hemorrhagic fevers (Ebola, Marburg, Lassa, Machupo)
- West Nile virus disease (neuroinvasive and non-neuroinvasive)*
- Western equine encephalitis virus disease (neuroinvasive and non-neuroinvasive)*
- ! Yellow fever

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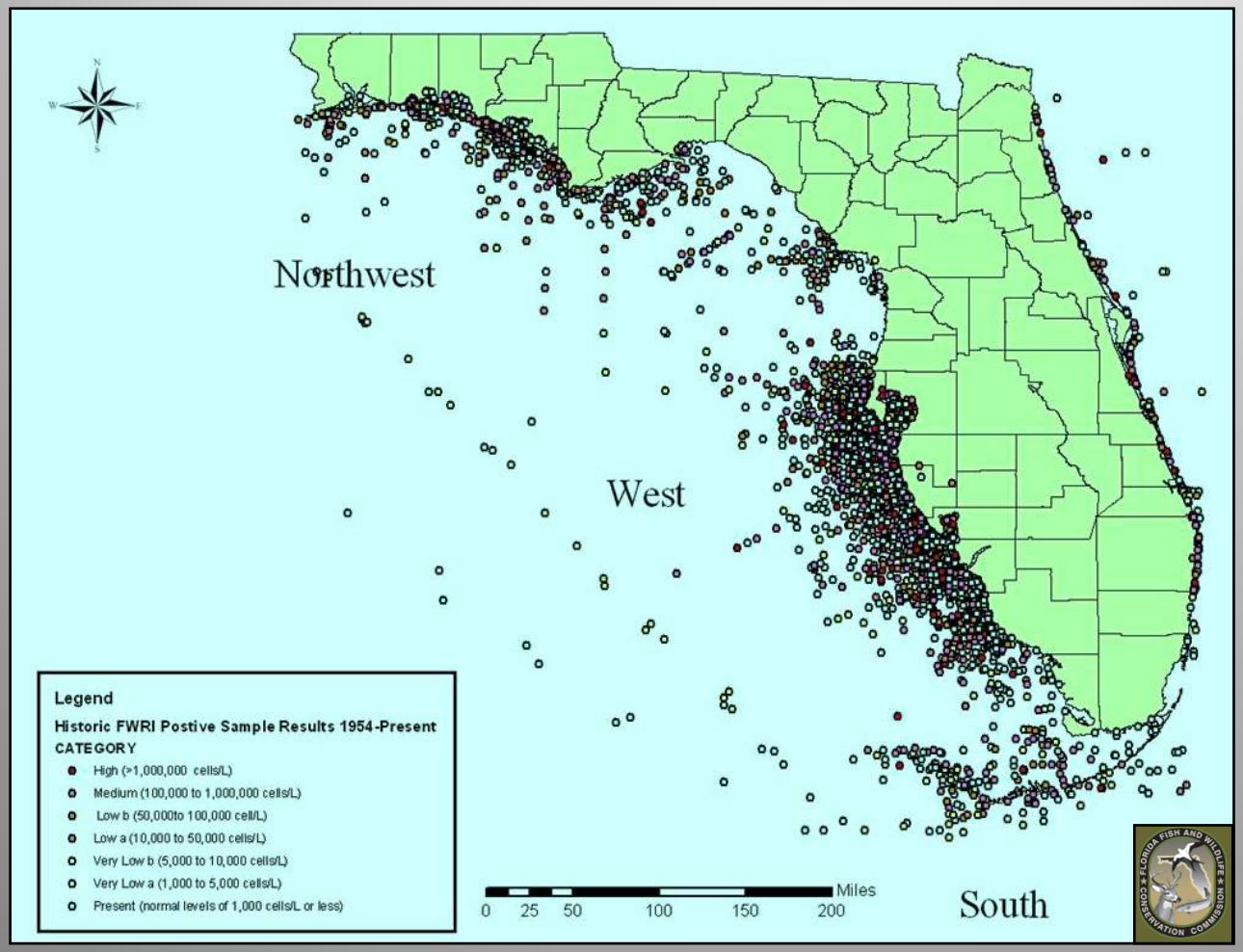
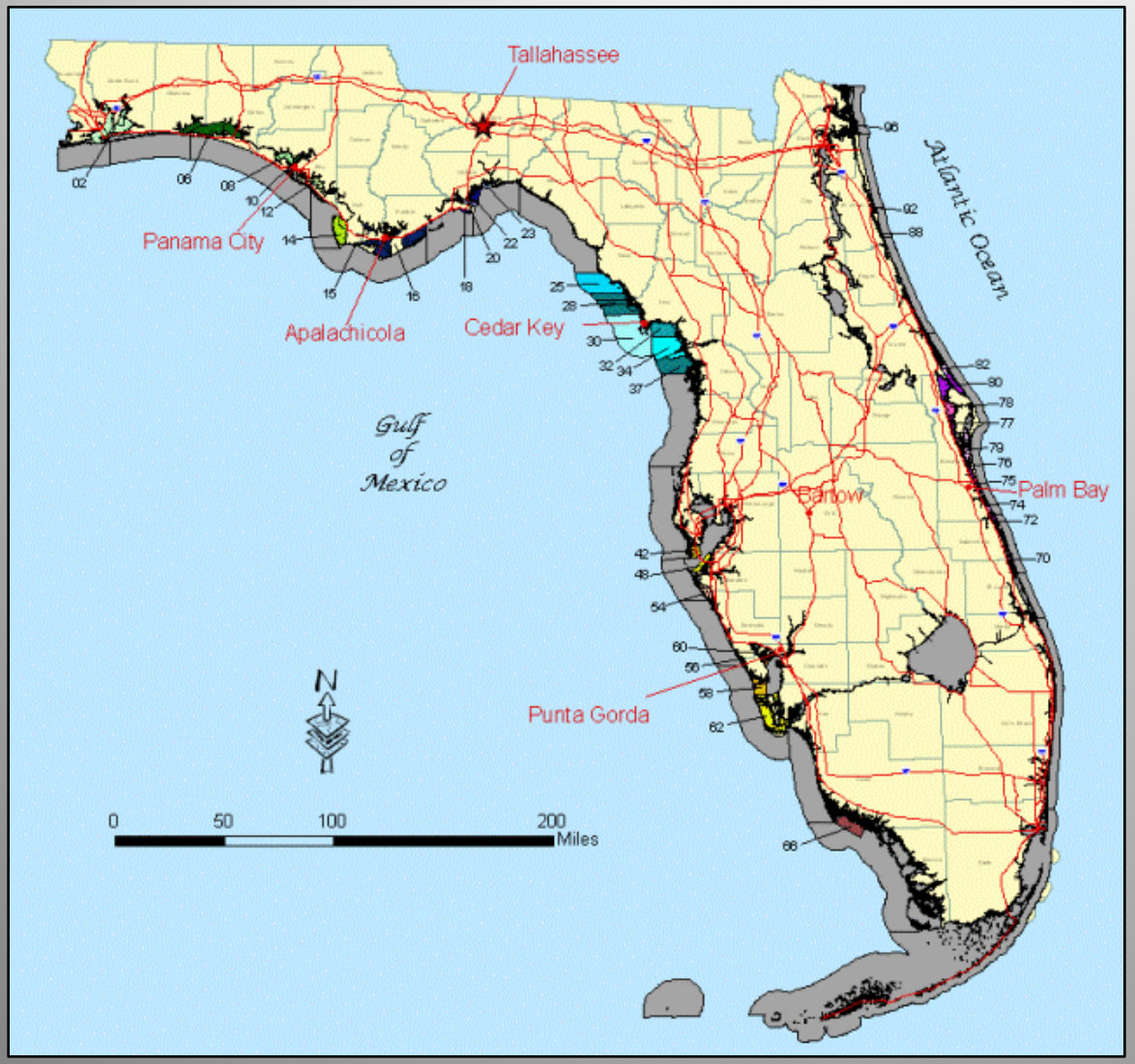
Florida Red Tide

Positive Samples, 1954 to Present



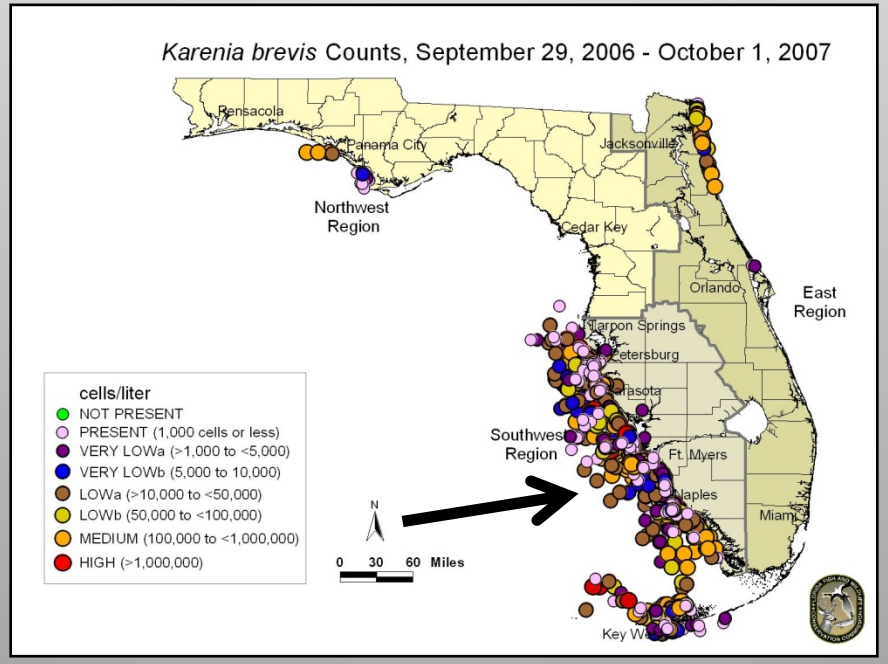
Shellfish Harvesting Areas



- Regulated by Florida Department of Agriculture and Consumer Services
- 1,200 sampling stations
- 38 harvesting areas
- 1.4 million acres

Neurotoxic Shellfish Poisoning

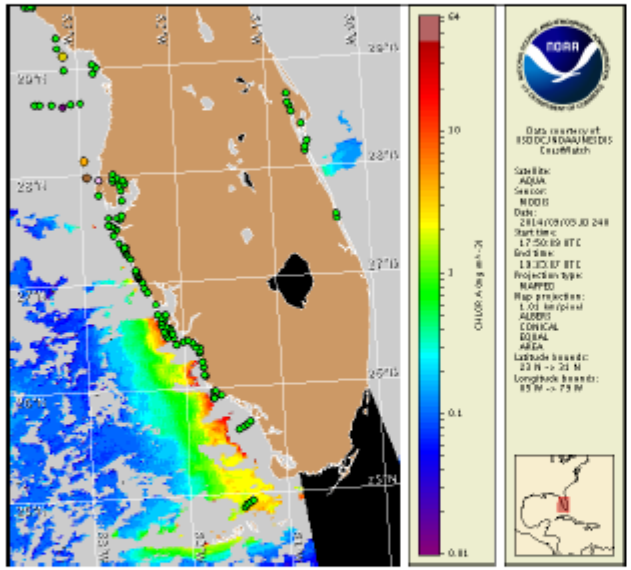
Outbreaks in 1995, 1996, 2001, 2005, 2006;
all from recreationally harvested shellfish



NOAA Gulf of Mexico Harmful Algal Bloom Bulletin

Gulf of Mexico Harmful Algal Bloom Bulletin

Region: Southwest Florida
Monday, 08 September 2014
NOAA National Ocean Service
NOAA Satellite and Information Service
NOAA National Weather Service
Last bulletin: Tuesday, September 2, 2014



Satellite chlorophyll image with possible *K. brevis* HAB areas shown by red polygon(s), when applicable. Points represent cell concentration sampling data from August 29 to September 4: red (high), orange (medium), yellow (low b), brown (low a), blue (very low b), purple (very low a), pink (present), and green (not present). Cell count data are provided by Florida Fish and Wildlife Conservation Commission (FWC) Fish and Wildlife Research Institute. For a list of sample providers and a key to the cell concentration categories, please see the HAB-OFS bulletin guide:
http://tidesandcurrents.noaa.gov/hab/habfs_bulletin_guide.pdf

Detailed sample information can be obtained through FWC Fish and Wildlife Research Institute at:
http://myfwc.com/redtidestatus

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

Conditions Report

Karenia brevis (commonly known as Florida red tide) ranges from not present to background concentrations along the coast of southwest Florida and is not present in the Florida Keys. *K. brevis* ranges from not present to medium concentrations offshore the coast of west Florida. No respiratory irritation is expected alongshore west Florida Monday, September 8 through Thursday, September 11. If field observations confirm *K. brevis* concentrations at the coast, this forecast will be updated prior to September 11.

Check http://tidesandcurrents.noaa.gov/hab/beach_conditions.html for recent, local observations. Over the past several days, reports of dead fish have been received from offshore Levy, Citrus and Pasco counties and offshore and alongshore some portions of northern Pinellas County.

Analysis

As of today, September 8, southwest Florida bulletins will be issued twice weekly on Mondays and Thursdays due to the presence of Karenia brevis concentrations nearshore.

Dixie to Pinellas County: Recent samples collected along- and offshore west Florida over the past ten days identified not present to 'medium' concentrations of *Karenia brevis*. The highest *K. brevis* concentrations identified were 'low b' approximately 3 miles west of Cedar Key in Levy County and 'medium' approximately 7 miles west of Anclote Key in northern Pinellas County (FWRI; 8/29-9/4). Samples collected between August 28 and September 2 offshore west Florida identified up to 'high' *K. brevis* concentrations 15-50 miles offshore Hernando and Pasco counties, with the highest concentrations collected at depth approximately 18 miles west of Bayonet Point in southern Pasco County (FWRI). Several samples collected alongshore Dixie, Levy and Pinellas counties all indicate that *K. brevis* is not present at the coast, with the exception of one sample indicating background concentrations at Clearwater Pass in northern Pinellas County (FWRI; 8/28-9/4).

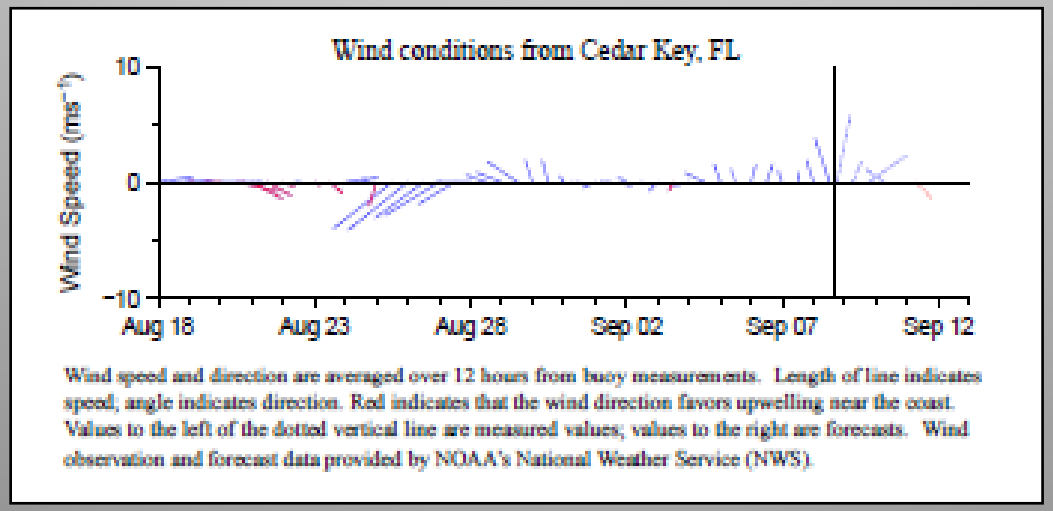
Dead fish continue to be observed in the sampling area of the bloom and have been reported offshore Levy, Citrus and Pasco counties and offshore and alongshore some portions of northern Pinellas County (FWRI; 9/1-5). Some reports of dead fish received last week from Pasco and northern Pinellas counties were accompanied by reports of respiratory irritation (FWRI; 9/3-4). However, no observations of respiratory irritation have been reported from the Pinellas County stations within Mote Marine Laboratory's Beach Conditions Reporting System (9/1-8).

Recent MODIS Aqua imagery (9/5, shown left) is obscured by clouds along- and offshore from Dixie to Pinellas counties, limiting analysis. A distinct bloom feature has not been visible in satellite imagery (9/2-4, not shown) and confirmed by cell concentrations, most likely due to increasing patchiness and the presence of concentrations below 100,000 cells/L.

Over the past few days, observed winds may have promoted northerly transport of the offshore surface *K. brevis* concentrations. Forecasted southeast to east winds over the next several days may continue to promote northerly transport of the surface *K. brevis*

NOAA Gulf of Mexico Harmful Algal Bloom Bulletin

… **reports of respiratory irritation** onshore in some parts of northern Pinellas County and **continued respiratory irritation in this area may be possible**. Today through Thursday, September 11, predominantly **offshore winds** forecasted through Thursday will **minimize the potential for respiratory irritation impacts at the coast** …

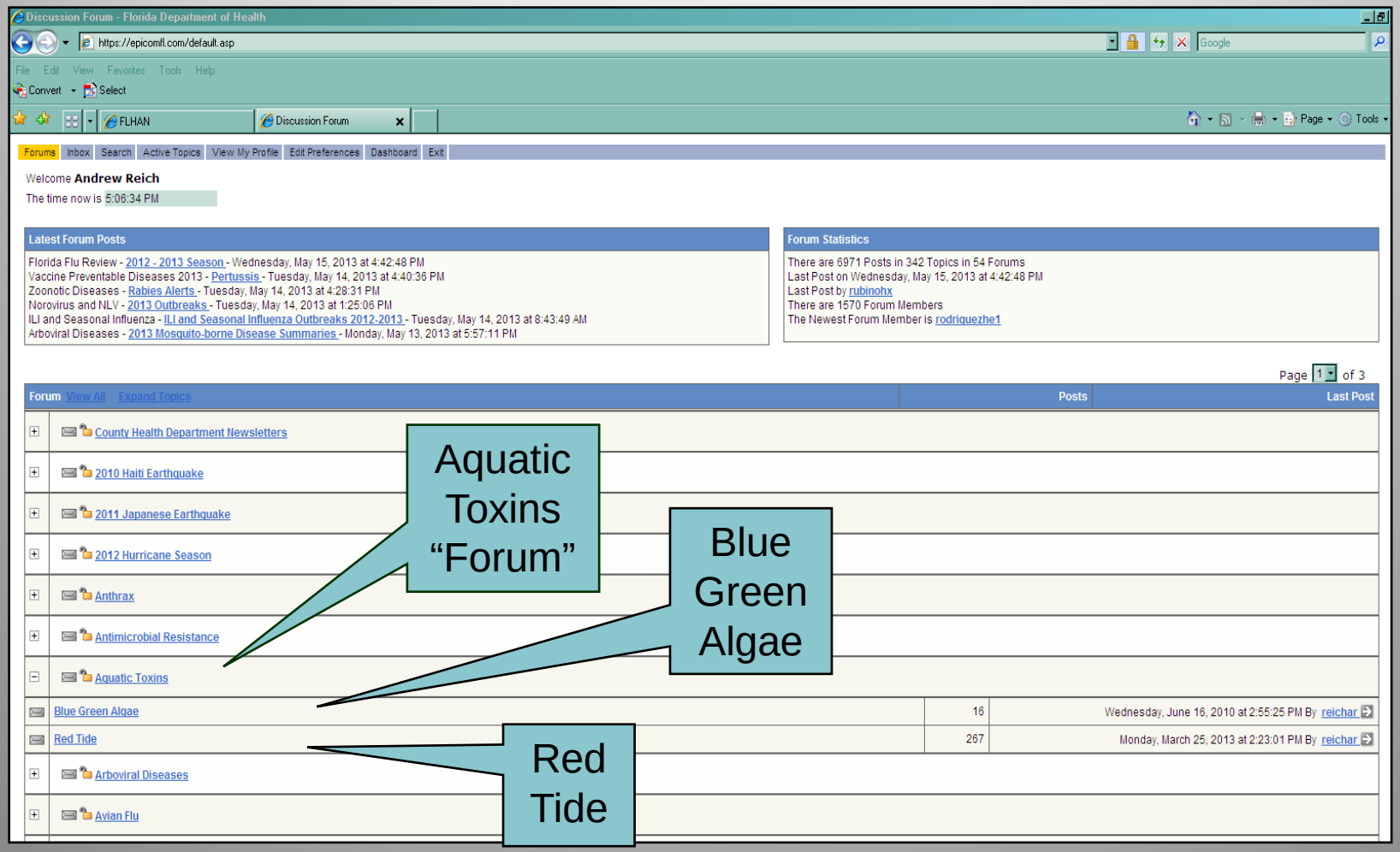


DOH EpiCom System

- EpiCom web board
  - ✓ Part of Everbridge ServFL, an online system for managing public health and medical disaster responders
- Immediate, real-time exchange of information
  - ✓ Disease outbreaks, incidents
- Subscribers: health care practitioners in Florida
  - ✓ Physicians, county health departments, etc.
- All postings reviewed by moderator
- Restricted access via username/password

Florida HEALTH

DOH EpiCom System



DOH EpiCom System

Automatic email to subscribers (600 registered)
Subject: New Post Forum: Aquatic Toxins

Gulf of Mexico Harmful Algal Bloom Bulletin

Conditions Report: The highest level of potential respiratory irritation forecast for Thursday, December 5 to Monday, December 9 is listed below:

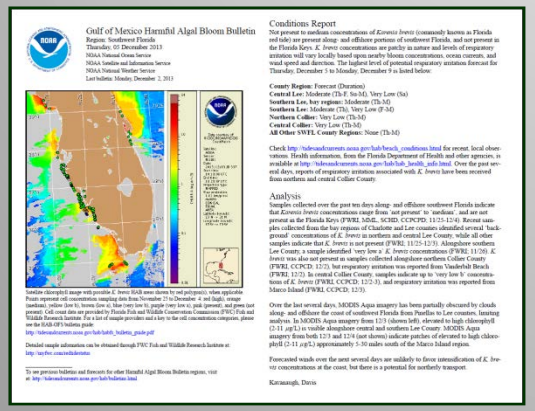
Central Lee: Moderate (Th-F, Su-M), Very Low (Sat)
Southern Lee
Southern Lee
Northern Collier: Very Low (Th-M)
Central Collier: Very Low (Th-M)
All Other SWFL County Regions: None (Th-M)

Archived Bulletin

Over the past several days, reports of respiratory irritation associated with *K. brevis* have been received from northern and central Collier County.

DOH EpiCom System

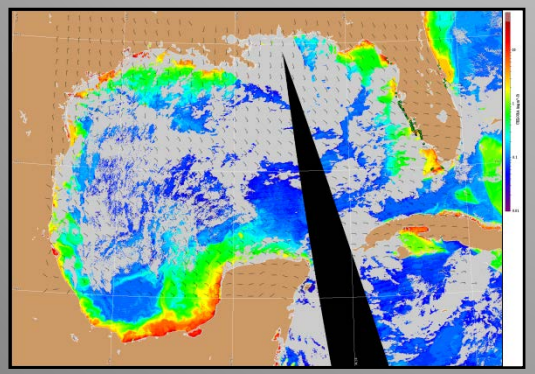
- NOAA HAB bulletin attached in EpiCom
- Information on health effects from harmful algal blooms found on DOH website

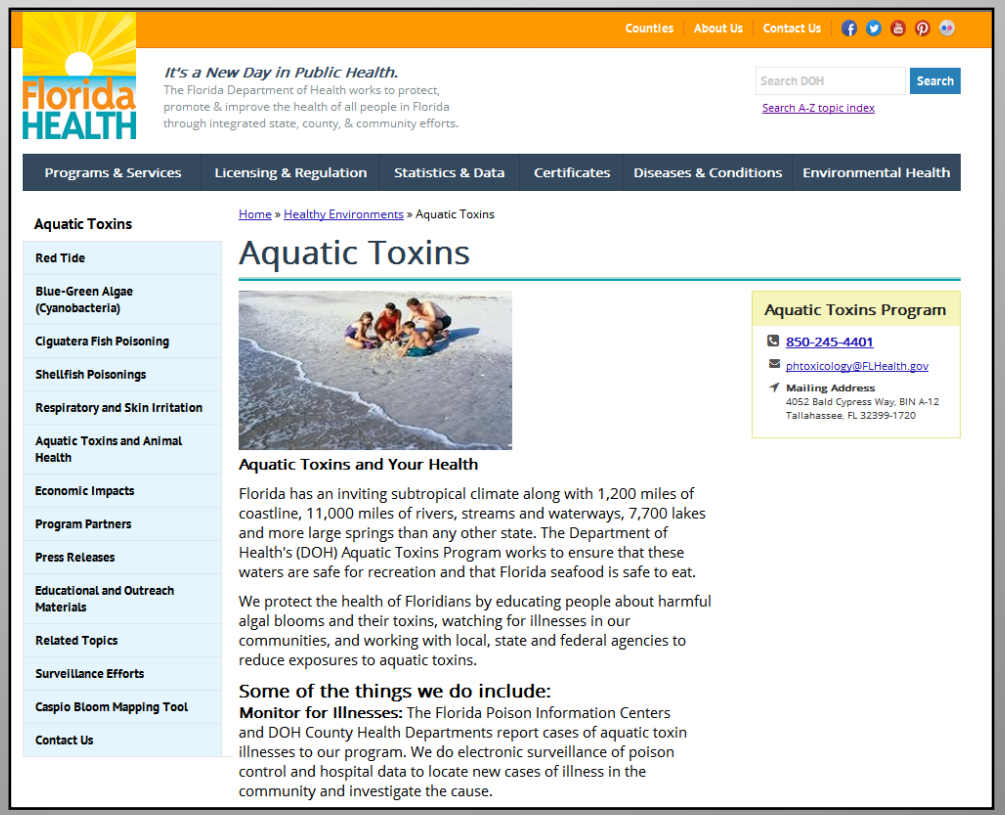


Gulf of Mexico Harmful Algal Bloom Bulletin

Conditions Report

Analysis





Florida HEALTH

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It's a New Day in Public Health.

The Florida Department of Health works to protect, promote & improve the health of all people in Florida through integrated state, county, & community efforts.

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Aquatic Toxins

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- Respiratory and Skin Irritation
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Aquatic Toxins

Aquatic Toxins and Your Health

Florida has an inviting subtropical climate along with 1,200 miles of coastline, 11,000 miles of rivers, streams and waterways, 7,700 lakes and more large springs than any other state. The Department of Health's (DOH) Aquatic Toxins Program works to ensure that these waters are safe for recreation and that Florida seafood is safe to eat.

We protect the health of Floridians by educating people about harmful algal blooms and their toxins, watching for illnesses in our communities, and working with local, state and federal agencies to reduce exposures to aquatic toxins.

Some of the things we do include:

Monitor for Illnesses: The Florida Poison Information Centers and DOH County Health Departments report cases of aquatic toxin illnesses to our program. We do electronic surveillance of poison control and hospital data to locate new cases of illness in the community and investigate the cause.

Aquatic Toxins Program

850-245-4401

phtoxicology@FLHealth.gov

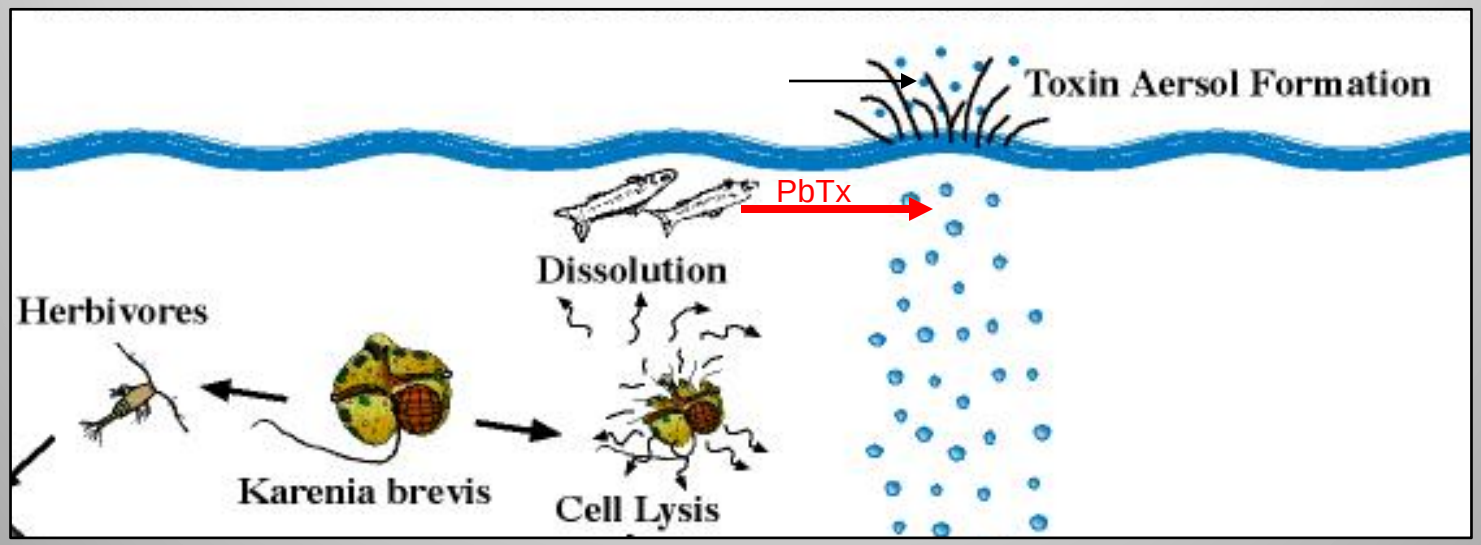
Mailing Address
4052 Bald Cypress Way, BIN A-12
Tallahassee, FL 32399-1720

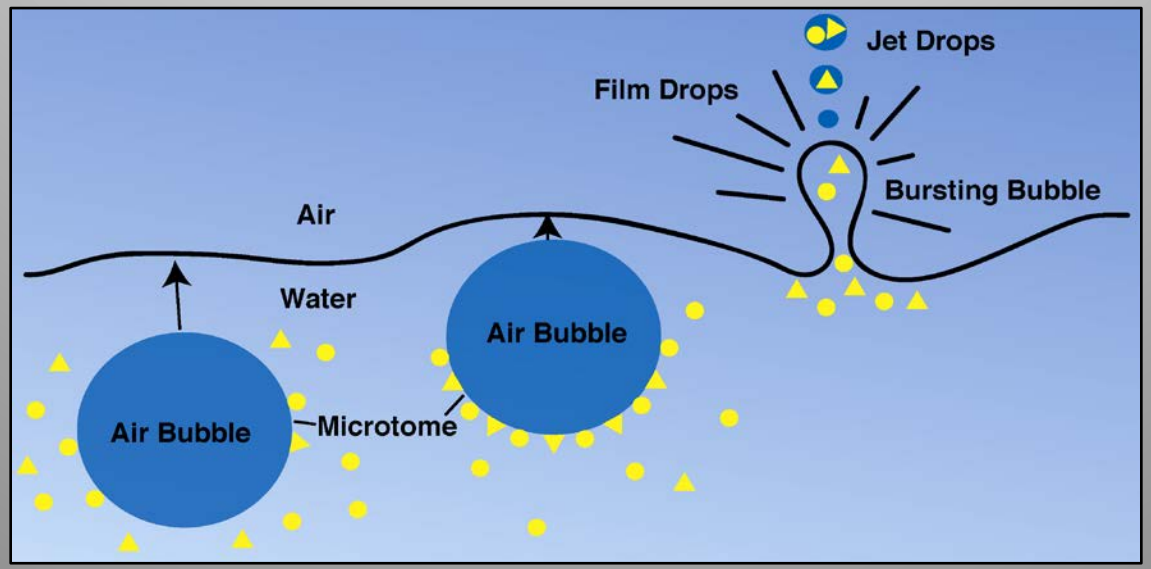
Florida HEALTH

Florida Red Tide Inhalation Studies

- Animal
- Occupational
- Asthma
- Emergency room
- Inland
- Follow-up

Bubble-mediated Transport





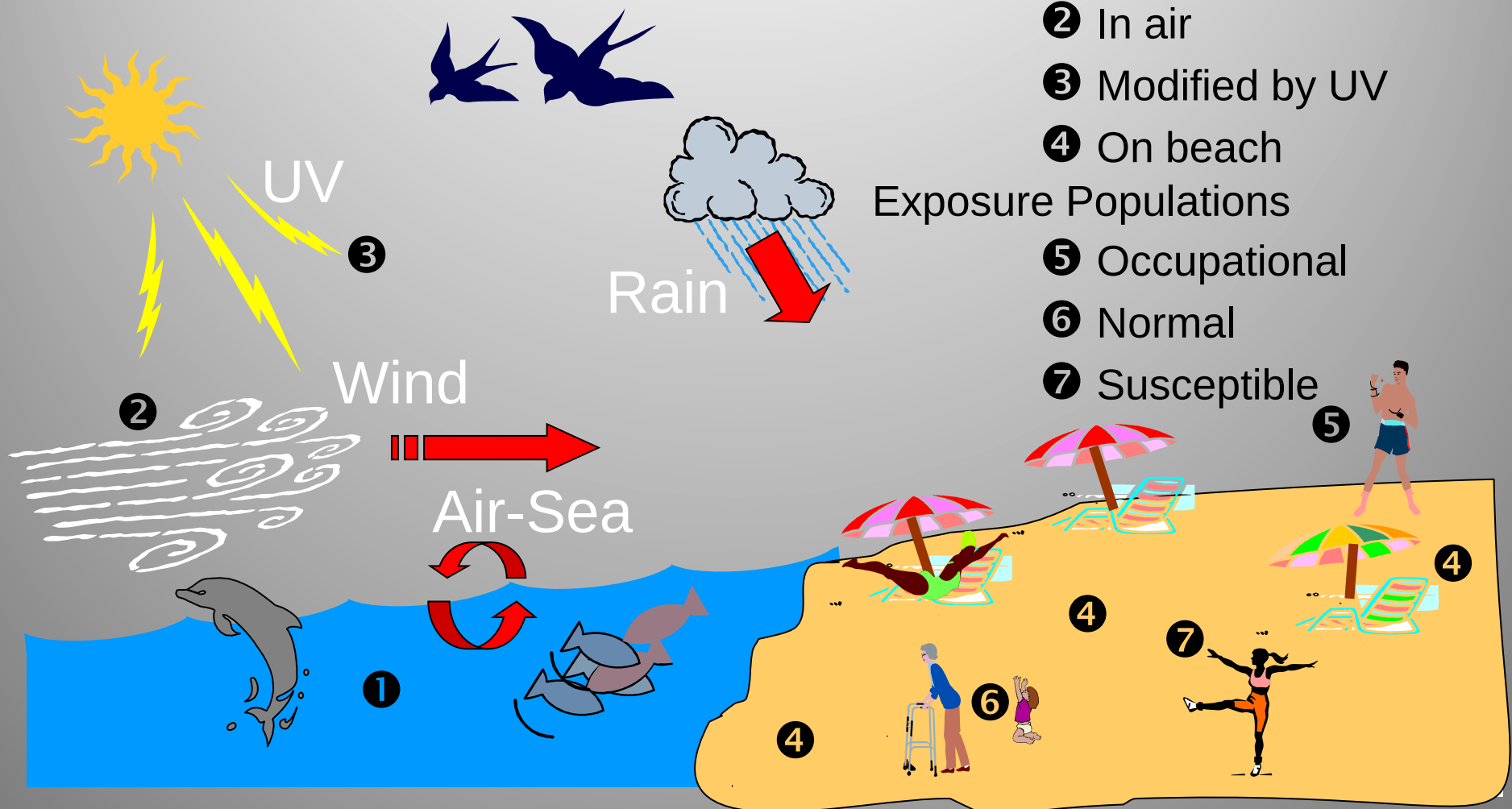
Study Design

Toxin Presence

- ❶ In water/cell counts
- ❷ In air
- ❸ Modified by UV
- ❹ On beach

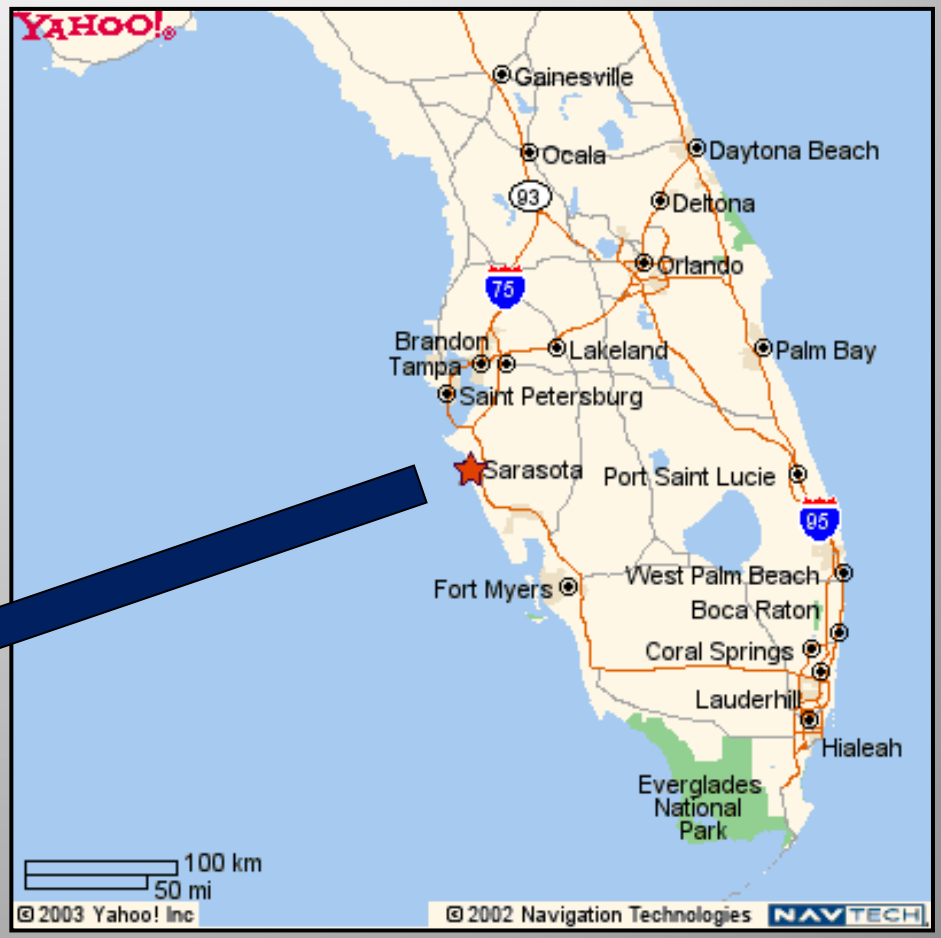
Exposure Populations

- ❺ Occupational
- ❻ Normal
- ❼ Susceptible



Study Site

Siesta Key



Collaborators

Centers for Disease Control and Prevention

Florida Department of Health

Harbor Branch Oceanographic Institution

Lovelace Respiratory Research Institute

Mote Marine Laboratory

Mount Sinai Medical Center

Twin Cities Hospital

University of Miami Epidemiology

Univ. of North Carolina-Wilmington Center for Marine Science

University of Cincinnati Biostatistics

University of Miami Pulmonary Medicine

Animal Studies

Wells et al. (1984). Increased airway resistance in guinea pigs with inhaled brevetoxins

Singer et al.(1998) and Abraham et al. (2001). Asthmatic sheep, picogram doses of PbTx-3 causes increased airway resistance

Benson et al. (1999). Rats: intratracheal instillation of PbTx-3; 80% rapidly cleared through lung, 20% retained in lung, liver and blood for up to 7 days

Environmental Conditions

- Documented environmental exposures to airborne red tide toxins
  - ✓ Cells and toxins in water
  - ✓ Toxins in the air (picogram doses)
  - ✓ Wind speed and direction important
  - ✓ Particulate size (20% respirable)

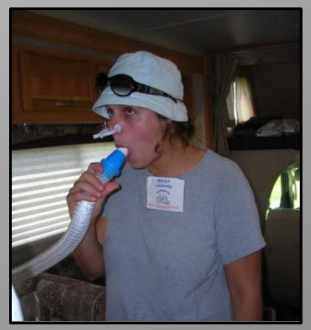
Occupational

No significant change in spirometry during red tide.

Significant for increased upper airway symptoms during red tide (cough, throat irritation, eye tearing).

Asthma

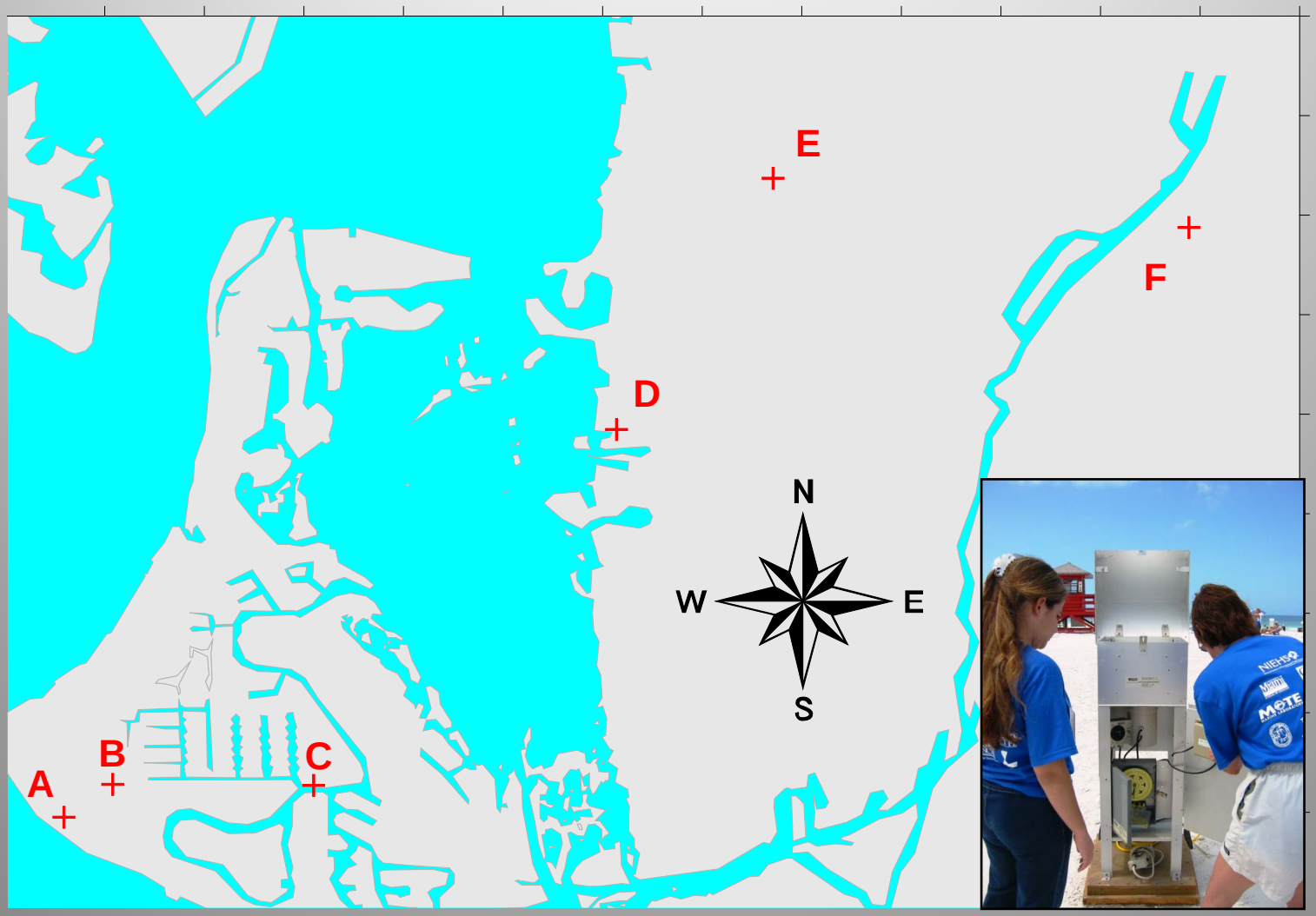
- Non-exposure
  - ✓ No significant changes for symptoms and spirometry
- 1 hour exposure
  - ✓ Significant changes for upper and lower airway symptoms
  - ✓ Significant changes in air flow as measured by spirometry in asthmatics
    - ✓ Medications > No Medications
    - ✓ Coastal > Inland



Emergency Room

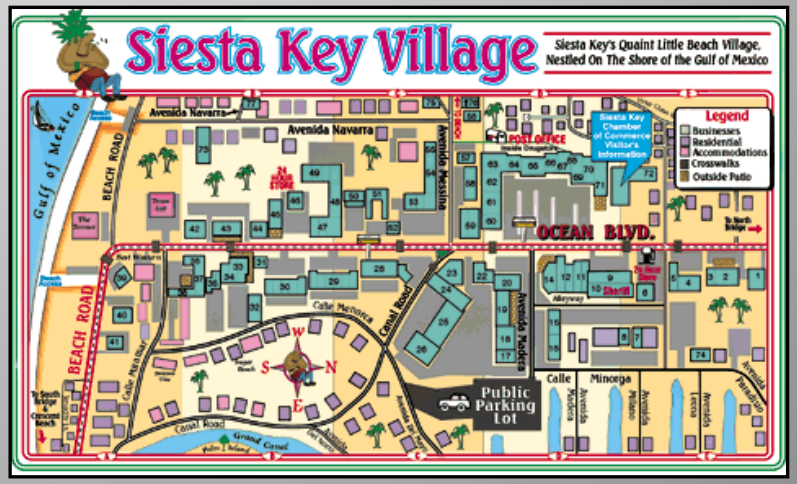
- Overall no significant change in admissions for 2 periods: with and without red tide
- 19% increase in pneumonia during red tide
- When separated by ZIP Code
  - ✓ Coastal residents: 54% increase in admissions compared to non red tide
  - ✓ Pneumonia 31%, bronchitis 56%, asthma 44%, and upper airway disease 64%

Inland



Inland

- Distance toxins travel variable yet do travel inland
- Amount of toxin variable by day and location (wind speed/direction)
- Exposure not ended by leaving beach



Follow-Up

- Research questions
  - ✓ Are maximum effects being captured immediately after people come off the beach?
    - ✓ Yes, indicated by data
  - ✓ Is there a latent response?
    - ✓ Not indicated by data
  - ✓ Do effects subside shortly after leaving the beach?
    - ✓ Number of symptoms gradually subside over a 5-day period

- The 1-hour exposure at the beach appears to trigger respiratory response.

Funding Sources

- CDC/FL DOH Cooperative Agreement U50/CCU423360-02
- NIH/NIEHS PO1 ES 10594

Review Article

Review of Florida red tide and human health effects

Contents lists available at ScienceDirect

Harmful Algae

journal homepage: www.elsevier.com/locate/hal

Harmful Algae 10 (2011) 224–233

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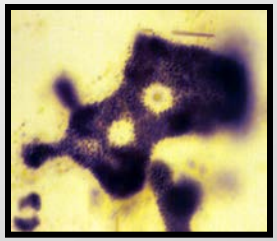
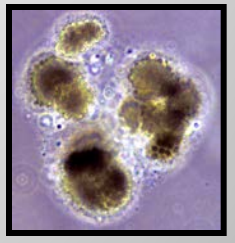
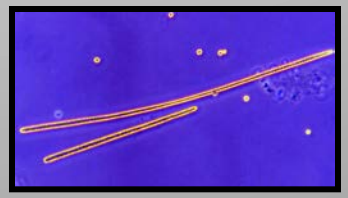
Cyanobacteria in Florida

- *Microcystis*
- *Cylindrospermopsis*
- *Anabaena*
- *Planktothrix*
- *Aphanizomenon*
- *Lyngbya wollei*
- *Oscillatoria*






Florida's Drinking Water

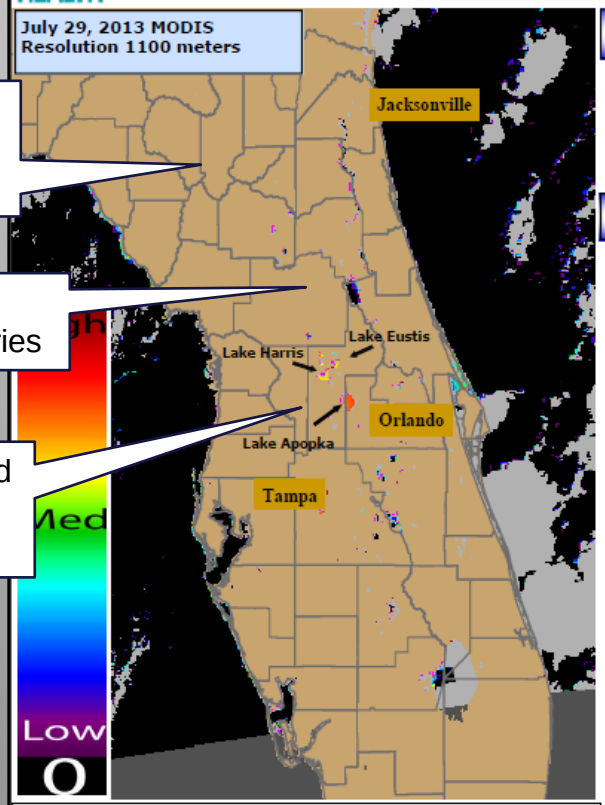
- 10-15% of Florida's population use surface water supplies for drinking water.
- The Floridan Aquifer is unable to meet projected demands for 2020

Cyanobacteria Blooms in Florida

DOH Inland HAB Health Bulletin

Inland Harmful Algal Blooms Health Bulletin: August 1, 2013

To report an illness related to a marine toxin or algal bloom contact the Florida Poison Information Center at 1-800-222-1222.
Images/data obtained from Florida Fish and Wildlife Research Institute, Florida Water Management Districts, National Oceanic and Atmospheric Administration (NOAA), NOAA National Climatic Data Centers and National Weather Centers. Support to produce this report from NOAA/NASA Contract NNH08ZDA001N.



MODIS Images display a chlorophyll-a index generated with a Moderate Resolution Imaging Spectroradiometer provided by the National Aeronautics and Space Administration (NASA)

- Very low likelihood of a bloom
- May indicate clouds or missing data
- Low estimated chlorophyll-a concentrations
- Medium estimated chlorophyll-a concentrations
- Higher estimated chlorophyll-a concentrations

Clouds Continue to Limit Assessment of Inland HABs Conditions

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

Toxic algae confirmed in St. Lucie River ... avoid contact

TCPALM

Toxic algae confirmed in St. Lucie River; residents urged to avoid contact

"The Florida Department of Health in Martin County is urging residents to avoid contact with visible algae in the St. Lucie River from the Okeechobee Canal to the St. Lucie Inlet after initial test results detected bloom concentrations of Microcystis aeruginosa, a type of blue-green algae also known as cyanobacteria that can produce toxins. These toxins can be harmful to people and pets.

Exposure to water containing algae toxins may cause nausea and vomiting if ingested and rash or hay fever symptoms if touched or inhaled. Sunlight, temperatures, physical conditions, precipitation and the water's nutrients contribute to the formation of algae.

If you spot blue-green algae, contact the Department of Environmental Protection at 772-467-5572.

To report fish kills or abnormal fish behavior call:

Florida Fish and Wildlife Conservation Commission, 1-800-636-0511

For more information, visit the Martin County Health Department's website."

** **Due to background levels of *K. brevis* off Florida's SW coast, status reports for Florida red tide will be suspended until bloom concentrations re-occur.**

MODIS Satellite Image

Political Boundaries

Affected Water Bodies

Partners

Affected Water Bodies

Featured Article

Other HABs

Flip-Side of Bulletin

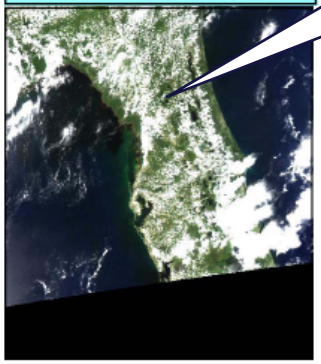
Interpreting Moderate Resolution Imaging Spectroradiometer Data

- 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 HABs 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 that 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.

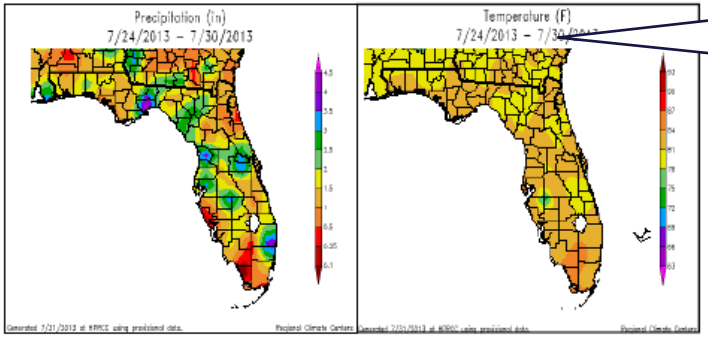
Weather Conditions: Temperature and Precipitation - 7/24/13 to 7/30/13

- Weather conditions can impact the duration and location of blooms and the satellite imagery shown in this report may no longer be relevant.
- Images represent the last image taken with a realization that blooms may have moved, dissipated or intensified.
- Cloud coverage can obscure imagery and create patches or gray areas on map and obscure bloom detection.

July 29, 2013
MODIS True Color Image



True Color Satellite Image



Climate Maps for Temp 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://tidesandcurrents.noaa.gov/hab/

For Individual Weather Station Data-Visit:
http://www.sercc.com/perspectives

Questions about the bulletin or suggestions- Contact
Andrew Reich, Aquatic Toxins Program
850.245.4187
andy_reich@doh.state.fl.us

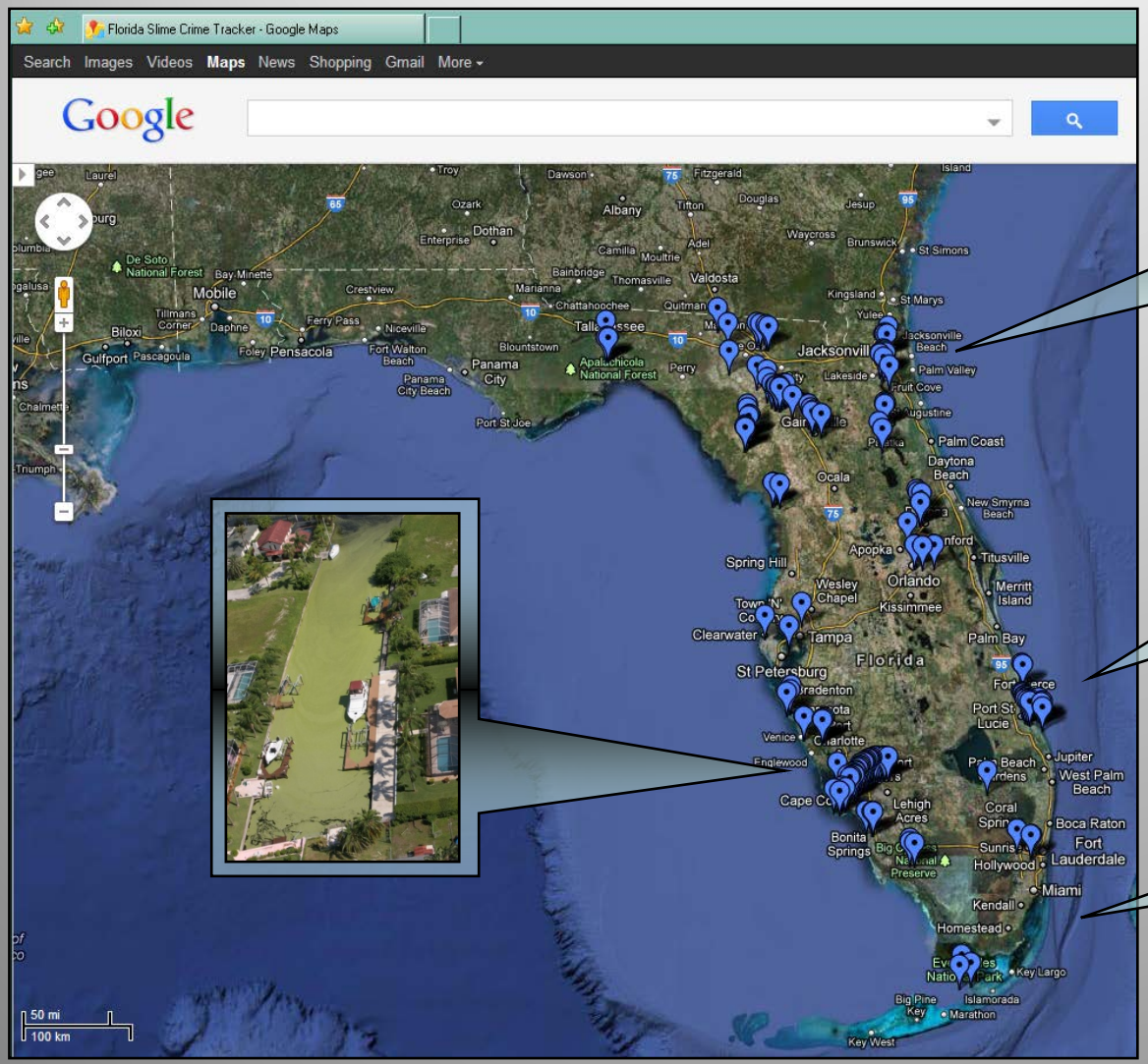
Florida HEALTH

Toxic Algae Confirmed

Downstream from Lake Okeechobee

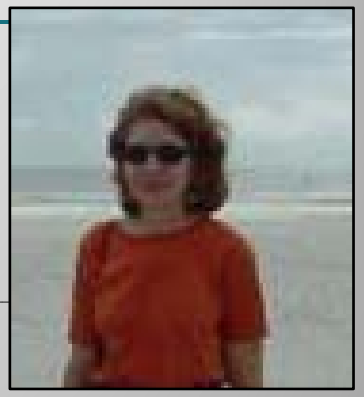
August 3, 2013

Florida “Slime Crime” Tracker



Human Exposures to Freshwater Harmful Algal Blooms

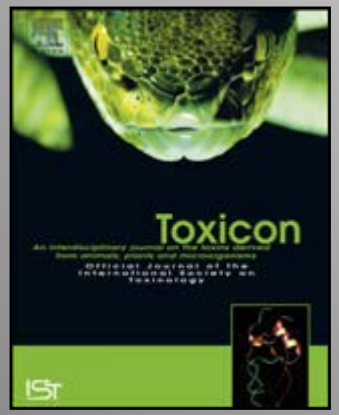
Lorraine C. Backer, PhD, MPH;
National Center for Environmental Health
US Centers for Disease Control and Prevention
lfb9@cdc.gov; 770.488.3426



marine drugs

Recreational Exposure to Low Concentrations of Microcystins During an Algal Bloom in a Small Lake

[L. Backer, et al. Volume 8, Issue 2 June 2008]

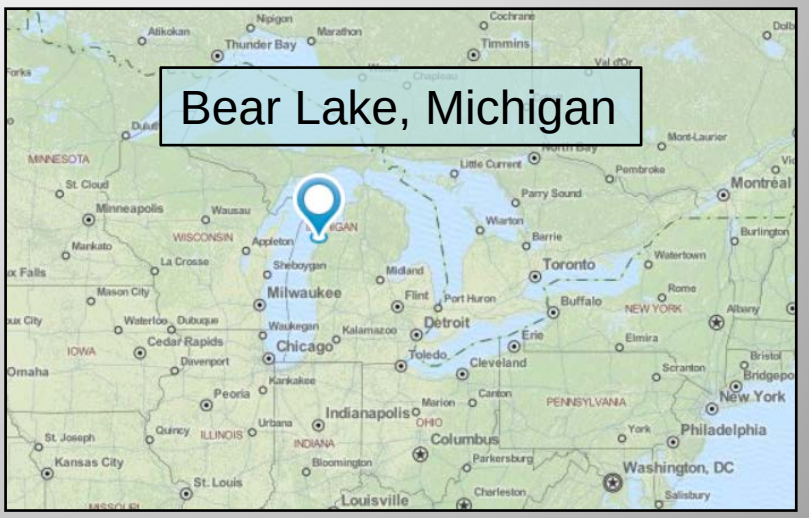


Recreational exposure to microcystins during algal blooms in two California lakes

[L. Backer, et al. Volume 55, Issue 5 May 2010]

Florida HEALTH

Study Locations



Blue-green algae a health hazard in Klamath River: Caution urged in water contact and fish consumption

The Times-Standard

POSTED: 09/17/2013 03:43:06 PM PDT 0 COMMENTS

Press release from the California Regional Water Quality Control Board:

Due to its potential health risks, federal, state, county and tribal agencies are urging swimmers, boaters and recreational users to avoid direct contact with or use of waters containing blue-green algae (cyanobacteria), now blooming in reaches of the Klamath River in Northern California.

Reaches of the Klamath River including the Copco and Iron Gate Reservoirs, and below to the confluence with Tully Creek are now posted with health advisories warning against human and animal contact with the water. People can still enjoy camping, hiking, biking, canoeing, picnicking, or other recreational activities while visiting the reservoirs and the Klamath River, with proper precautions to avoid direct contact with algal bloom waters.

Something's Amuck

Algae blooms return to Michigan shores

June 2006
Michigan Environmental Council

Florida HEALTH

Collaborators

- National Center for Environmental Health, CDC
- National Center for Emerging Zoonotic and Infectious Diseases, CDC
- Mote Marine Laboratory
- GreenWater Laboratory
- Lovelace Respiratory Research Institute
- Wright State University
- Other Federal Agencies
- State and local public health agencies
- Officials or others at study site
- California Department of Health
- Siskiyou County
- Karuk Tribe
- Pacific Corporation

Epidemiology Study Design

- Study population
  - ✓ Planning recreational activities in lake with a HAB (exposed)
  - ✓ Planning recreational activities in lake with no HAB (control)
- Recruited in person
- Human health
  - ✓ Self-reported symptoms
  - ✓ Blood and nasal swabs

Health-Related Data Collection

- Questionnaires
  - ✓ Pre-exposure
  - ✓ Post-exposure
  - ✓ Follow-up (7-10 days later)
- Post exposure plasma samples
  - ✓ Microcystins
- Nasal swabs
  - ✓ Microcystins

Environmental Data Collection

- Water samples
  - ✓ Viruses
  - ✓ Water quality
  - ✓ Algal taxonomy
  - ✓ Microcystins

Environmental Data Collection: New Methods

- Ambient air samples
  - ✓ High-volume
    - ✓ Particle size
    - ✓ Microcystins
- Personal air samples
  - ✓ Microcystins

Results

- Microcystins were found in lake water.
- No differences in symptoms between control (n = 7 and 7) and exposed populations (n = 97 and 88).
- No microcystins were found in blood serum samples.
- Low microcystin concentrations were found in:
  - ✓ Personal air samples.
  - ✓ Nasal swabs.

Conclusions

- Aerosols containing microcystins can be generated in lakes with blue-green blooms.
- There is a potential for aerosol inhalation exposures to people.
- There is a potential for public health impact.

NOAA satellite Lake Erie 2011 algae bloom

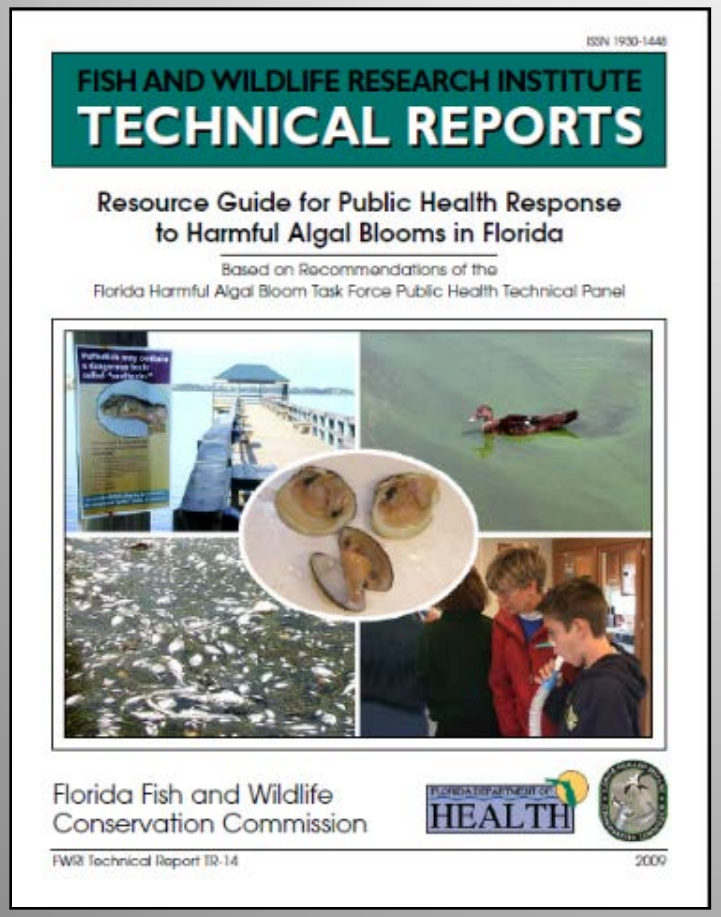
2011 Lake Erie algae bloom

Toledo, Ohio August 3, 2014

NATIONAL GEOGRAPHIC

Florida HEALTH

Resource Guide for Public Health Response to HABs in Florida



Background

Responsibility

Databases

Surveillance

Regulations

Outreach

Management

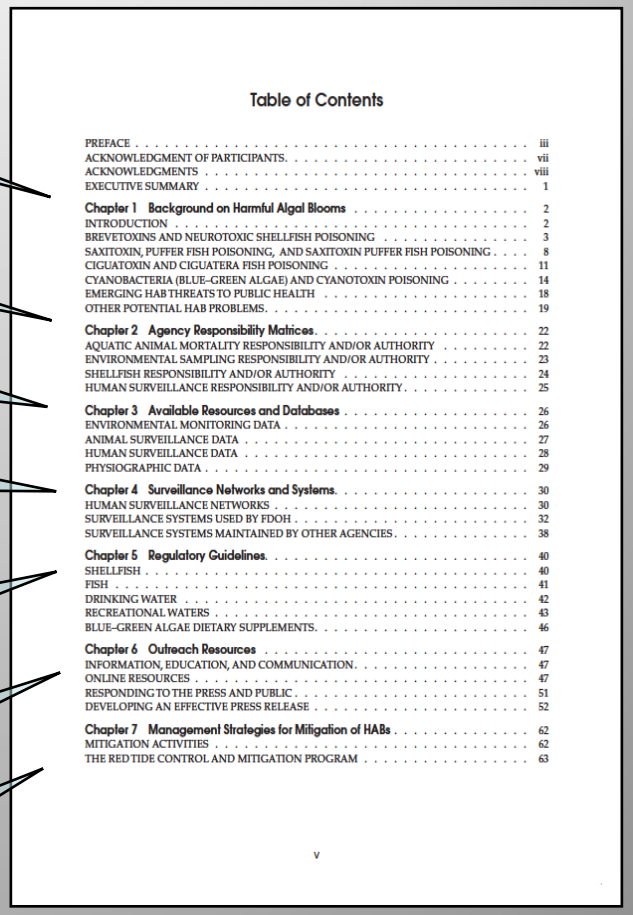


Table of Contents

http://www.myfloridaeh.com/medicine/aquatic/resourceguidepublichealth.pdf

Florida HEALTH

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

Current Funding

- 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 Florida Gulf Coast, Award #1009244
- National Oceanic and Atmospheric Administration: Monitoring and Forecasting Cyanobacterial Blooms for Public Health Protection and Response DG133C-11-SE-3203

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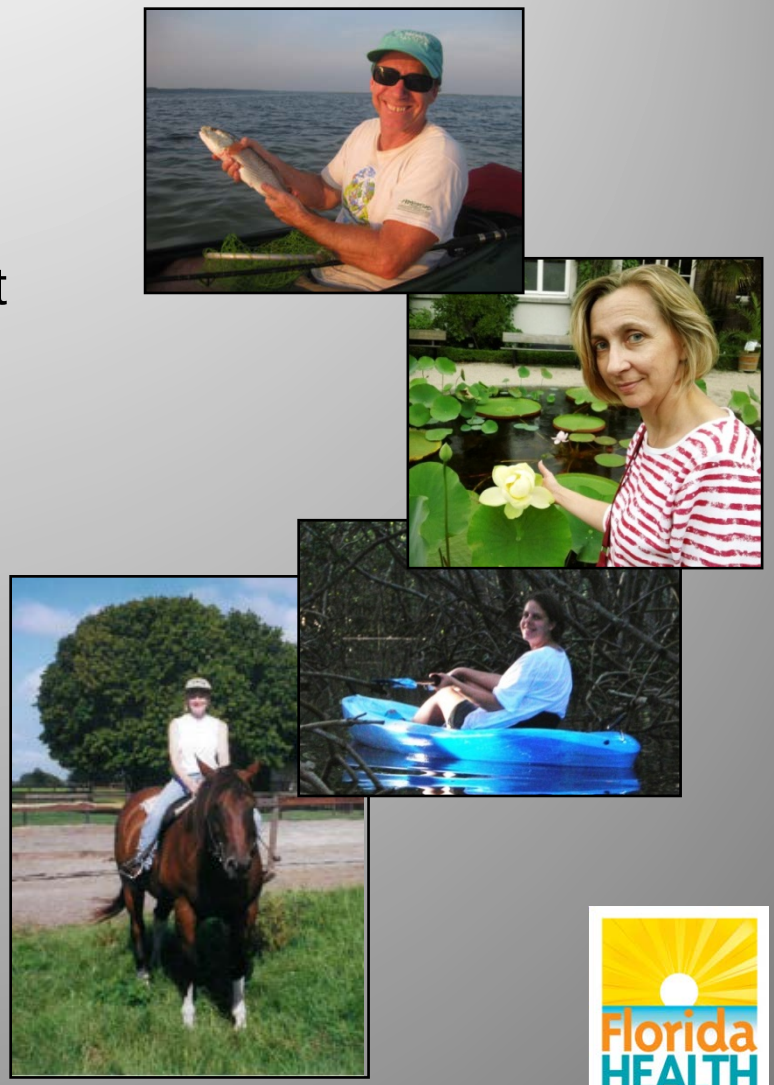

Disclosure Statement of Financial Interest

I, Andrew Reich, DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.