Harmful Algal Blooms (101) – Bloom Basics and Public Health Response

TRAIN Course ID: 1070588

July 25, 2017
1pm – 4pm

Facilitator: Keith Skiles, Director, Division of Shellfish Sanitation

Introduction

Harmful Algal Blooms (101) – Bloom Basics and Public Health Response








Introduction

Harmful Algal Blooms (101) – Bloom Basics and Public Health Response

Target Audience

Epidemiology and Nursing staff

Environmental Health staff

Public Information Officers

Introduction

Harmful Algal Blooms (101) – Bloom Basics and Public Health Response

Purpose

To educate priority staff on Harmful Algal Blooms, regional/district staff roles and responsibilities during a bloom event, issuing recreational advisories for HABs, sampling & analyzing for HABs, and services provided by the Virginia Harmful Algal Bloom Task Force.

Introduction

Harmful Algal Blooms (101) – Bloom Basics and Public Health Response

Learning Objectives

At the conclusion of the training, participants will be able to:

1. Explain their role during a HAB event.
2. Identify the characteristics of algae blooms and the health effects which are possible.
3. Describe best practices to avoid exposure to blooms or what to do if exposed.
4. Explain to the public where to find information on blooms & how to report blooms or fish kills.

Agenda

Harmful Algal Blooms (101) – Bloom Basics and Public Health Response

Session # and Topic	Speakers	Time
1. HAB 101 – General Overview & HAB Task Force	Todd Egerton Margaret Smigo	40 minutes
2. HAB 101 – for Epidemiologists & Nursing Staff	Kim Reece Ana Colon Amani Bassyouni Paige Bordwine	55 minutes
3. HAB 101 – for Environmental Health Staff	Leah Gibala-Smith Margaret Smigo	45 minutes
4. HAB Resources & Training Recap	Amani Bassyouni Keith Skiles	25 minutes

Q&A

Q&A

Q&A and break

Q&A

Housekeeping

Harmful Algal Blooms (101) – Bloom Basics and Public Health Response

- Register in **TRAIN - Course ID: 1070588**
- Please submit a course survey in TRAIN
- Polycom is being recorded and will be posted at www.HarmfulAlgaeVA.com
- Please keep microphones on mute unless asking a question during our Q&A sessions.
- Please do not interrupt the training for technical issues. Email or call Richard.Watson@vdh.virginia.gov or (804) 864-7179 who will help you.

Harmful Algal Blooms (HABs) 101- Bloom Basics and Public Health Response

VDH Webinar. TRAIN: 1070588

July 25, 2017

Plankton 101: overview of freshwater and marine algae & HABs in Virginia

Todd Egerton, PhD

Marine Science Supervisor

Virginia Department of Health

Office of Environmental Health Services

Division of Shellfish Sanitation

VDH VIRGINIA DEPARTMENT OF HEALTH

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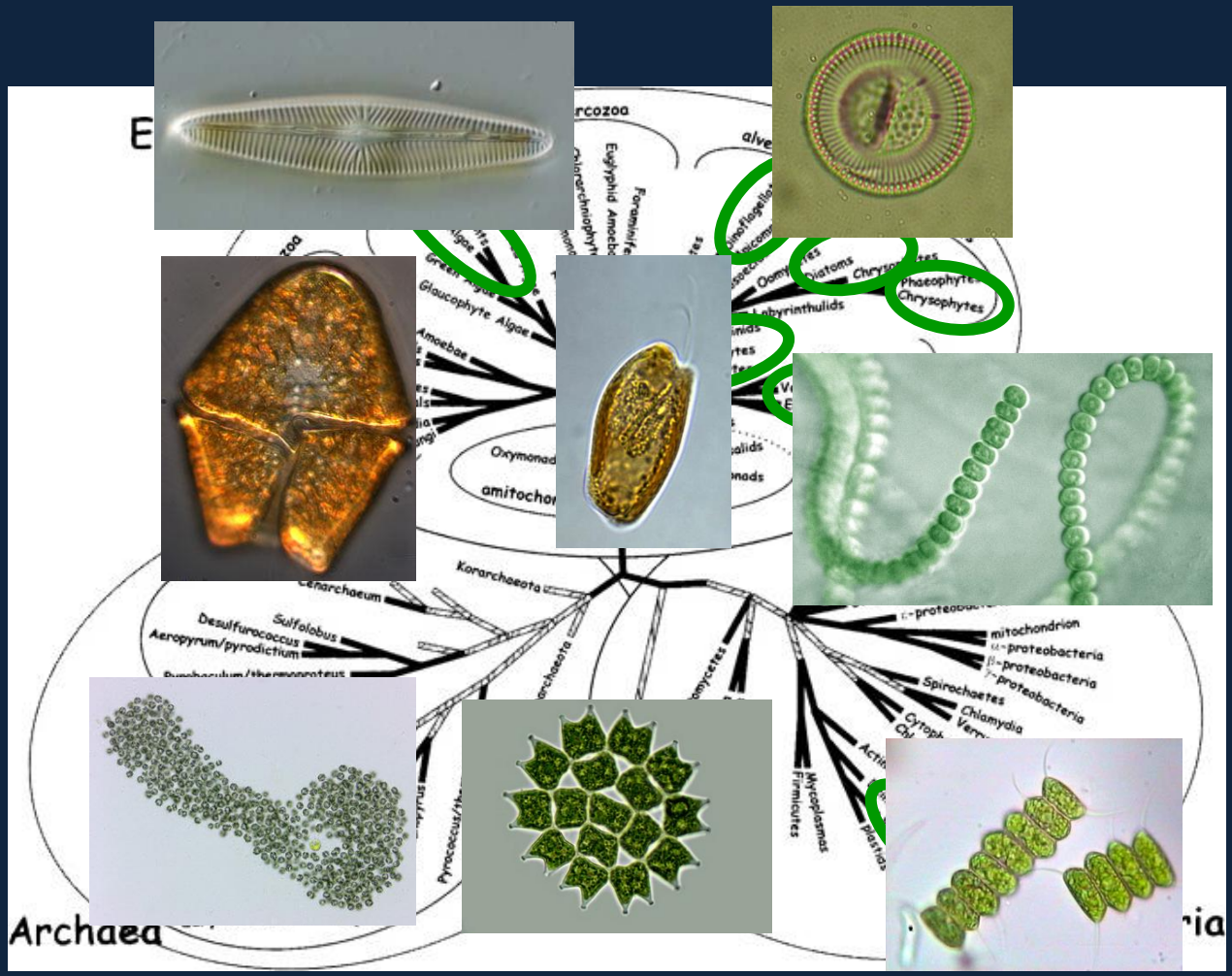
Outline/objectives

- Definitions
  - Algae and algal blooms
- What is a HAB?
  - Characteristics and causes
  - Consequences to natural resources and human health
- HAB prevalence in Virginia
  - Coastal and freshwater distributions

Definitions: Algae

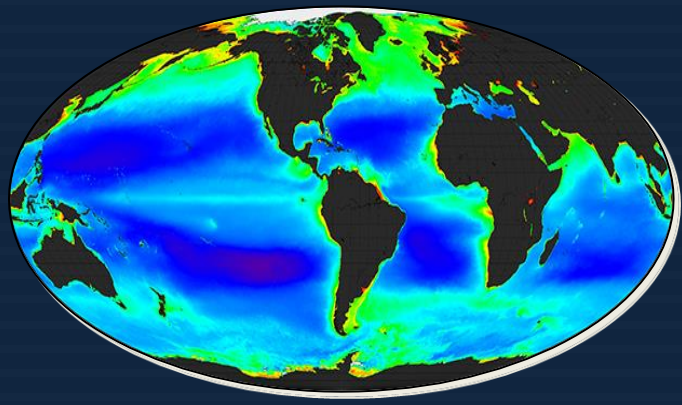
Functional definition, not considered a phylogenetic group

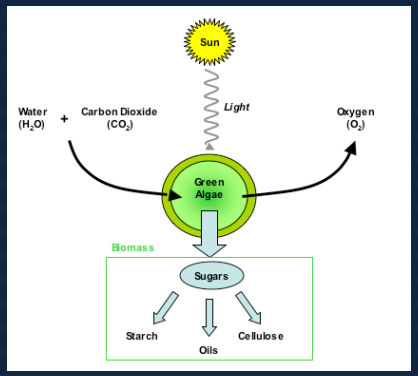
- General features:
  (always exceptions)
  - aquatic
  - photosynthetic
  - lacking vascular system
  - Unicellular, colonial, filamentous
- Incredibly diverse:
  ~73,000 species
- ***Phytoplankton***
  -Pelagic microscopic algae (compared to macroalgae, terrestrial and periphyton forms)



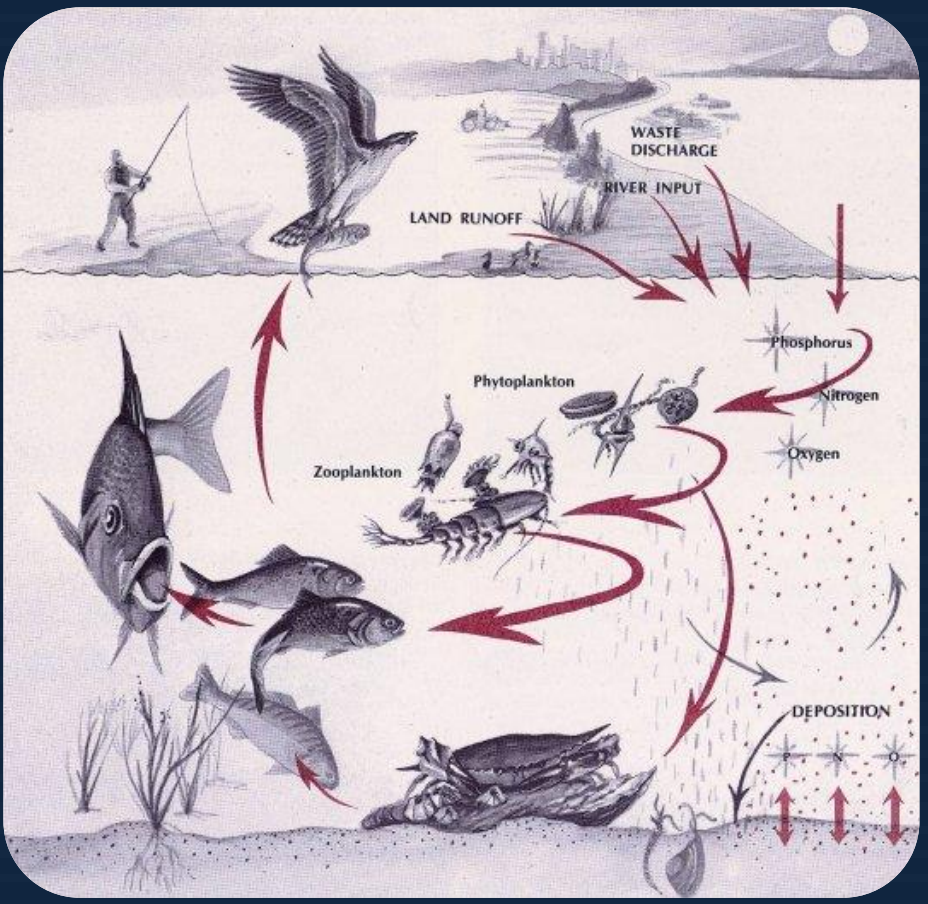
Importance of algae

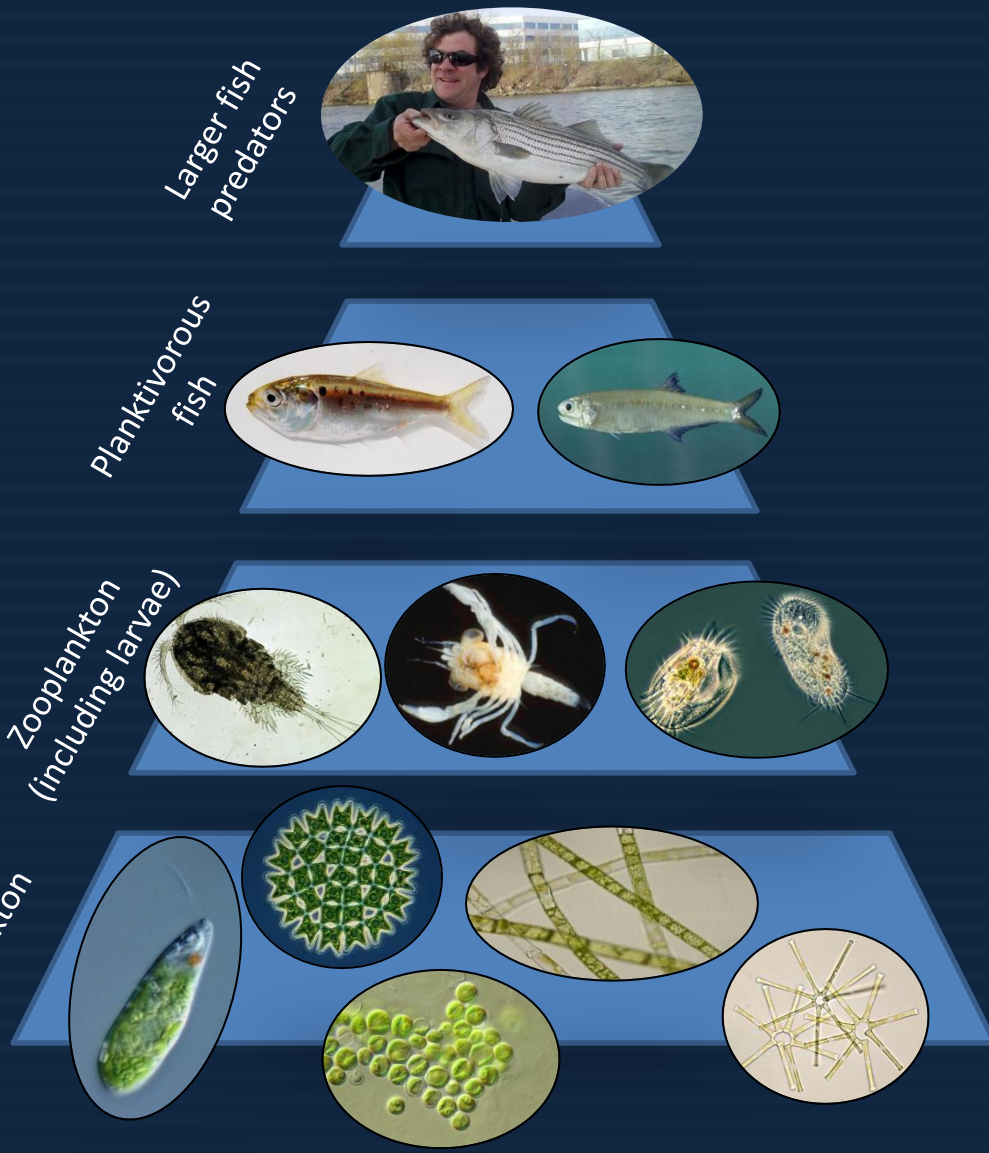
- Represent the major carbon source for various food webs of aquatic environments
- Major oxygen producer
- Indicators of environmental change
- Excellent research model system
  - Food web interactions
  - Biodiversity studies
  - Biofuels
- <u>Potential negative impacts on natural resources and human health</u>



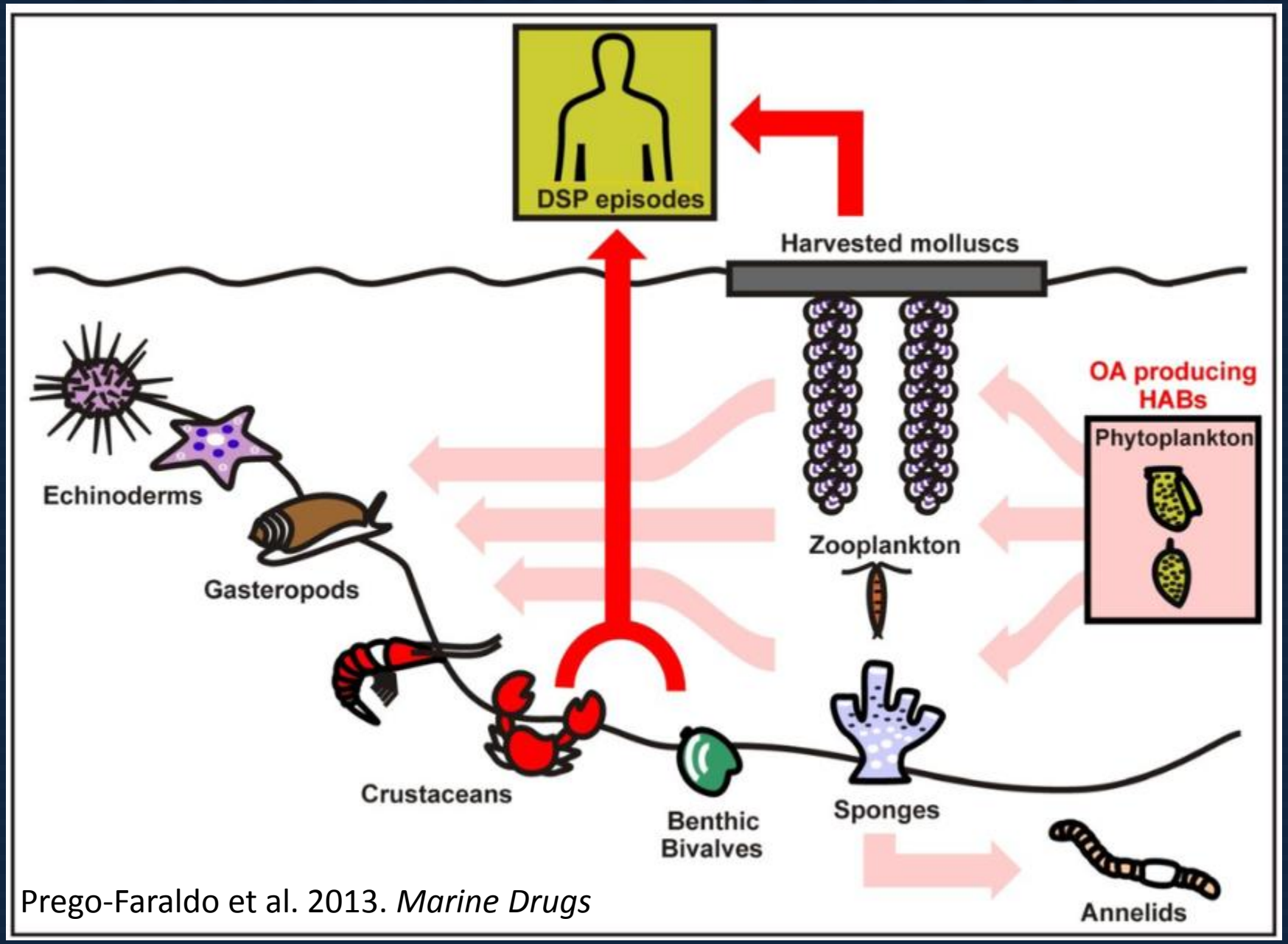


Base of aquatic food webs





Transmission of biotoxins

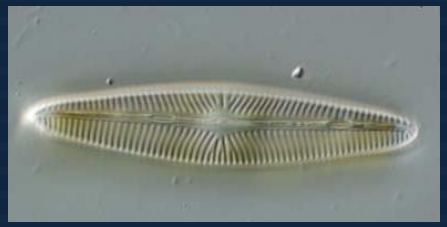


Prego-Faraldo et al. 2013. *Marine Drugs*

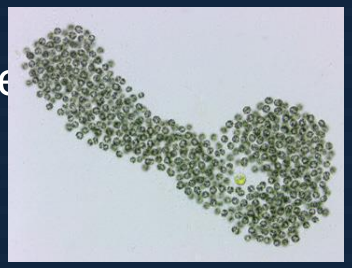
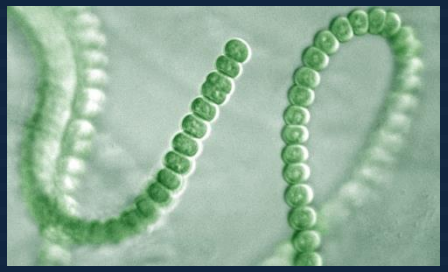
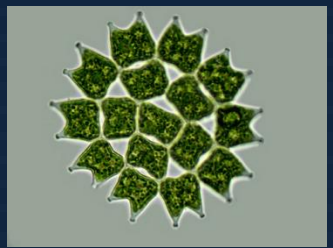

All algae are not the same!
1480 species in Chesapeake Bay

Major algal groups within Virginia

- **Diatoms**
  - Silica frustule, high growth rates, unicellular and filamentous, ubiquitous worldwide, some toxic species
- **Dinoflagellates**
  - Motile, generally unicellular, complex life histories, mixotrophic, includes harmful/toxic species in Bay
- **Cryptomonads**
  - Unicellular, flagellated, non-toxic
- **Cyanobacteria**
  - Prokaryotes, unicellular, colonial, filamentous, nitrogen fixation in some taxa, more common in fresh water includes harmful/toxic species in Bay
- **Chlorophytes**
  - Green algae, unicellular, colonial, filamentous, fast growth rates, more common in freshwater

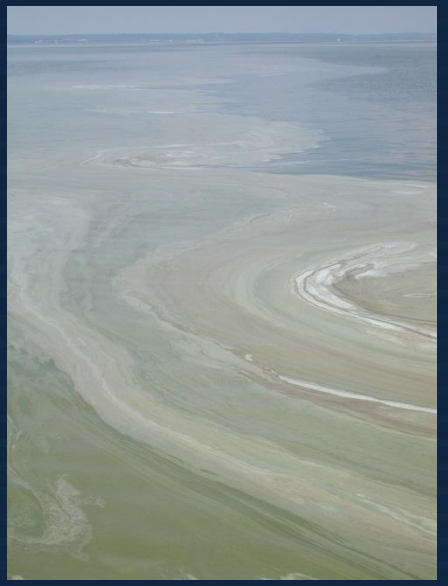


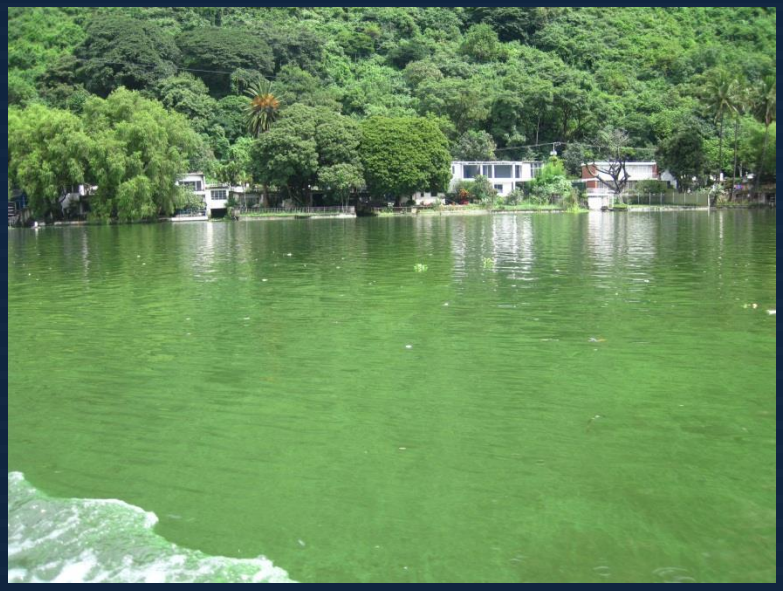



Algal blooms- characteristics

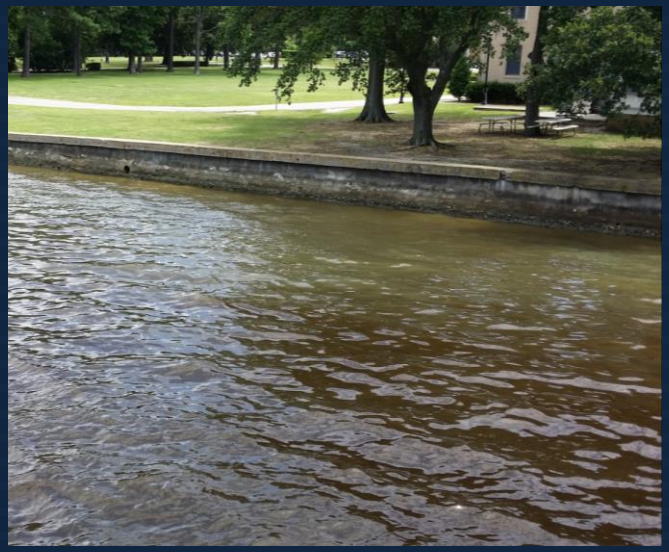
- Natural phenomena that occur in freshwater habitats, estuaries and oceans.
- Few days to several months
- Extraordinary, symptomatic events
  - Water color, odor, dissolved oxygen or other impacts
- Generally the product of a single algal species.
- Often described by the color they impart to the water column, as in “red, or mahogany tides”.





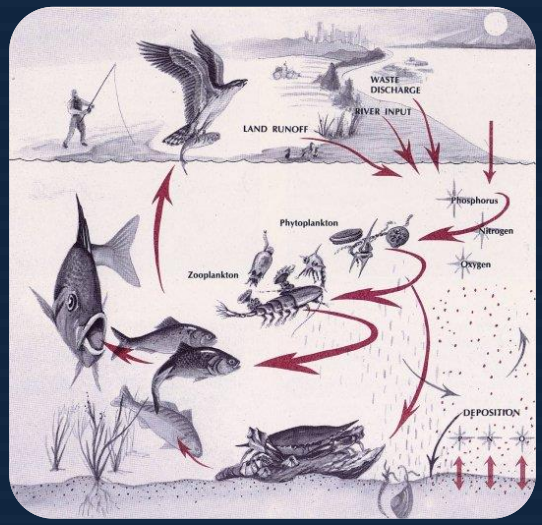
Algal blooms- causes

- In general, they result from favorable environmental conditions for increased development of one or more algae.
- Nutrient inputs, temperature increases, mixing of water column, changes in salinity, light intensity…



Algal blooms- disruption and die-off

- Most blooms often end after few weeks-months
- Lower temperatures, storms and mixing often lead to termination of blooms
- Reduction of nutrients, grazing, increased turbidity, competition, viruses, etc.



What do blooms look like?

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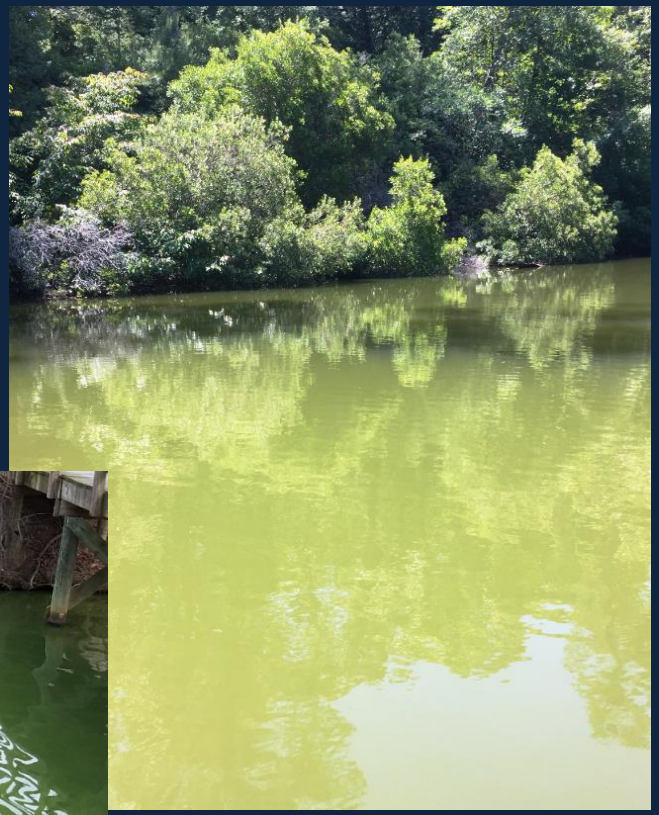

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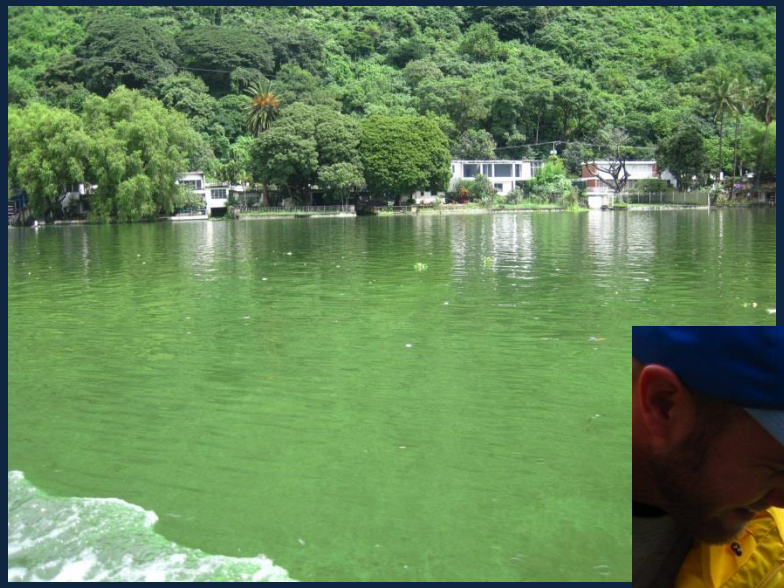

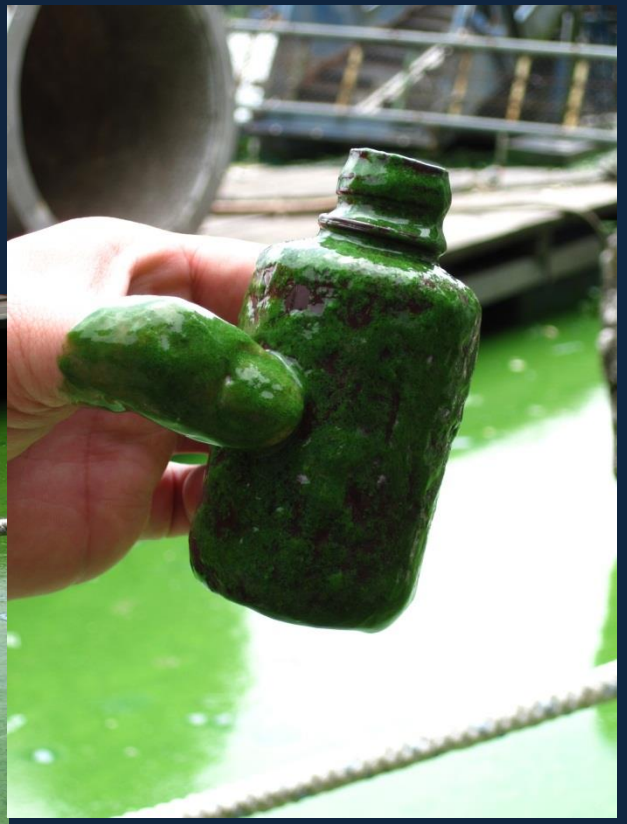

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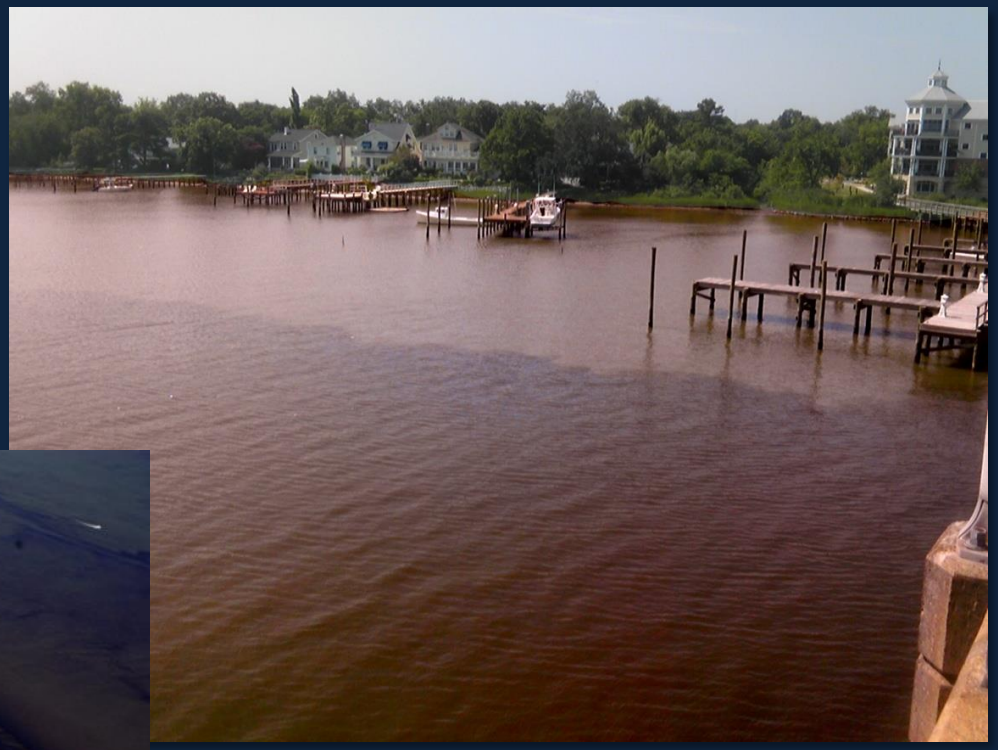

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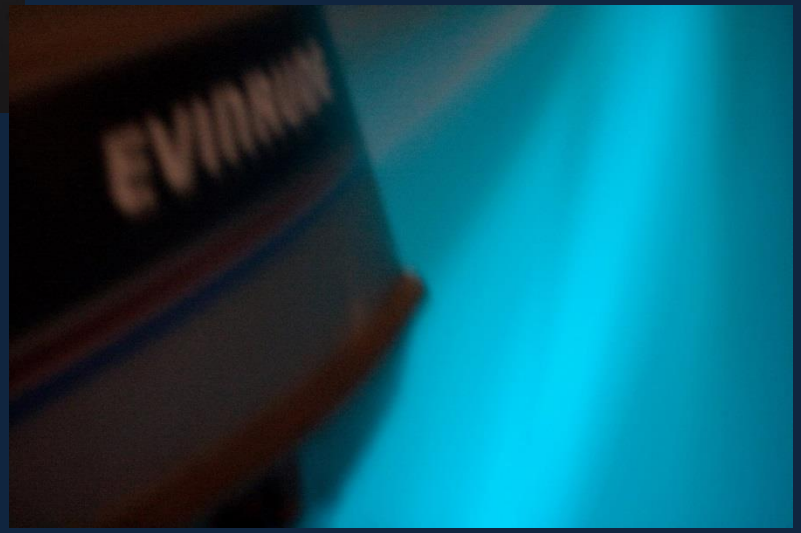
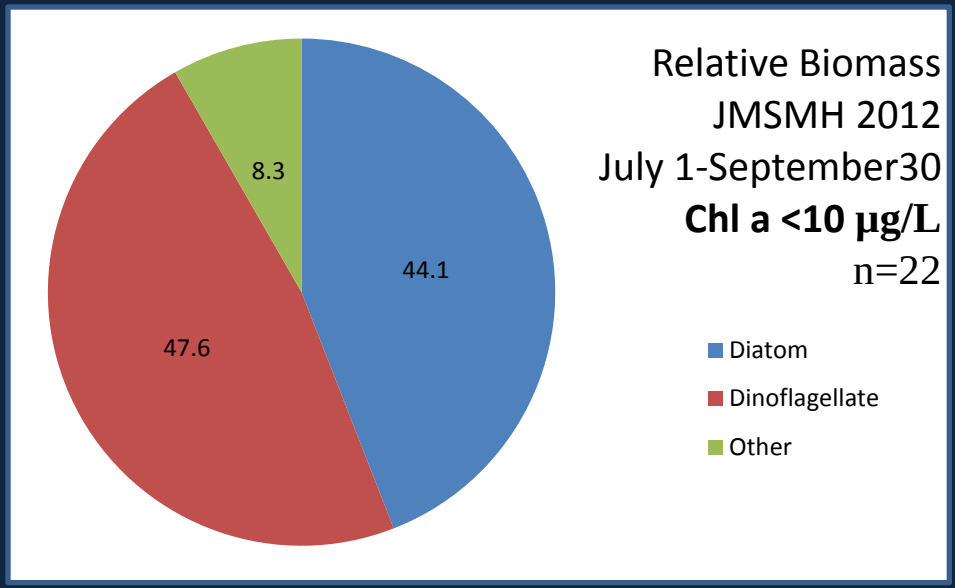
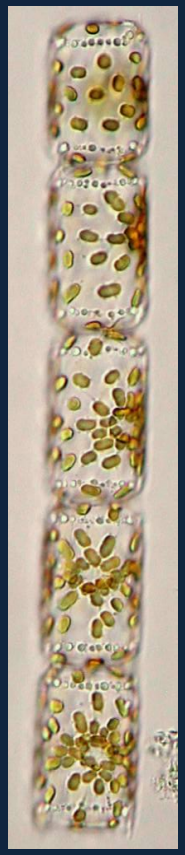
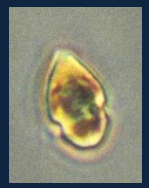
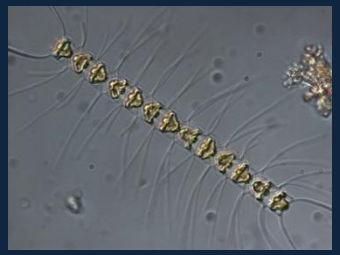


What do blooms look like (microscopic scale)?









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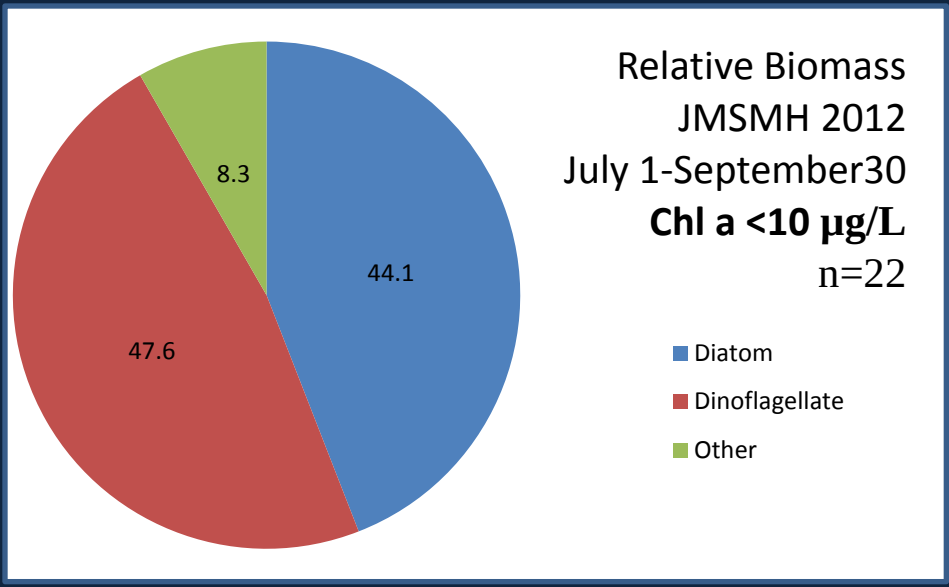
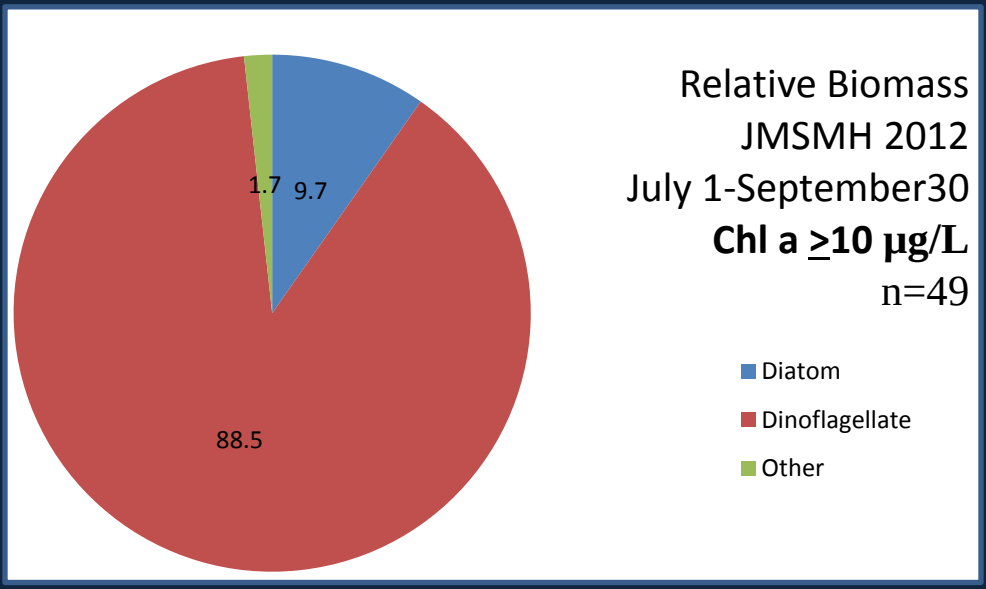
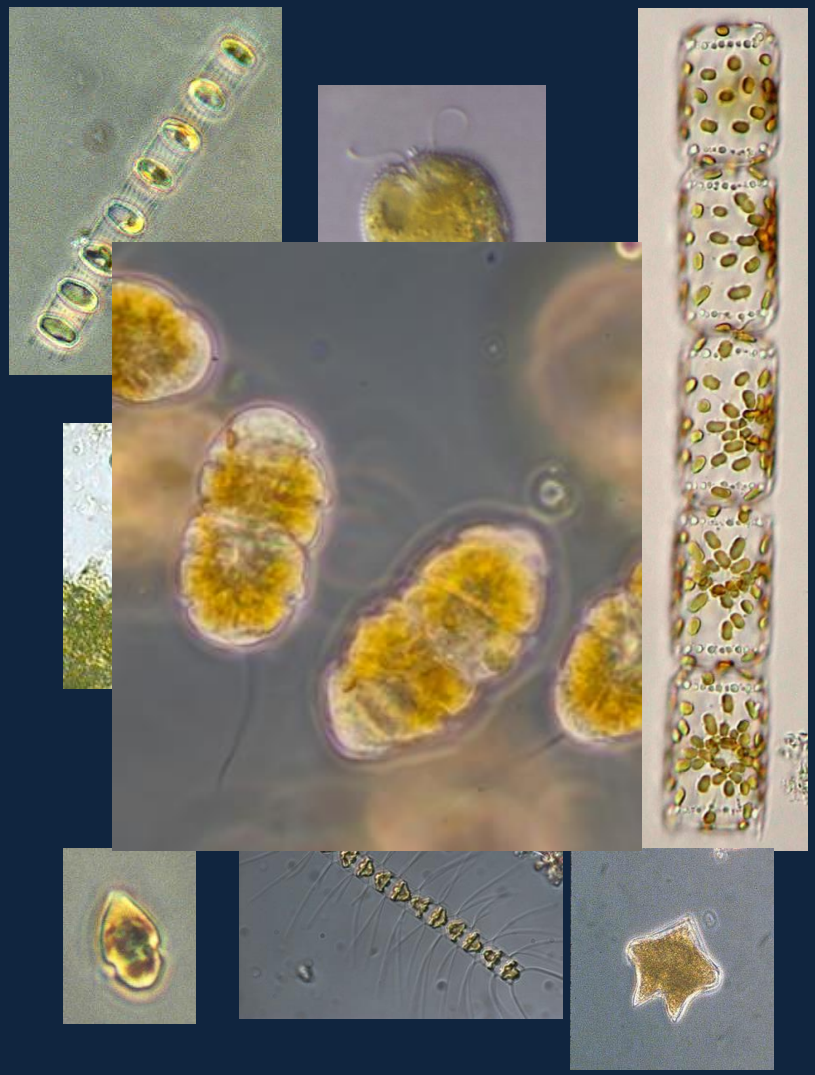






What do blooms look like (aerial view)?

Cochlodinium polykrikoides bloom: Elizabeth River

What is a HAB?: Harmful Algal Bloom

Impacts to Natural Resources

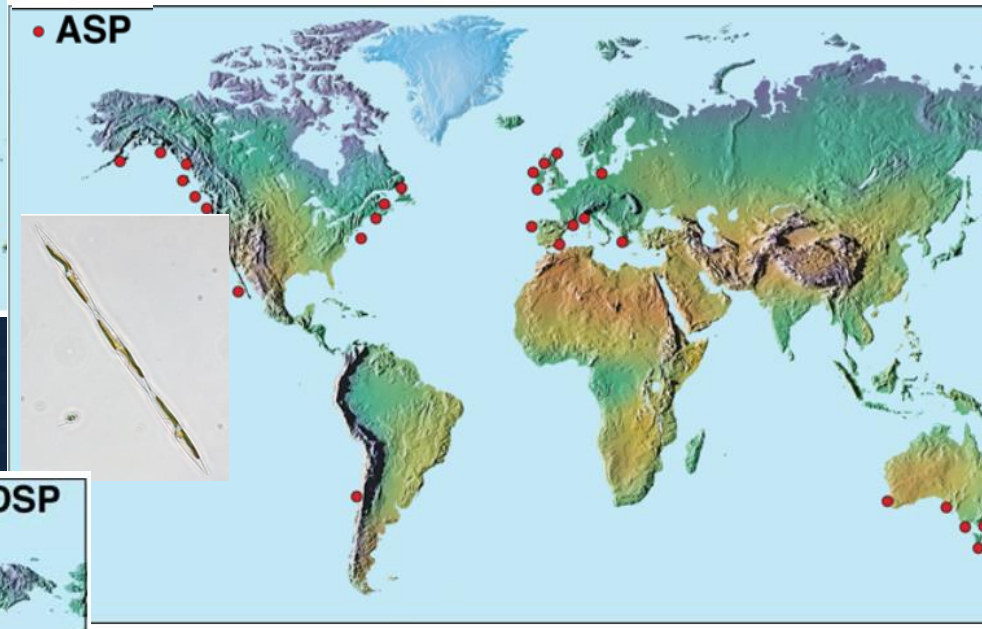
- Produce nuisance algal blooms in summer/fall months.
- Their decomposition lowers oxygen levels in the water.
  - Contributes to hypoxia and anoxia in deeper basins of Chesapeake Bay.
- Blooms also clog invertebrate and fish gills, produce odors, discolor water.
- High biomass blooms produced mainly by dinoflagellates and cyanobacteria.

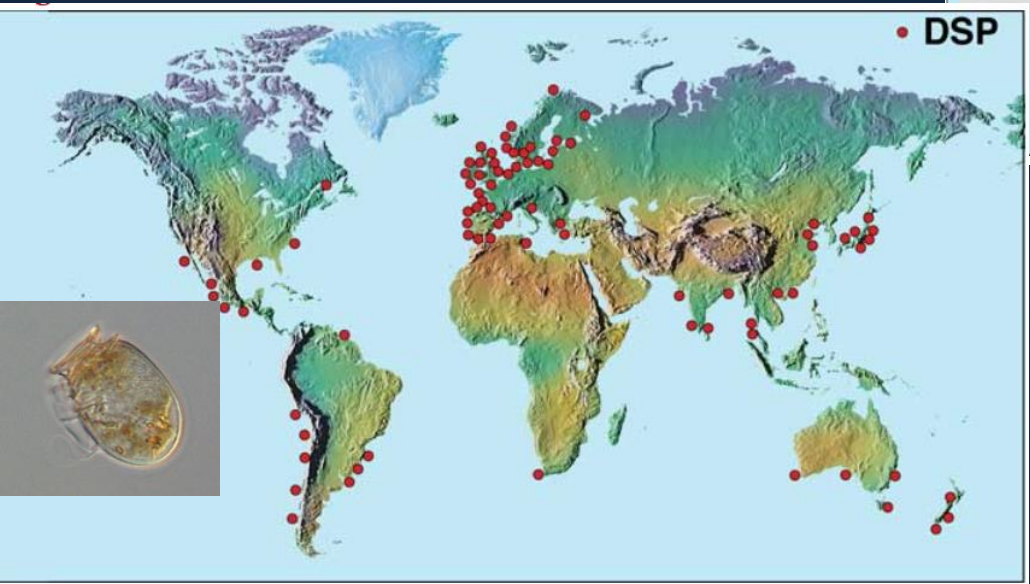
What is a HAB?: Harmful Algal Bloom

Toxin producing HABs

- Relatively rare
- Of the ~73,000 species of algae, ~300 species may form blooms, <100 are known to produce toxins
- Toxin producers can cause:
  - fish kills
  - pet, livestock, wildlife mortalities
  - harmful effects to humans
    - shellfish contamination
    - drinking water contamination
    - recreational contact concerns

Global distribution of Marine HABs

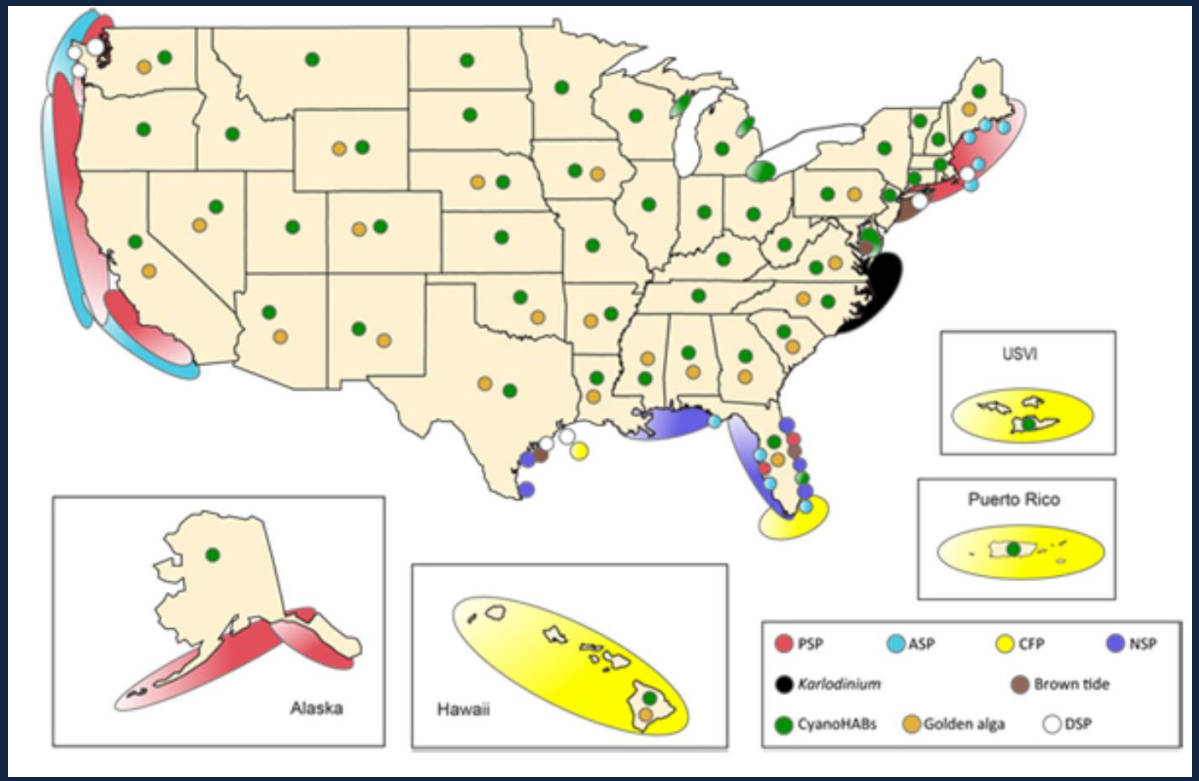




Woods Hole Oceanographic Institution

www.whoi.edu/redtide

HABs Across the United States



https://www.whoi.edu/redtide/regions/us-distribution

National Ocean Service

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HOME > NEWS > WEST COAST HARMFUL ALGAL BLOOM

West Coast Harmful Algal Bloom

NOAA **responds to unprecedented bloom** that stretches from central California to the Ala

Clam diggers along the Washington state coast. So far this year, the presence of harmful algal bloom toxin in Washington state water's has resulted in fishery closures, which can have tremendous economic and ecological effects. In May, the razor clam fishery closed resulting in an estimated $9.2 million in lost income. The state's commercial crab fishery, worth roughly $84 million annually, has also been affected.

Toxic algae bloom shuts down West Coast fisheries

Sea lions poisoned with domoic acid sit in recovery pens at the Marine Mammal Care Center in San Pedro in 2007. A recent, huge bloom of algae off the West Coast has killed sea birds and sickened marine mammals from Central to Northern California, experts found. (Rick Loomis / Los Angeles Times)

By JOSEPH SERNA

Tap Water Ban for Toledo Residents

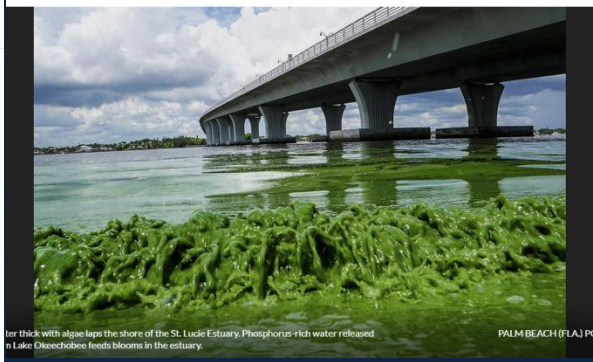
By EMMA G. FITZSIMMONS AUG. 3, 2014

LOCAL

Lake Erie, S. Florida algae crises share common toxins and causes

By Tom Henry | BLADE STAFF WRITER

Published on July 24, 2016 | Updated 10:04 a.m.



ter thick with algae laps the shore of the St. Lucie Estuary. Phosphorus-rich water released n Lake Okeechobee feeds blooms in the estuary.

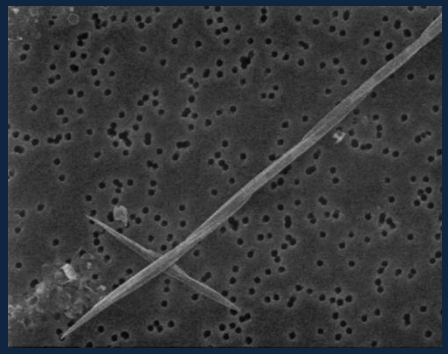
PALM BEACH (FLA.) P

Estuarine/Marine HABs in VA

Potentially toxic algae in Chesapeake Bay

- There are 38 potentially harmful algal species in Virginia waters (<3% of VA species)
- Five major taxa of concern in coastal waters

Dinophysis acuminata



Pseudo-nitzschia seriata

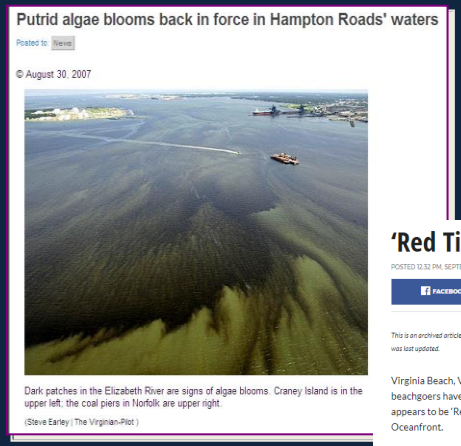
Alexandrium monilatum

Karlodinium veneficum

Cochlodinium polykrikoides

Estuarine/Marine VA bloom history

- Routine, seasonal annual dinoflagellate blooms
  - Lower Chesapeake Bay
  - 20+ years
  - Impacts on natural resources
    - Fishkills, anoxia, shading
- To date, there has been *no HAB related human illnesses from Virginia shellfish.*
  - *Also none from MD or DE*

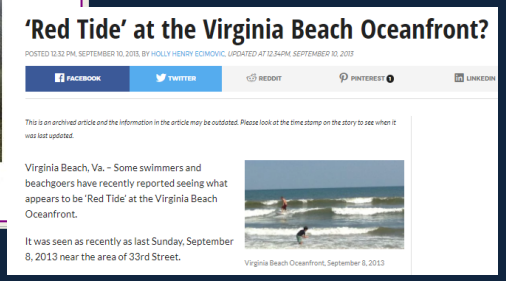

Putrid algae blooms back in force in Hampton Roads' waters

Posted to: News

© August 30, 2007

Dark patches in the Elizabeth River are signs of algae blooms. Craney Island is in the upper left; the coal piers in Norfolk are upper right.

(Steve Earley | The Virginian-Pilot)


'Red Tide' at the Virginia Beach Oceanfront?

POSTED 12:32 PM, SEPTEMBER 10, 2013, BY HOLLY HENRY EGIMOVIC, UPDATED AT 12:34PM, SEPTEMBER 10, 2013

FACEBOOK TWITTER REDDIT PINTEREST LINKEDIN

This is an archived article and the information in the article may be outdated. Please look at the time stamp on the story to see when it was last updated.

Virginia Beach, Va. – Some swimmers and beachgoers have recently reported seeing what appears to be 'Red Tide' at the Virginia Beach Oceanfront.

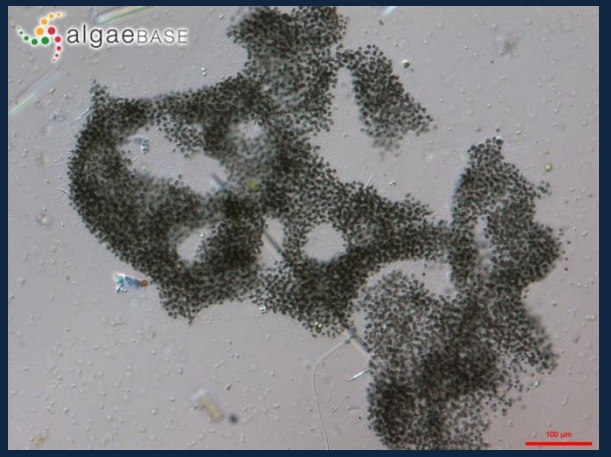
It was seen as recently as last Sunday, September 8, 2013 near the area of 33rd Street.

Virginia Beach Oceanfront, September 8, 2013

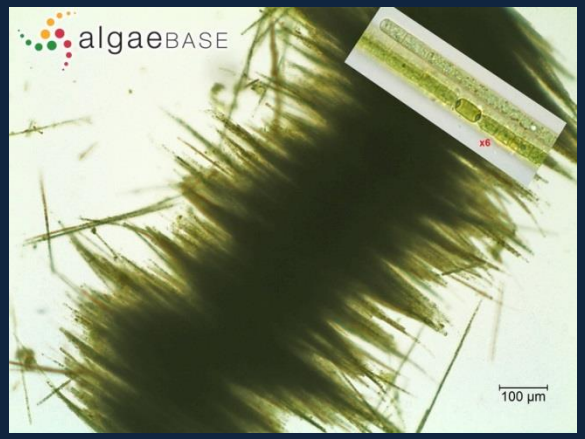
Toxic algal bloom explodes in Chesapeake Bay this summer

Freshwater cyanobacteria HABs in Virginia lakes

Anabaena spp.



Microcystis aeruginosa

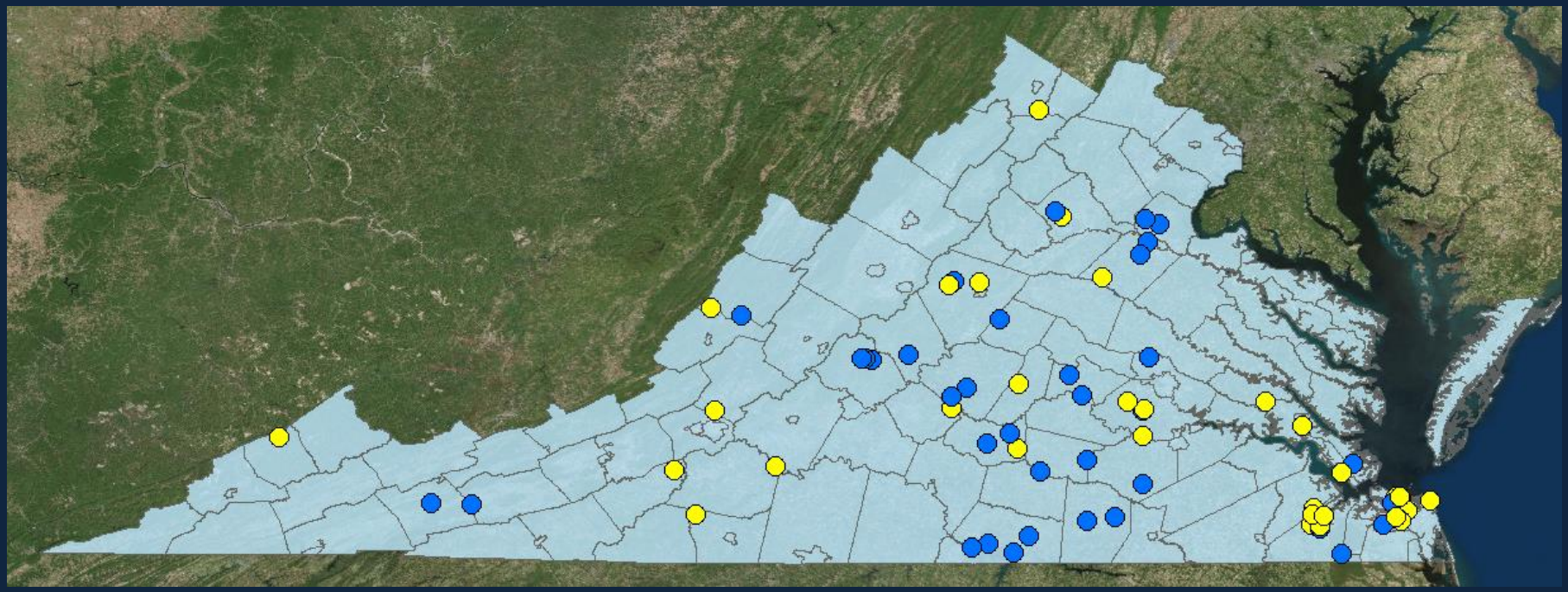


Aphanizomenon flos-aquae

Cylindrospermopsis raciborskii

Planktothrix isothrix

Freshwater cyanobacteria HABs in Virginia

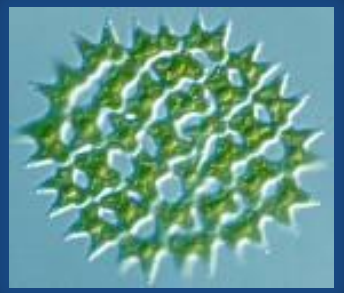


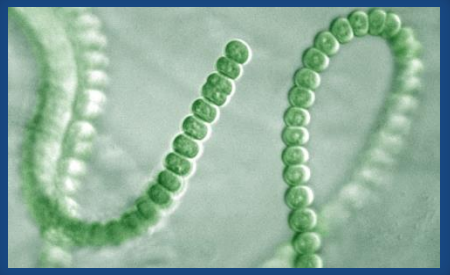
69 lakes and ponds sampled (2010-2017)

31 have at least one potentially toxic species

Algal Bloom Summary

- Algae are an important natural and common component to aquatic systems.
- Majority of blooms are brief and restricted in area.
- Not all algal blooms represent a health concern.
- Non-toxic blooms may still impact natural resources through anoxia, shading, clogging gills of fish and shellfish.





VA HAB Summary

- Although relatively few in number, toxin producing algae are established in coastal and freshwaters throughout Virginia.

- Toxic HABs do pose potential threats to shellfish contamination, drinking and recreational water contamination and natural resource impacts.

- Ongoing statewide collaborative programs are necessary to monitor algae, toxins and potential health impacts.

Thank You!

todd.egerton@vdh.virginia.gov
757-355-5745

VDH Algal Bloom Surveillance Map:

http://www.vdh.virginia.gov/environmental-epidemiology/harmful-algal-blooms-habs/algal-bloom-surveillance-map/

VDH DSS Marine Biotoxin Control plan:

http://www.vdh.virginia.gov/environmental-health/environmental-health-services/shellfish-sanitation/regulations-and-control-plans/

Possible follow up questions/topics

- Are HABs expanding/increasing in Virginia?

  -Monitoring suggests yes, longer duration and greater intensity and spatial coverage of summer dinoflagellate blooms in Chesapeake

  -Greater number of cyanobacteria blooms and toxins in freshwater (coincides with increased sampling effort and toxin testing capabilities)
- Why are blooms expanding?
  - Possible reasons: warmer temperatures, continued/ increased nutrient loading (legacy of N&P in sediments), mixing of nutrients associated with resuspension from tropical storms, possible transport of cysts and resting stages

HAB Task Force, Roles & Responsibilities, & the Virginia HAB Response Plan

Margaret Smigo

Division of Environmental Epidemiology

Waterborne Hazards Control

VDH VIRGINIA DEPARTMENT OF HEALTH

Protecting You and Your Environment

www.vdh.virginia.gov

Overview

- HAB Task Force
  - Background
  - Services
- HAB Task Force Response Plan
  - Agency Roles & Responsibilities
  - VDH – Regional/District Roles & Responsibilities

HAB Task Force - Background

1990s

Hysteria over Pfiesteria

An Atlantic Coast mystery

Pfiesteria (fee-STEER-ee-uh) has been causing hysteria along the Atlantic coast. Just the name *pfiesteria* sounds kind of scary, doesn't it? Well, you'll be glad to know that it is not contagious or infectious. You can't catch it like you can a cold. Okay, then, what is it? Pfiesteria is a marine organism that generally falls under the heading "algae."

Though it's very small (0.007 of a millimeter wide) and can't be seen

presence of fish, pfiesteria transforms from an inactive cyst to a cyst that produces a poison. Pfiesteria uses this poison to stun fish, making it easier to

Unfortunately, scientists still do not know a lot about pfiesteria, but research is under way in Maryland, Delaware, and North Carolina, where pfiesteria is most widespread. Many researchers believe that pfiesteria has

A

B

1 2 IN

1 2 CM

transformations. Increases in dead fish also seem to be associated with warmer waters, higher salt contents, and frequent storms.

yst form of pfiesteria

War waged against pfiesteria

Sick fish close down third river

Our say

Coping with pfiesteria threat won't be easy

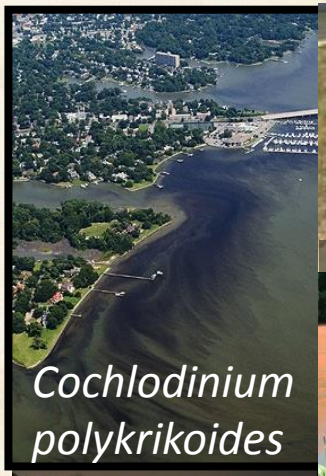
Doctors affirm link between pfiesteria and human illness

ASSOCIATED PRESS

BALTIMORE — After studying a group of watermen on the Eastern Shore, a group of physicians yesterday reaffirmed the suspicion that Pfiesteria piscicida may make

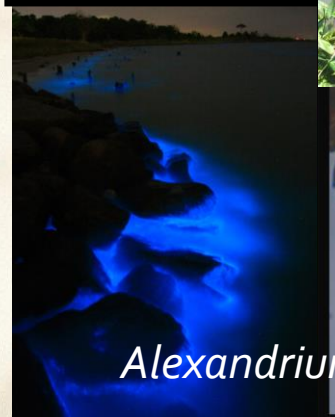
Physicians from the University of Maryland and Johns Hopkins University have spent the past three weeks examining people who complained of memory loss and — in some cases — skin lesions after being exposed to contaminated waters.

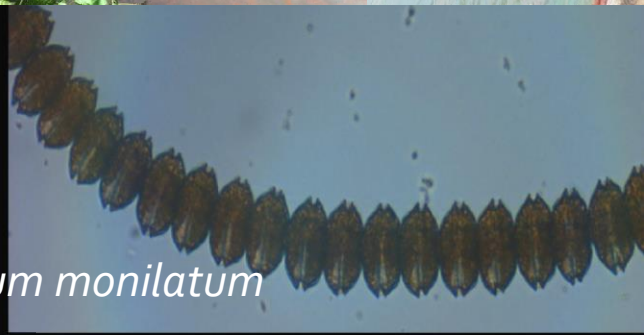
2010s-Present



Cochlodinium polykrikoides

Cyanobacteria



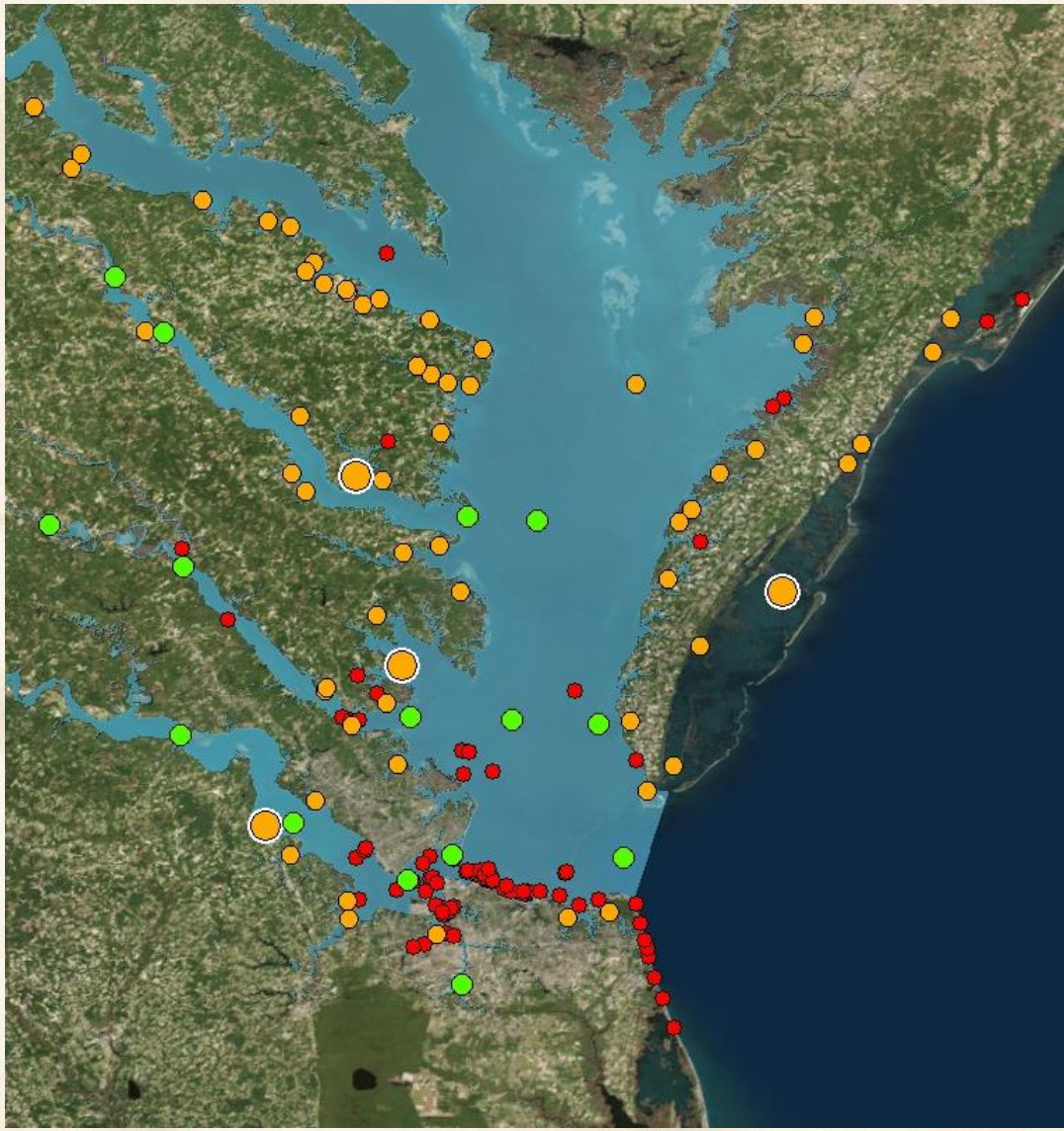


Alexandrium monilatum

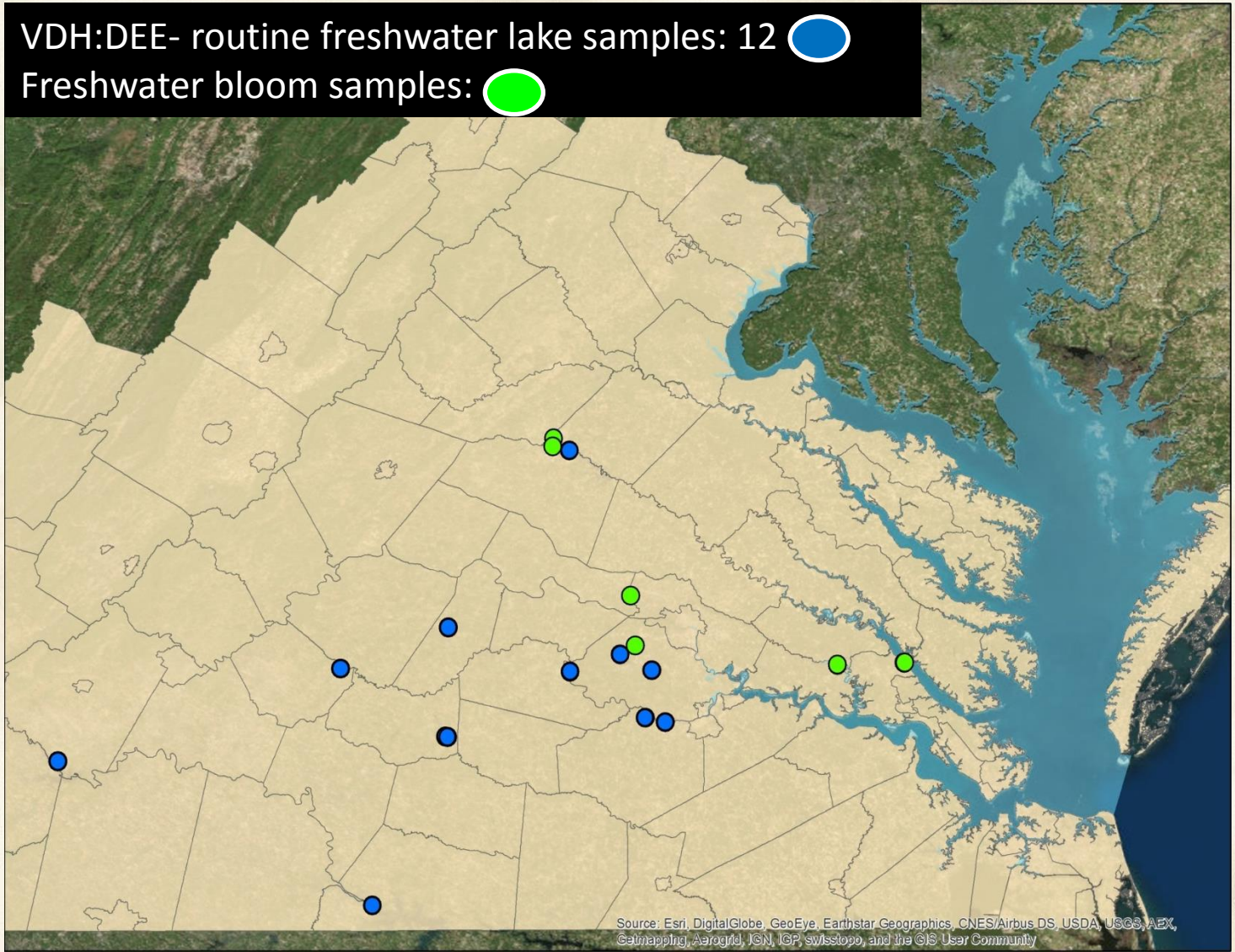
HAB Task Force - Services
Surveillance, Monitoring & Response

Marine/Brackish Waters

- VDH: DSS- 62 routine stations
- DEQ/CBP-16 routine
- DEQ/VDH/ODU Bloom sampling



HAB Task Force - Services
Surveillance, Monitoring & Response

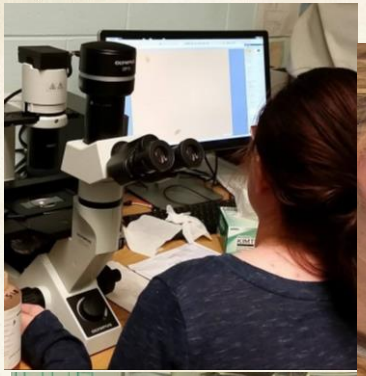


Freshwater

- Since 2010, sites selected for freshwater surveillance each year
- In 2016, 10/12 lakes with species capable of producing toxin
- 2016 -Six bloom responses

HAB Task Force - Services

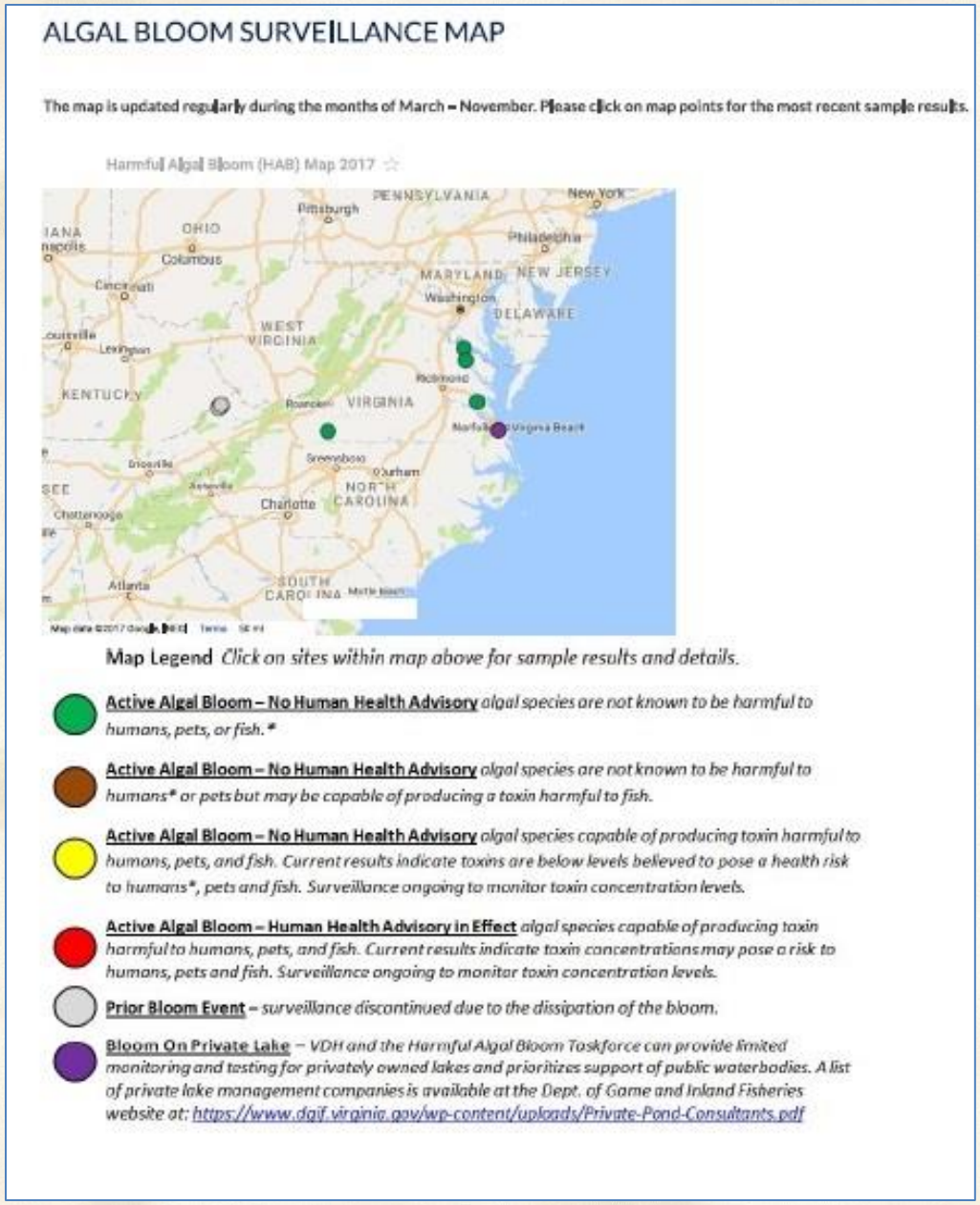
Phytoplankton identification, enumeration & toxin assays



HAB Task Force – Services

Reporting Out

- Algal Bloom Map
- Feature pages on website for bloom events
- Seasonal email updates to Task Force members
- Annual HAB Task Force Meeting



ALGAL BLOOM SURVEILLANCE MAP

The map is updated regularly during the months of March – November. Please click on map points for the most recent sample results.

Harmful Algal Bloom (HAB) Map 2017

Map Legend *Click on sites within map above for sample results and details.*

Active Algal Bloom – No Human Health Advisory *algal species are not known to be harmful to humans, pets, or fish.**

Active Algal Bloom – No Human Health Advisory *algal species are not known to be harmful to humans* or pets but may be capable of producing a toxin harmful to fish.*

Active Algal Bloom – No Human Health Advisory *algal species capable of producing toxin harmful to humans, pets, and fish. Current results indicate toxins are below levels believed to pose a health risk to humans*, pets and fish. Surveillance ongoing to monitor toxin concentration levels.*

Active Algal Bloom – Human Health Advisory in Effect *algal species capable of producing toxin harmful to humans, pets, and fish. Current results indicate toxin concentrations may pose a risk to humans, pets and fish. Surveillance ongoing to monitor toxin concentration levels.*

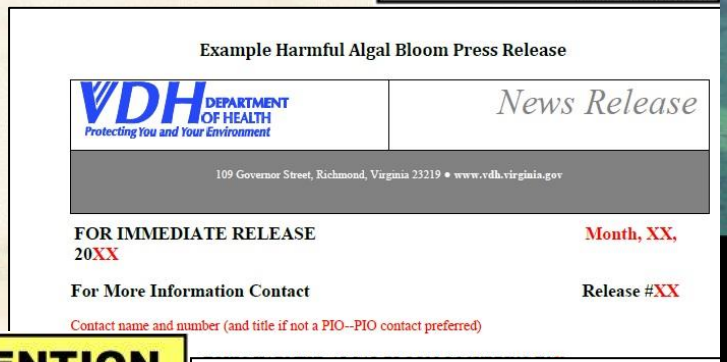
Prior Bloom Event – *surveillance discontinued due to the dissipation of the bloom.*

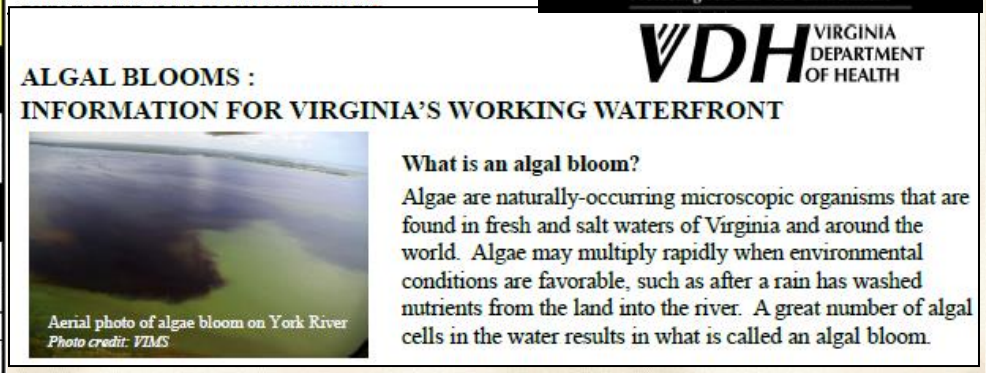
Bloom On Private Lake – *VDH and the Harmful Algal Bloom Taskforce can provide limited monitoring and testing for privately owned lakes and prioritizes support of public waterbodies. A list of private lake management companies is available at the Dept. of Game and Inland Fisheries website at: https://www.dgif.virginia.gov/wp-content/uploads/Private-Pond-Consultants.pdf*

HAB Task Force – Services

Reporting (Out)

- Public Health Messaging
  - Signage
  - Press Releases
  - FAQs
  - Fact Sheets
  - Brochures
  - Message maps





HAB Task Force – Services

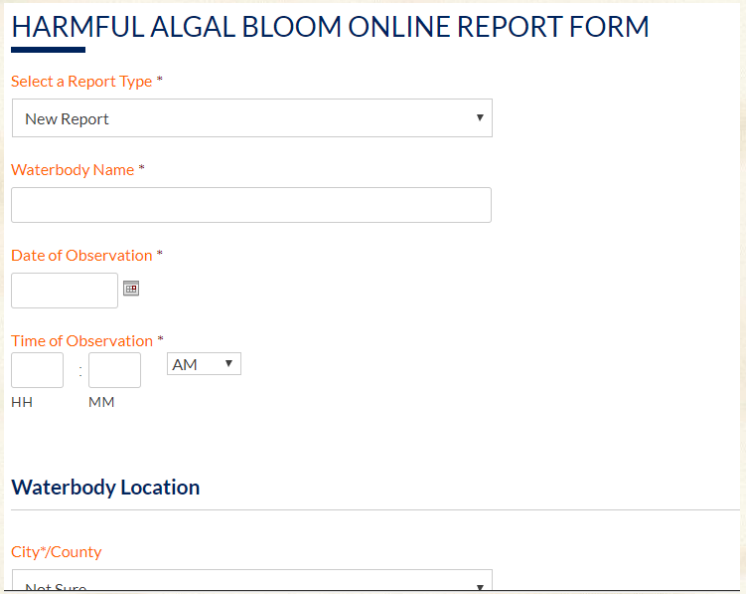
Reporting (In)

- 24/7 HAB Hotline
  - HAB-related human health effects

#866-842-5779

- Online HAB Report Form
  - Blooms & Fish kills

www.HarmfulAlgaeVA.com


HARMFUL ALGAL BLOOM ONLINE REPORT FORM

Select a Report Type *

New Report

Waterbody Name *

Date of Observation *

Time of Observation *

AM

HH MM

Waterbody Location

City*/County

Not Sure

HAB Task Force - Guidance

HAB Response Plan (Updated 2017)

Details 4 Objectives:

Objective 1:

Surveillance and Identification of HAB species

Objective 2:

Responding to and Managing HAB events

Objective 3:

Identify Primary Support Members and their Roles & Responsibilities

Objective 4:

Notification During HAB Events

HAB Task Force
Agency Roles & Responsibilities

Department of Environmental Quality

- Provide response to marine and freshwater bloom events and fish kills
- Collect samples
- Historically service was limited to coastal areas, but has expanded to service state-wide*

HAB Task Force
Agency Roles & Responsibilities

Laboratories: Virginia Institue for Marine Science & Old Dominion University

- Collect marine water samples
- Provide taxonomic identification and enumeration of cells in fresh/marine samples
- Conduct toxin assays
- Develop assay methods and conduct research
- Phytoplankton and HAB experts

HAB Task Force
Agency Roles & Responsibilities

Virginia Marine Resources Commission

- Provide enforcement for closures of marine waterbodies
- Resource for watermen & boaters

HAB Task Force
VDH Roles & Responsibilities

- VDH – OEHS - DSS
  - Shellfish growing area surveillance/closures to protect human health
  - Collects **LOTS** of samples
  - Implement biotoxin contingency plan for testing shellfish during HABs

HAB Task Force
VDH Roles & Responsibilities

- VDH - ODW
  - -Source water protection plans
  - -HAB Response Plan for Drinking Water
  - -HAB monitoring guidance public utilities
  - -Drinking water advisories

HAB Task Force
VDH Roles & Responsibilities

- VDH - OEPI – DEE
  - Co-leads HAB Task Force with DEQ
  - Coordinates agreements with Task Force agencies
  - Manages HAB data & website
  - Develops epidemiologic surveillance and screening guidance
  - Coordinates with Local/Regional staff during bloom events
  - Collect samples / coordinate collection

HAB Task Force
VDH Roles & Responsibilities
Regional & Local Staff

ALL RESPONSE is LOCAL

- Epidemiology and Nursing staff
- Environmental Health Specialists
- Public Information Officers

HAB Task Force

VDH Roles & Responsibilities

Epidemiologists & Nursing Staff

- Conducts human illness surveillance and epi-interviews for suspected HAB-related illnesses
- Submits HAB Health-effects Screening Forms to DEE
- Coordinates outreach for HAB-associated event information with medical providers, hospitals, poison control centers, and others as necessary

HAB Task Force
VDH Roles & Responsibilities
Environmental Health Staff

- Supports HAB-investigations by facilitating sample collection when requested
- Coordinates with the Health Director and PIO to issue/lift recreational advisories and to post signage
- Coordinates outreach and press releases for HAB-associated event information with the PIO and DEE

HAB Task Force
VDH Roles & Responsibilities
Public Information Officers

- Supports HAB-investigations by coordinating consistent messaging to the public
  - Press releases for advisories
  - Coordinates media interviews with staff/subject matter experts as necessary

Thank you!

Margaret Smigo
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Program Coordinator
VDH-OEPI-DEE
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(804)864-8128

Marine HABs and Human Health

VDH – HAB Training July 25, 2017

Kimberly S. Reece, Ph.D.

Chair and Professor, Aquatic Health Sciences

Marine Molecular Genetics and Ecology

Routes of Exposure

Consumption

- Shellfish or finfish (brackish/marine waters*)
- Accidental ingestion while recreating/swimming
- Drinking water (freshwater)

Dermal

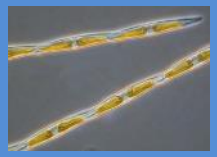
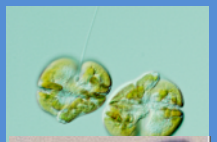
- Some algae release compounds which cause allergy-type response
- Toxins absorbed through skin

Inhalation

- Toxins may become aerosolized
- Aspirate water into the lungs

*emerging research suggests bioccumulation in edible fish tissues is possible in freshwater, but more study is needed.

HAB-related human shellfish poisoning illnesses

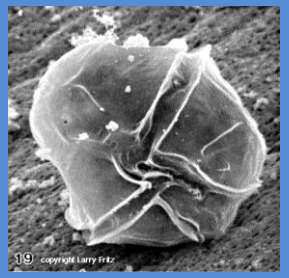
	HAB species	Toxin	Illness
* 	*Alexandrium fundyense/tamarense/ catenella/minutum*	Saxitoxins	Paralytic Shellfish Poisoning (PSP)
* 	*Pseudo-nitzschia* spp.	Domoic acid	Amnesic Shellfish Poisoning (ASP)
* 	*Dinophysis* spp.	Okadaic acid	Diarrhetic Shellfish Poisoning (DSP)
	*Karenia brevis*	Brevetoxin	Neurotoxic Shellfish Poisoning (NSP)
	*Gambierdiscus toxicus*	Cinguatoxin Maitotoxin Gambieric Acid	Ciguatera fish poisoning

Gastrointestinal and neurological symptoms

* Seen in Chesapeake Bay

Photos: Nancy Lewis, Dr. Rozalind Jester, oceandatacenter.ucsc.edu, FL Fish and Wildlife
Slide made by Sarah Pease

Paralytic Shellfish Poisoning-PSP



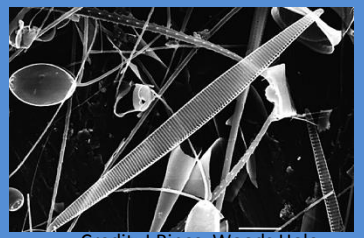
(Photo credit - Larry Fritz)

- Saxitoxin(s)-several toxins in the group
  - mortality in wildlife and humans
  - heat stable toxin
  - ingestion-usually bivalves: mussels, clams, oysters, but also crabs, lobsters and snails can be contaminated. A few cases from finfish
  - Saxitoxins in dinoflagellates and cyanobacteria:
  - *Alexandrium tamarense* complex
  - Cyanobacteria: *Anabaena, Cylindrospermopsis, Lyngbya, Aphanizomenon, Planktothrix*, and *Raphidiopsis*

PSP (cont.)

- Symptoms can begin within minutes after ingestion
  - tingling, numbness starts in the mouth and lips
  - spreads to the face and neck
  - next to the extremities with respiratory difficulties
  - headache, dizziness, nausea, vomiting, rapid pain
  - 2-12 hours death OR recovery after 12 hours with symptoms gone in a few days
  - fatality rate ~10%

Amnesiac Shellfish Poisoning-ASP

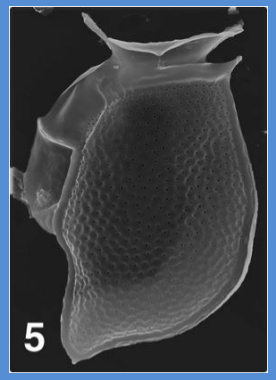


Credit: J.Rines, Woods Hole Oceanographic Institute/NOAA

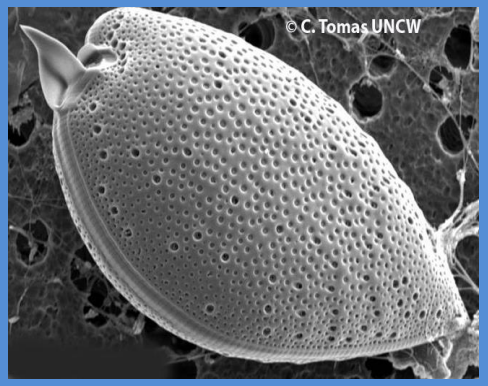
- Domoic acid
- **Pseudo-nitzschia* spp. (diatoms), some red algae produce low levels of domoic acid
- Heat labile except in shellfish where there appears to be protection from inactivation by heating
- Causes illness and mortality in marine mammals, sea birds and finfish
- Gastrointestinal and neurological symptoms
  - nausea, vomiting, abdominal cramps, and diarrhea
  - dizziness, headache, seizures, disorientation, short-term memory loss, respiratory difficulty, and coma, death
- Mussels, bay scallops, sea scallops, razor clams, Dungeness crabs, anchovies (note: toxin is found in viscera of finfish and crustaceans)

Diarrhetic Shellfish Poisoning-DSP

- Okadaic acid
- **Dinophysis* spp., **Prorocentrum* spp. (Often seen in VA waters)
- The first reported cases of DSP were in the Netherlands in the 1960s, followed by similar reports in the late 1970s from Japan- now numerous cases around the world including US East coast
- Symptoms usually begin within 30 mins to a few hours of consumption
- Diarrhea, nausea, vomiting, abdominal cramps, and chills (usually not fatal and without neurological symptoms)



Dinophysis caudata



Prorocentrum micans

Neurotoxic Shellfish Poisoning-NSP

(*Karenia brevis, also K. mikimotoi, K. brevisulcata, K. selliformis*, and *K. papilionacea* AND *Chattonella subsalsa*)

- Brevetoxin
  - tasteless and odorless
  - Ingestion-shellfish and finfish (generally lower concentrations)
  - inhalation of aerosols for beachgoers; surf disrupts cells
  - Dermal exposure
  - Seldom fatal, but can result in hospitalizations

- Gastrointestinal, dermal and neurological symptoms: abdominal pain, vomiting, and diarrhea, paresthesias, reversal of hot and cold temperature sensation, vertigo, ataxia, cough, dyspnea and bronchospasm

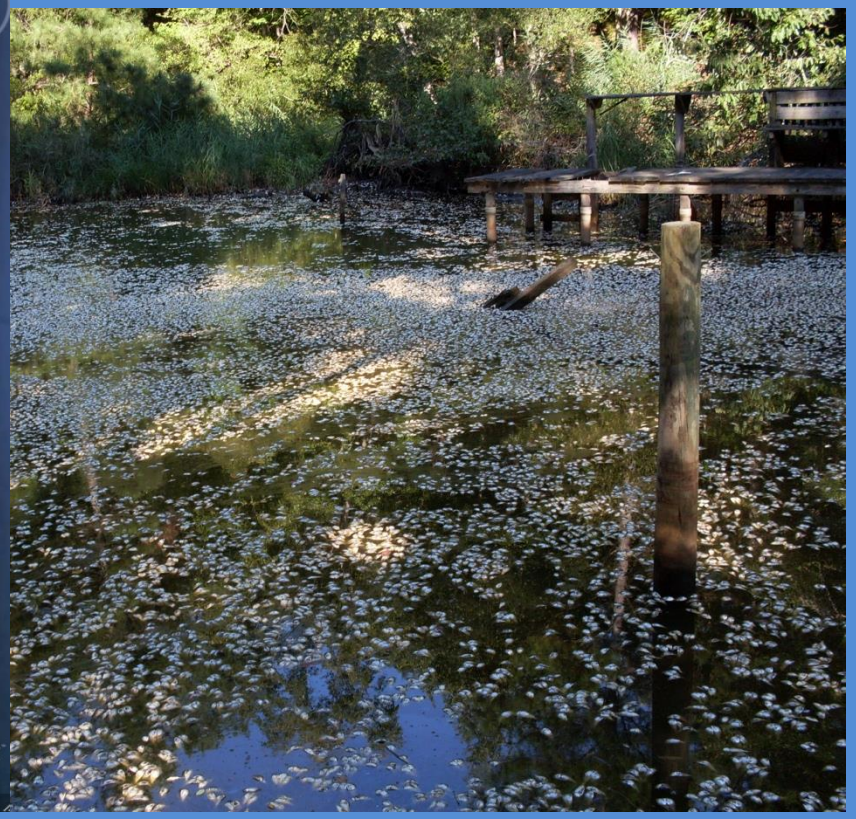
- Can also impact many commercial and recreational species of fish, sea birds, sea turtles, manatees and dolphins-fish kills are common with *K. brevis* blooms

Raphidophyte Blooms

(Chattonella subsalsa, *Heterosigma akashiwo,* and *Chloromorum toxicum)*

Brownish-green discoloration of the water

- Potential brevetoxin production
- Low levels of brevetoxin detected in fish, shellfish and water samples from blooms



Ciguatera Fish Poisoning-CFP

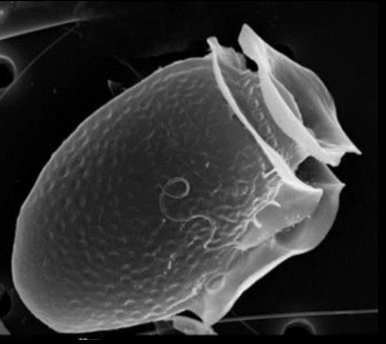
- Ciguatoxin(s)
- *Gambierdiscus toxicus, Prorocentrum lima*
- gastrointestinal, neurological, and cardiovascular symptoms.
  - Diarrhea, vomiting, and abdominal pain usually first symptoms (within 24 hrs)
  - Reversal of temperature sensation, muscle aches, dizziness, anxiety, sweating, numbness and tingling of the mouth and extremities (1-2 days later)
  - Advanced cases cardiovascular damage
  - Variable recovery time, could be months or years
- Reef fish: grouper, snapper, mackerel, jack, barracuda, parrot fish , tang, goat fish…., gastropods

VDH FACT SHEET: Marine HAB Toxins

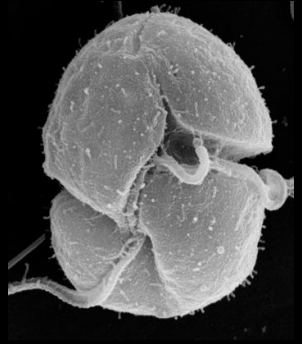
Marine Toxins and Associated Syndromes

Syndrome/toxins	Dinoflagellates/Diatoms	Exposure(s)	Range of symptoms	Symptom Onset
Paralytic Shellfish Poisoning (PSP) -saxitoxins	*Alexandrium* spp.*, *Gymnodinium catenatum*, *Pyrodinium bahemense* (dinoflagellate)	• Shellfish (including, crabs, lobsters, puffer fish) in Pacific Coast, New England, Florida	• Perioral tingling • Numbness of face and neck • Headache • Nausea and vomiting • Respiratory difficulty • Death	Few minutes – 10 hrs
***Observed coincidental health effects but not scientifically confirmed** -Goniodomin A	*Alexandrium monilatum*	• Direct skin contact • Inhalational	• Skin rash • Mild burning and itching • tingling around the lips • Respiratory difficulty	Immediate – 15 min
Diarrhetic Shellfish Poisoning (DSP) -okadaic acid and derivatives	*Dinophysis* spp. *Prorocentrum* spp. (dinoflagellate)	• Shellfish (Gulf Coast of Texas)	• Diarrhea (most prominent) • Nausea and vomiting • Abdominal pain	30 min – 2 hrs
Ciguatera Fish Poisoning (CSP) -ciguatoxins, maitotoxin	*Ganbierdiscus toxicus*, *Prorocentrum* spp. (dinoflagellate)	• Reef fish (tropical/subtropical)	Early onset • Diarrhea, abdominal pain • Nausea, vomiting Later onset • Reversal of hot and cold sensations • Paresthesias • Blurred vision • Headache • Arrhythmias • Paralysis	2 – 6 hrs 12-24 hrs
Neurotoxic Shellfish Poisoning (NSP) -brevetoxin	*Karenia brevis* (dinoflagellate) *Chattonella subsalsa* (Raphidophyte)	• Shellfish (Mid-Atlantic and Gulf of Mexico) • Inhalation of aerosolized toxins	GI and neuro symptoms • Similar to those of PSP except NSP not known to cause death Irritation: • Eyes • Throat	Few min - hours
Domoic Acid Poinsoning / Amnesiac Shellfish Poisoning (ASP) -domoic acid	*Pseudo-nitzschia* spp. (diatom)	• Shellfish (Pacific Coast, Northeast Coast, Western Coast of Florida)	• Diarrhea • Nausea and vomiting • Confusion • Memory loss • Seizures • Coma • Death	Nausea and vomiting usually within 24 hrs; other symptoms 24 – 48 hrs

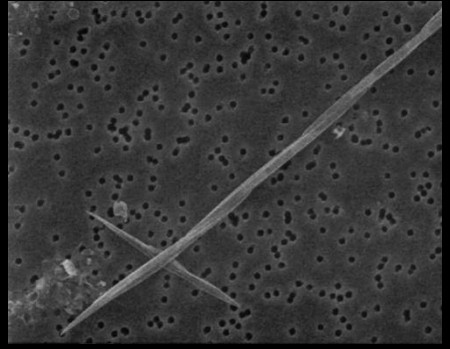
Not included above, is Azaspiracid Shellfish Poisoning (AZP), caused by toxins of a dinoflagellate in Ireland, Netherlands, Belgium, Morocco, and eastern Canada.
*Range of symptoms reported in Virginia as a result of direct contact to *A. monilatum*.



Dinophysis acuminata



Karlodinium veneficum



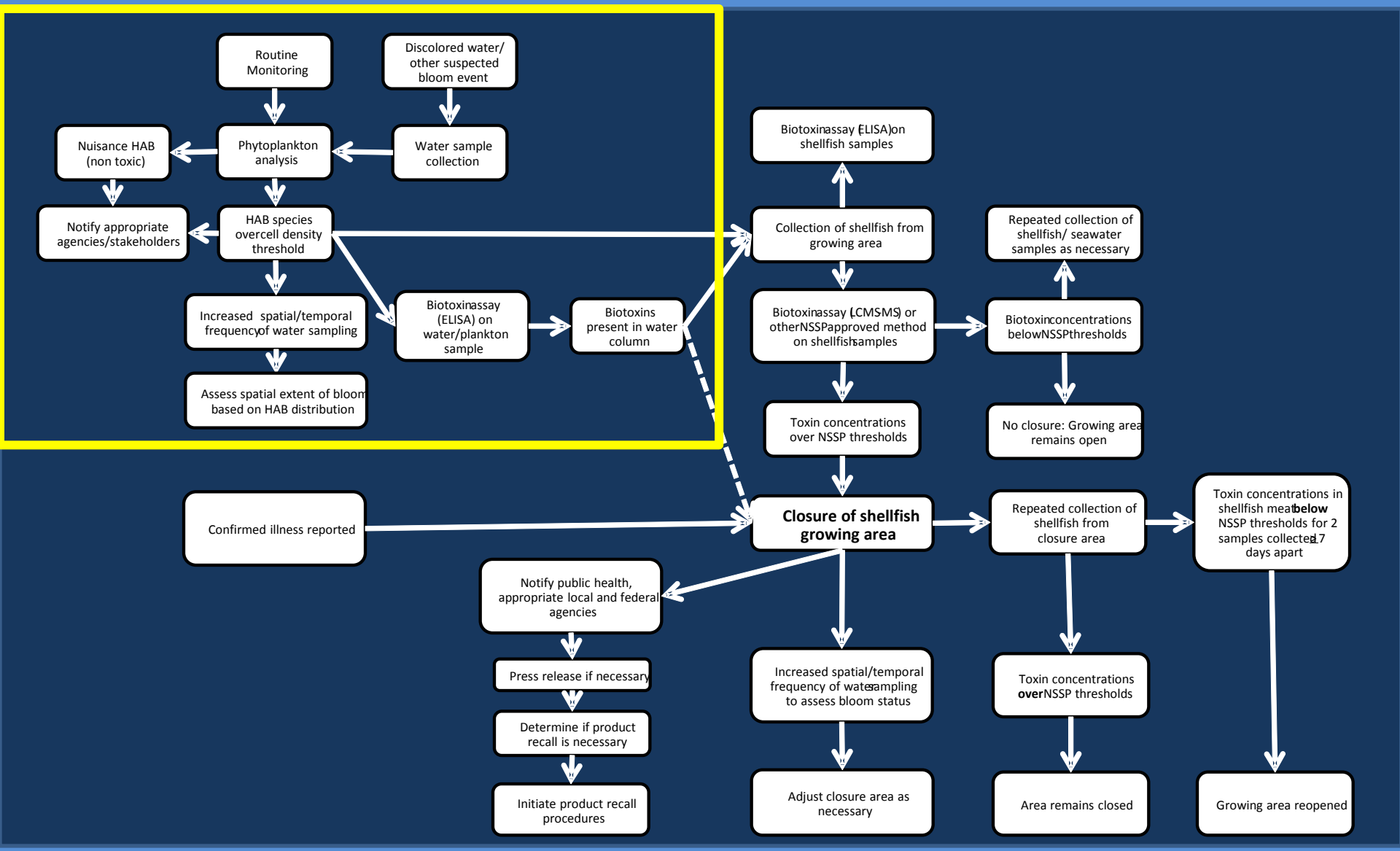
Pseudo-nitzschia seriata

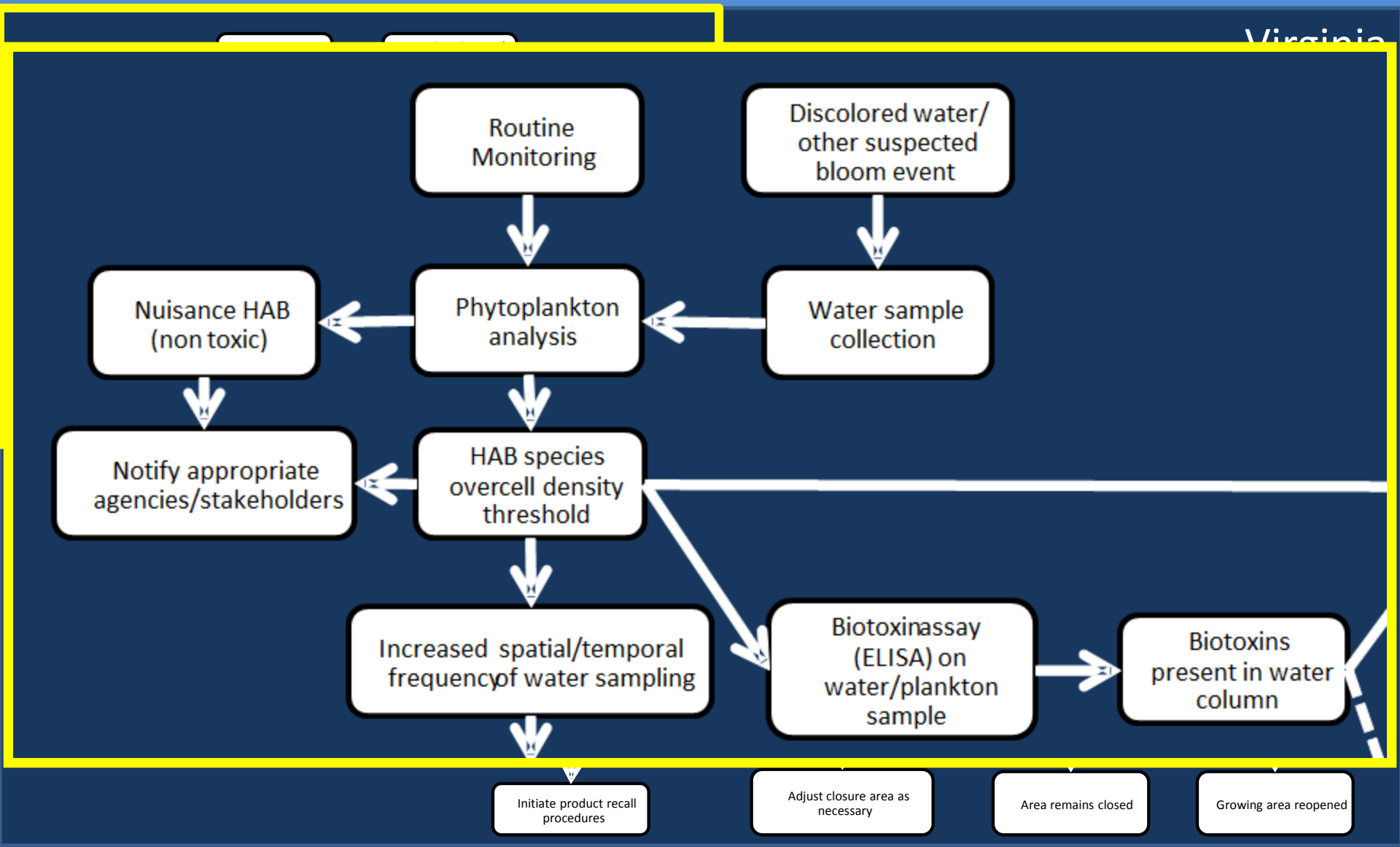
Cochlodinium polykrikoides

Alexandrium monilatum

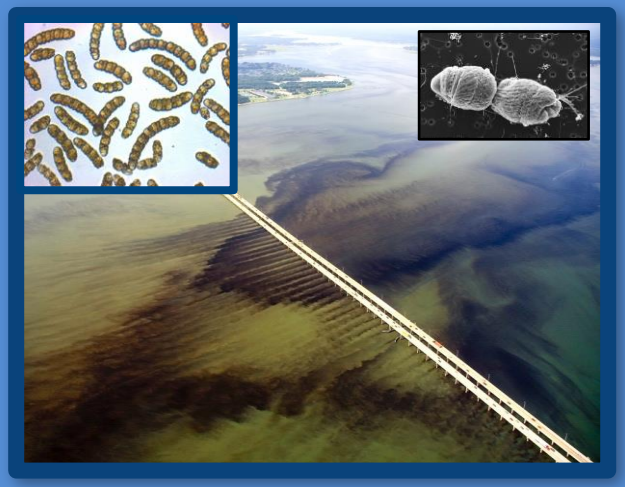
Algal species	Impacts	Main Toxin	NSSP shellfish growing area closure level (toxin w/in meat)	Regional threshold (cell density in water column)
Alexandrium tamarense species complex	Paralytic Shellfish Poisoning	Saxitoxin	80µg /100g	presence
Karenia brevis	Neurotoxic Shellfish Poisoning	Brevetoxin	0.8mg /kg	presence
Dinophysis spp.	Diarrhetic Shellfish Poisoning	Okadaic acid	0.16 mg/kg	≥ 10 cells/ml
Pseudo-nitzschia spp.	Amnesic Shellfish Poising	Domoic acid	2mg/100g	≥ 1,000 cells/ml
Alexandrium monilatum	Fish/invertebrate mortality	Goniodomin A	NA	≥ 1,000 cells/ml
Cochlodinium polykrikoides	Fish/invertebrate mortality	icthyotoxin	NA	≥ 1,000 cells/ml
Karlodinium veneficum	Fish mortality	Karlotoxins	NA	≥ 10,000 cells/ml

Virginia Shellfish Biotoxin Contingency Plan

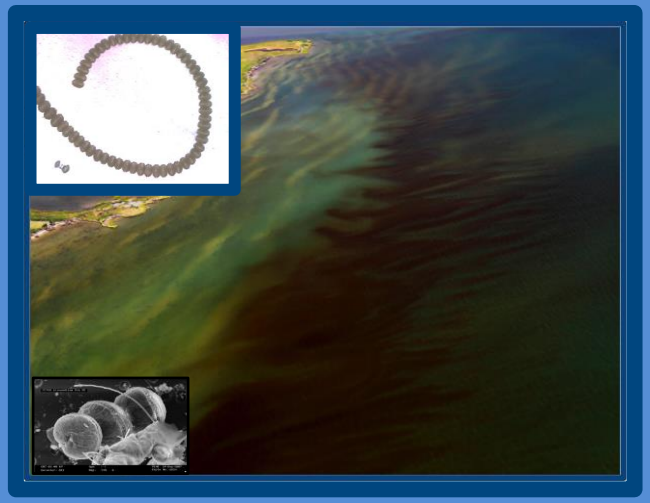



Routine Monitoring
Discolored water/ other suspected bloom event
Nuisance HAB (non toxic)
Phytoplankton analysis
Water sample collection
Notify appropriate agencies/stakeholders
HAB species overcell density threshold
Increased spatial/temporal frequencyof water sampling
Biotoxinassay (ELISA) on water/plankton sample
Biotoxins present in water column
Initiate product recall procedures
Adjust closure area as necessary
Area remains closed
Growing area reopened

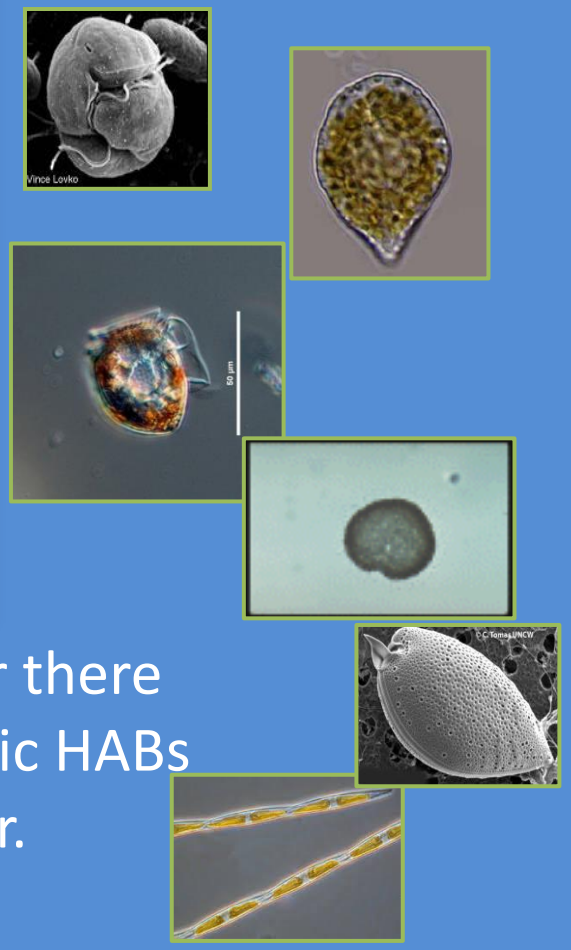
Historic blooms and emerging species



Cochlodinium polykrikoides-decades



Alexandrium monilatum-since 2007



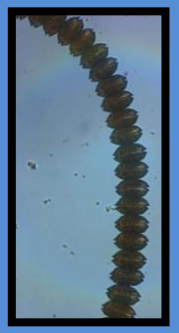
As mentioned earlier there are several other toxic HABs knocking on our door.

Cochlodinium polykrikoides

- Very heavy blooms in lower Chesapeake Bay almost annually.
- There have been reports of foul orders and respiratory irritation during blooms

York River-north of the Coleman Bridge

Alexandrium monilatum: Emerging species



- 2007 a "new" bloom organism was identified as *Alexandrium monilatum* blooming in the York River near VIMS.

- This is a common bloom species along the southern Atlantic and Gulf coasts of the USA.

- The range has expanded to the Chesapeake Bay region

  - Heavy blooms in recent years, particularly in the York River region.

  - Recently expanding north and south to the Potomac, VA Beach and into the James River, and NC Outer Banks.

A. monilatum: Health Effects?

Many *Alexandrium* species produce saxitoxins: human health effects are characterized

A. monilatum toxin = goniodomin A: health effects not well characterized

Other toxic compounds also produced?

Fish and shellfish mortalities reported with Gulf state blooms

York River area

Mortality of experimental animals at VIMS exposed to bloom water

~500 Whelks

~10 Cow nose rays

Shellfish growers have reported mortality; particularly of young oysters.

VIMS laboratory studies-numerous toxicity bioassays

Mortality to zooplankton, larval, juvenile and adult oysters, larval finfish, worms…

A. monilatum: Human Health Effects?

VIMS staff and students

- Field and laboratory exposures
- Respiratory, mucosal and dermal irritation
  - Coughing, watery eyes, itching and stinging skin, some rashes
- Very mild gastrointestinal disturbances

VDH Staff

- Tingling to slightly stinging skin submerged during HAB sampling
- Effects subsided after rinsing with freshwater, no rash or redness

Groups most likely to be exposed:

- Scientists
- Aquaculturists
- Fishers
- Boaters
- Swimmers

❖Additional exposure information is needed!

VDH Factsheet – Occupational Exposures

VDH VIRGINIA DEPARTMENT OF HEALTH

ALGAL BLOOMS :
INFORMATION FOR VIRGINIA'S WORKING WATERFRONT

Aerial photo of algae bloom on York River
Photo credit: VIMS

What is an algal bloom?

Algae are naturally-occurring microscopic organisms that are found in fresh and salt waters of Virginia and around the world. Algae may multiply rapidly when environmental conditions are favorable, such as after a rain has washed nutrients from the land into the river. A great number of algal cells in the water results in what is called an algal bloom.

What does it look like?

Algal blooms often result in a noticeable change in the color of the water due to the color of the pigments inside the algal cells. They can be many colors, but are most commonly red or brown and are referred to as "red" or "brown" tides. An odor may also be present in the vicinity of the bloom. Some algae can produce a bioluminescence, glowing bright blue at night.

How common are they?

Algal blooms occur in the lower Chesapeake Bay during the spring and summer. Algae respond to the same conditions that encourage plant growth on land, and are most likely to form blooms when waters are warm and nutrient rich. Certain blooms are predictable, like those which occur in summer each year in the lower York River near Gloucester Point and Yorktown beaches, in the Lower James offshore of Norfolk Beaches, and at the mouths of the James and York Rivers.

Are they harmful?

Most algae do not harm people, wildlife, or the environment. However, some types of algae in Virginia are dangerous and can affect fish and humans, as well as other animals like birds and marine mammals. These are known as Harmful Algal Blooms (HABs). There have been reports of work-related exposures to HABs resulting in health effects which include mild burning or tingling of the skin, watery eyes, runny nose, or mouth irritation. **If you are concerned that you have been exposed to a HAB, please see your doctor and report health effects to the VA HAB Hotline.**

WHEN IN DOUBT STAY OUT!

- ***Avoid contact by wearing protective gear (gloves, waders, eyewear, etc.)***
- ***Wash exposed skin w/ fresh water***
- ***See your doctor if you have health effects***
- ***Report health effects to the Virginia HAB Hotline (888) 238-6154***

What should I do if I see an algal bloom?

When in doubt, stay out (this goes for pets too). Avoid contact with the water in areas with a visible bloom, or water with unusual color or odor, or if dead fish are observed. If you come in contact with bloom water, wash skin thoroughly with clean water. If you cannot avoid contact, protect skin by wearing gloves, waders or thigh boots and avoid eye splash by using protective eyewear. If you are concerned about an exposure to bloom water, please see your doctor and call your local health department. Telling your doctor about contact with water and the specific location may help treat any symptoms properly.

Report HABs, fish kills, and suspected health effects to the HAB Hotline 888-238-6154.

Visit http://www.HarmfulAlgaeVa.com for more information on algal bloom activity or to submit an online HAB report.

- **Raise awareness**
- **What to do if exposed**
- **How to report blooms, fish kills, and exposures**

Acknowledgements

- VIMS
  - Wolf Vogelbein
  - Juliette Smith
  - Thomas Harris
  - Gail Scott
  - Bill Jones
  - Patrice Mason
  - Alanna MacIntyre
  - Marta Sanderson
  - Sarah Pease
  - Clara Robison
- VDH
  - Todd Egerton
  - Margaret Smigo
  - Amani Bassyouni
  - Rebecca LaPrell (now CBF)
- ODU
  - Todd Egerton
  - Leah Gibala-Smith
  - Harold Marshall

Thank you!

Bioluminescence by *A. monilatum* was reported throughout the region: Rappahannock down into VA Beach (NC Outer Banks)

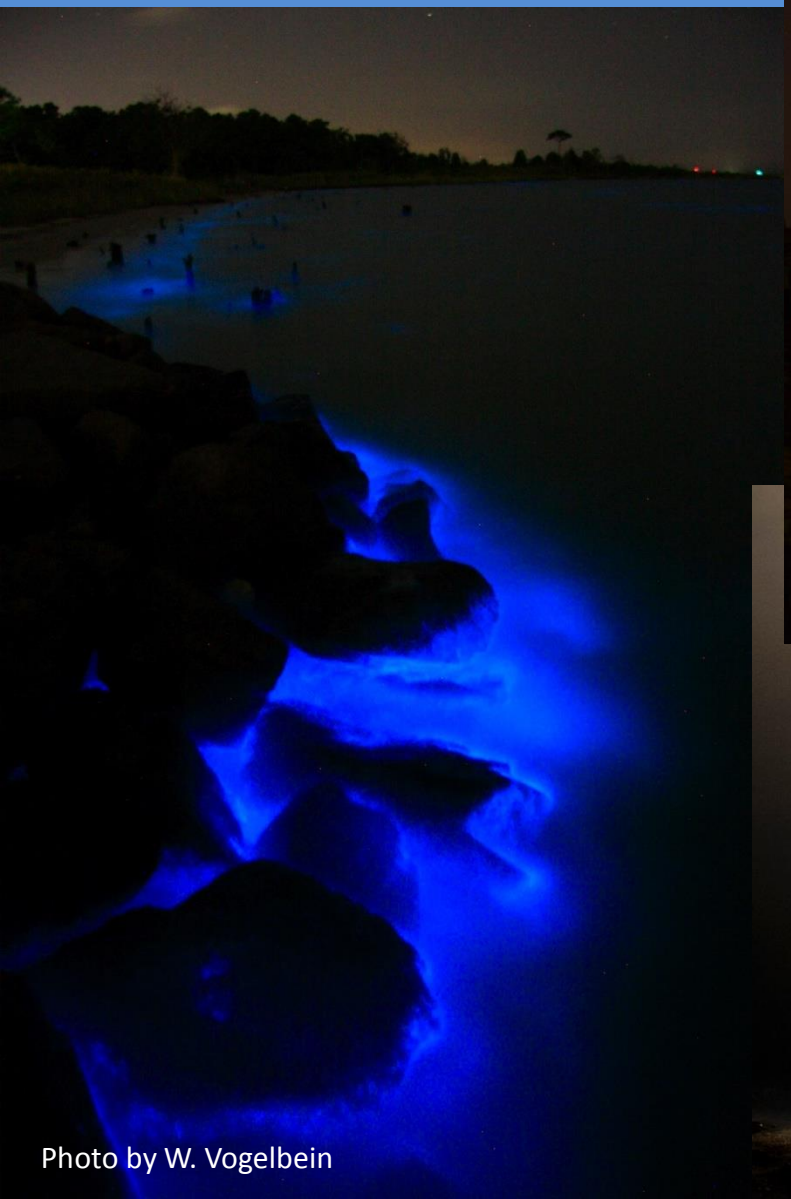
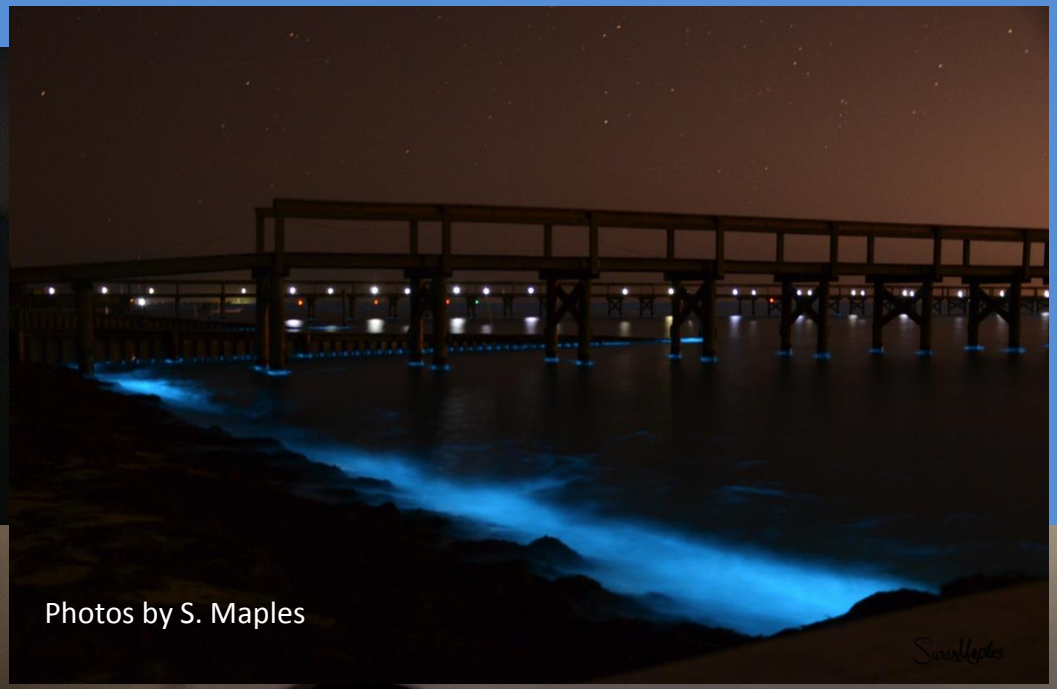
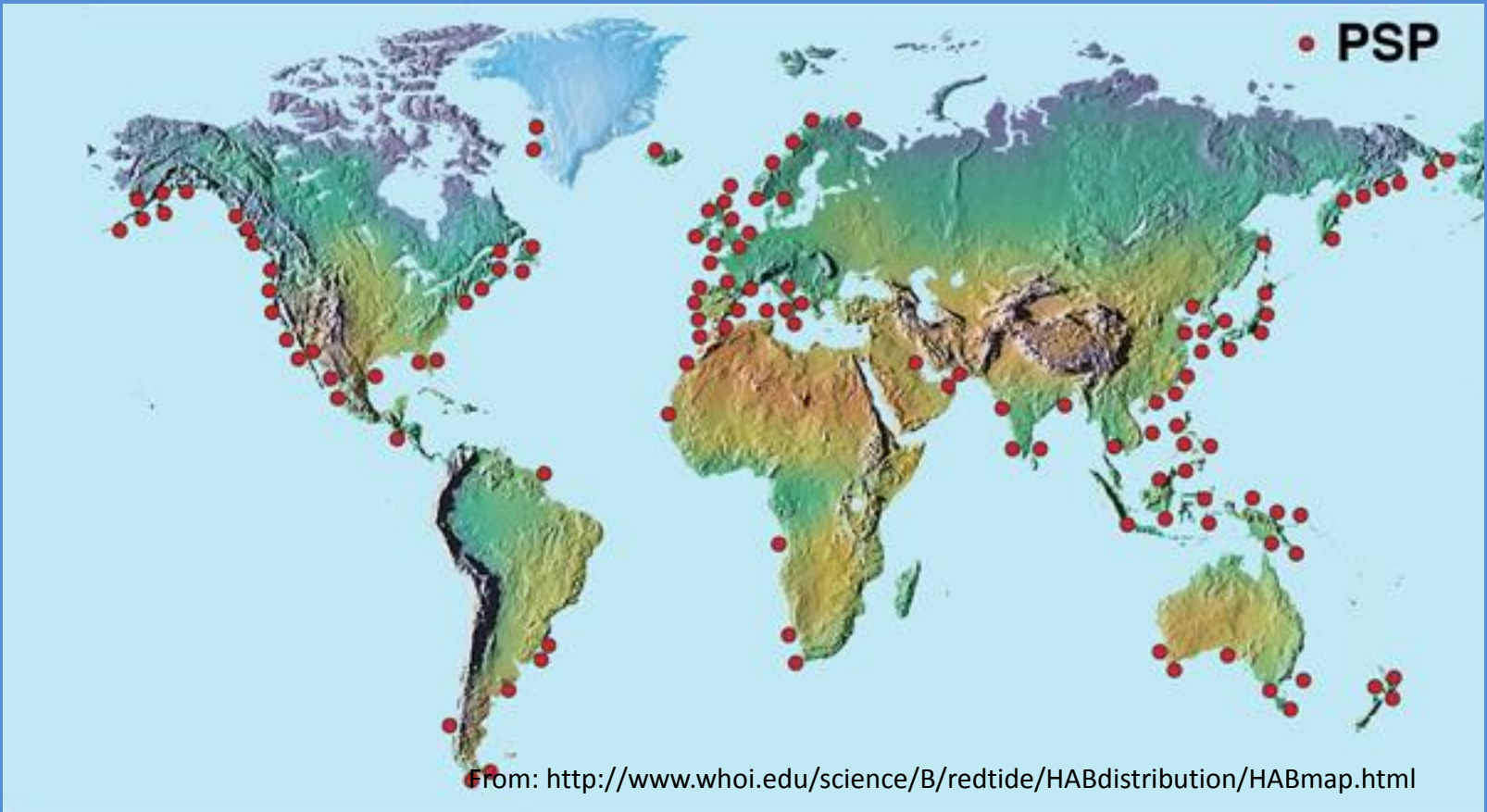


Photo by W. Vogelbein



Photos by S. Maples

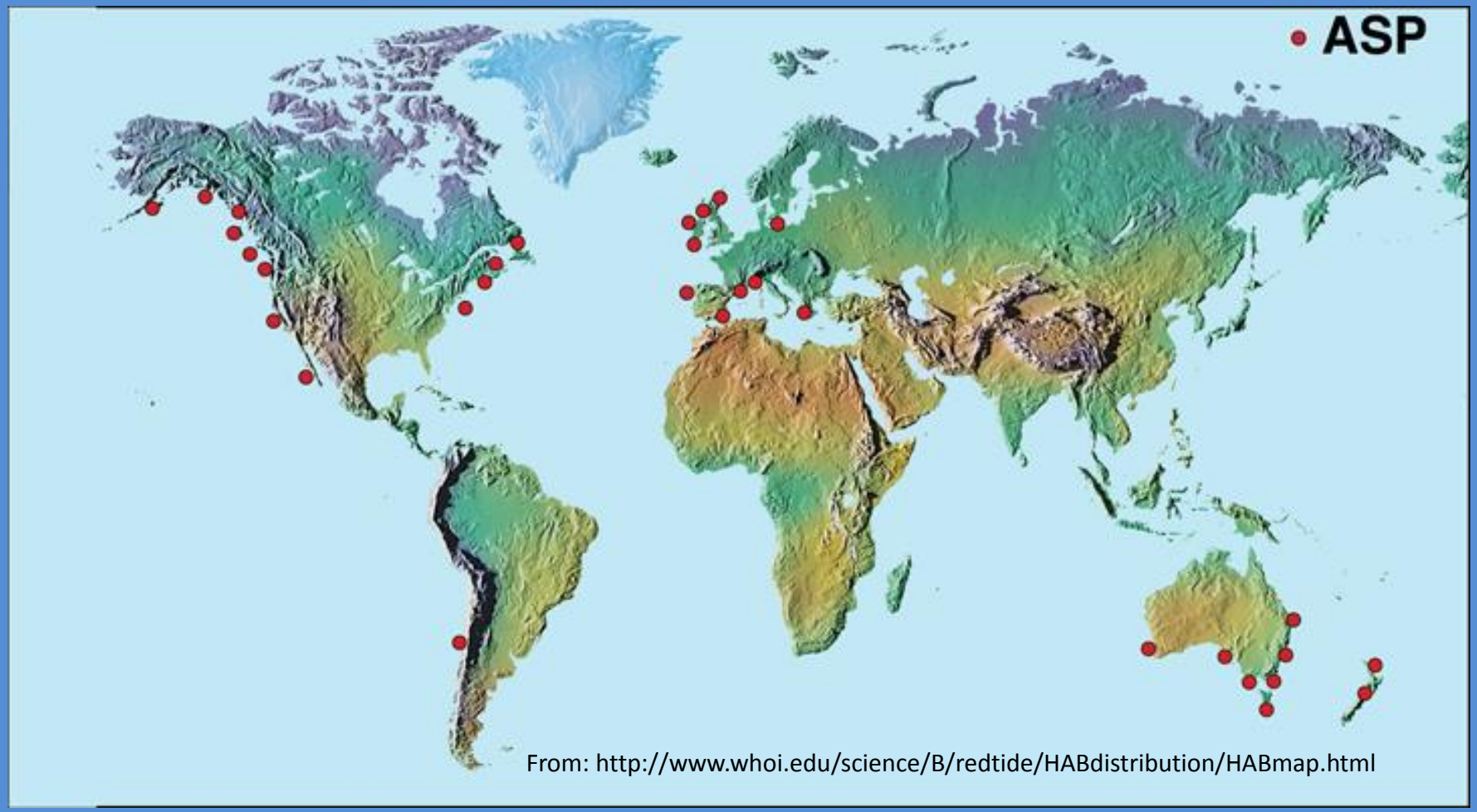
PSP Distribution



From: http://www.whoi.edu/science/B/redtide/HABdistribution/HABmap.html

- US- Northeast and West coast, less common in Caribbean and Gulf of Mexico
- It has been reported from all continents
- **A. minutum* found in MD waters

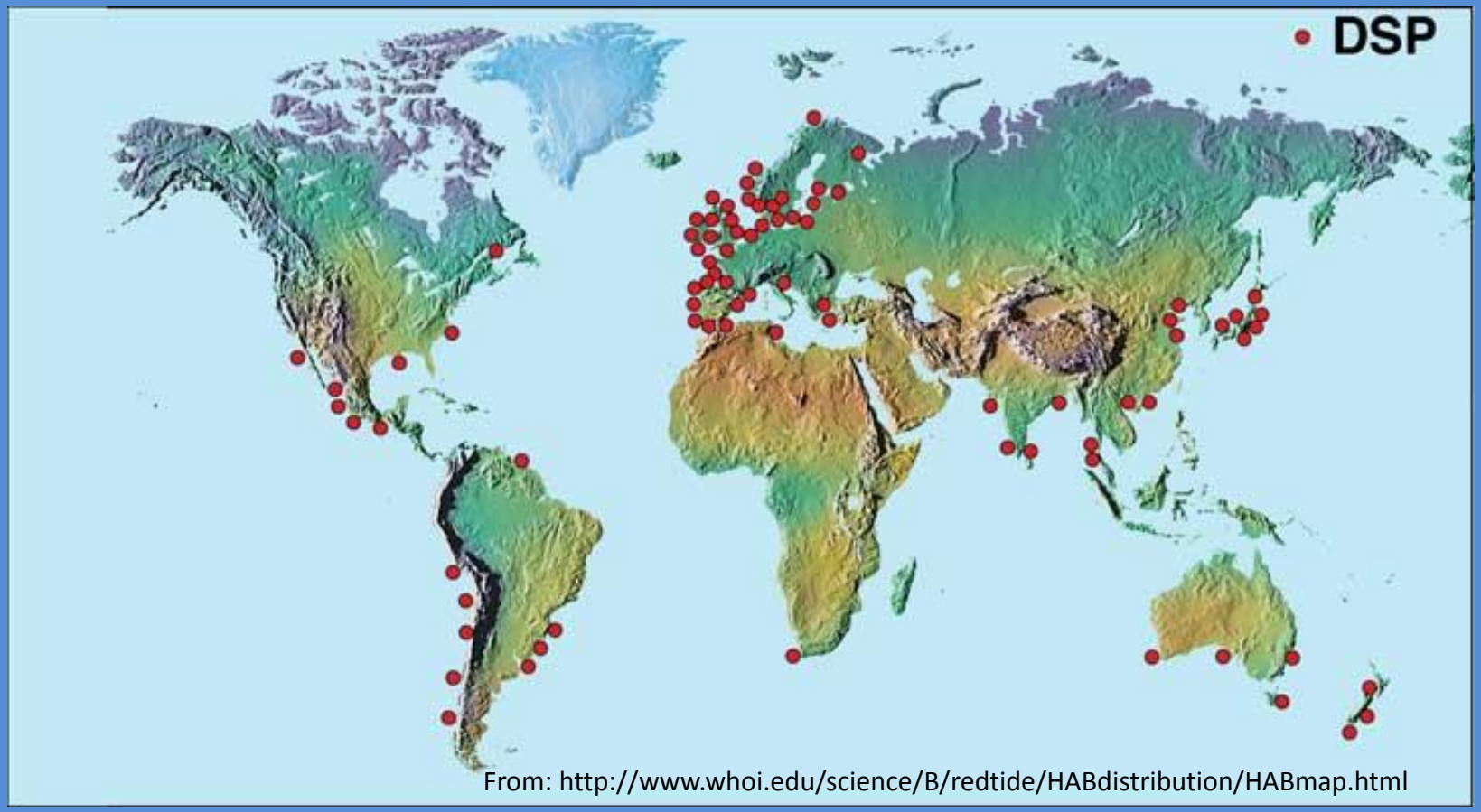
ASP Distribution



From: http://www.whoi.edu/science/B/redtide/HABdistribution/HABmap.html

- 1987-outbreak in PEI, Canada (mussels): 143 illnesses, 4 deaths
- Recent events on the US West coast from Baja to Alaska
- Europe, Australia, New Zealand and S. America
- *Pseudo-nitzschia* spp. in VA water samples-toxicity unknown

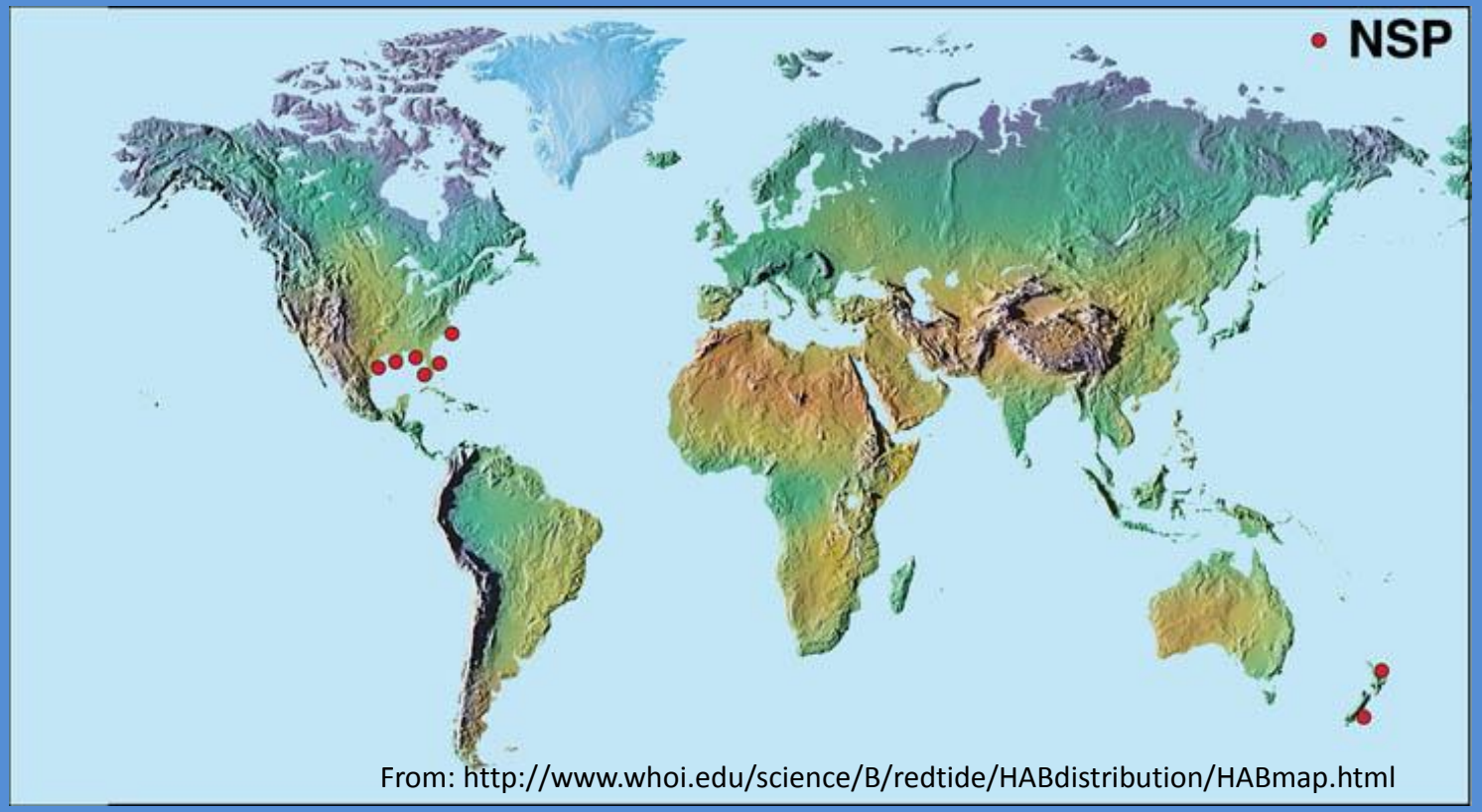
DSP Distribution



From: http://www.whoi.edu/science/B/redtide/HABdistribution/HABmap.html

- Netherlands in the 1960s
- Late 1970s from Japan
- Numerous cases around the world including US East and Gulf coasts
- *Dinophysis* spp. in VA water samples: toxicity unknown

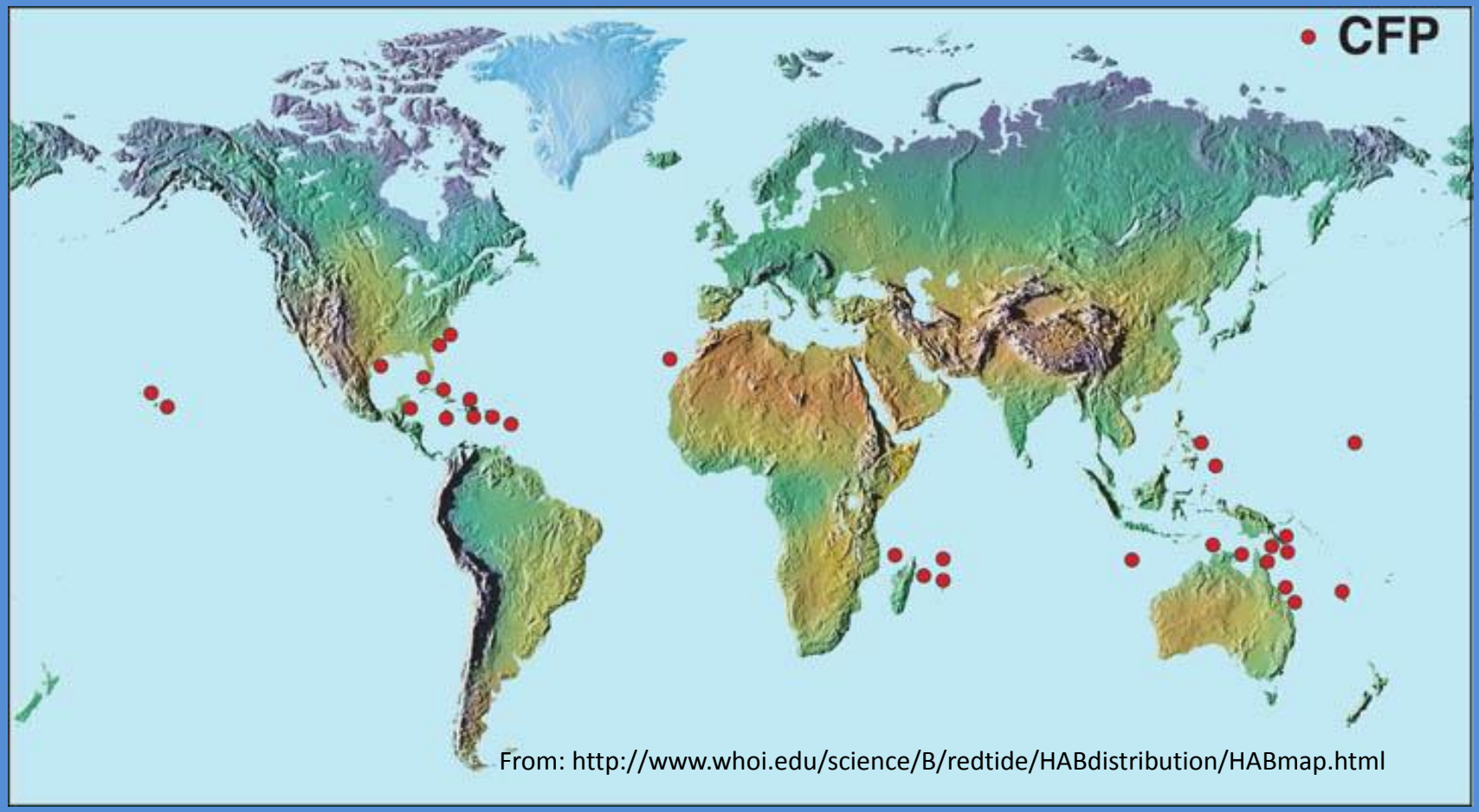
NSP Distribution



From: http://www.whoi.edu/science/B/redtide/HABdistribution/HABmap.html

- Gulf of Mexico, South Atlantic Bight in the US (as far north as NC) and New Zealand
- More recent reports from Mexico, Spain, Portugal and Japan

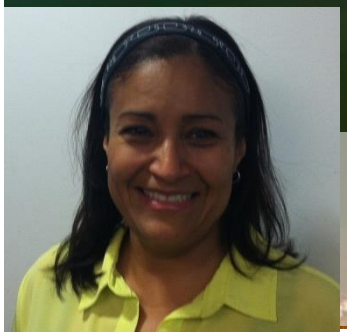
CFP Distribution



- Primarily sub-tropical and tropical distribution

Notes from the Field…

Epidemiology Investigations and surveillance of health effects associated to Alexandrium *monilatum* algal blooms in Eastern Region September 2016



Ana Colón, MPH
Eastern Region Epidemiologist
Virginia Department of Health

Photo Credit: Virginia Institute for Marine Science

VDH VIRGINIA DEPARTMENT OF HEALTH
Protecting You and Your Environment

Marine water algal blooms events

-1985 Monitoring of HABs in Virginia tidal waters

-1997-2005 focus in highly toxic Pfiesteria strains (*Brown or Red tide*)

-Caused fish disease, kills and human effects

Role of the LHDs

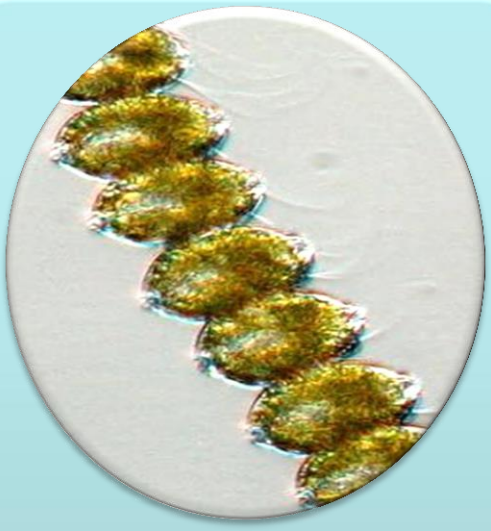
-Alert medical & public to report

-Notify VDH-DEE

-Assist: ID cases, source & prevention

-Consider press releases

-Promote HAB hotline for reporting



Alexandrium monilatum

-Recent human illness concerns

-Epi challenges:

- Defining exposure
- Tracking & reporting
- Active surveillance vs. passive

Human Illness Concerns: Epi Investigation

Sept. 2016

- Gloucester Point, Yorktown and James River high counts
- Researchers & water monitoring staff (4 recent and 2 historical exposures)

Approach

- Confirm the *who-what-where-when-how?...*
- Apply *OHHABS case definition and report form
- Consultation with area experts, within VDH (DSI-DEE-DSS) and CDC National Center for Environmental Health

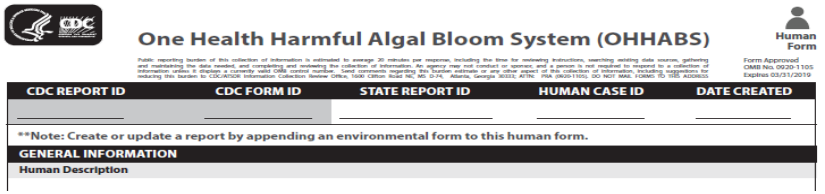
Findings

- 3 of 4 predominantly skin irritation sensation of tingling to slightly burning, no visible reaction
- 1 of 4 reported varying symptoms; chronic dermal, respiratory and GI
- Not immediate, within 15 minutes lasting 10-12 hours
- No beach goers complaints

***https://www.cdc.gov/habs/pdf/ohhabs-case-and-event-definitions-table-3-14-17.pdf**

Epi Investigation Challenges

- Variety on exposure and locations
- Required coordination
  - Case finding and active surveillance
- Not ‘front-user’ friendly OHHABS case report form



One Health Harmful Algal Bloom System (OHHABS)

Human Form

CDC REPORT ID	CDC FORM ID	STATE REPORT ID	HUMAN CASE ID	DATE CREATED

**Note: Create or update a report by appending an environmental form to this human form.

GENERAL INFORMATION

Human Description

- Participants recall and perception bias

Accomplishments

A great starting point!

- Systematic approach to investigate individual complaints and clusters in relation to current environmental HABs status
- Validated query on ESSENCE syndromic surveillance to pick HAB associated complaints from hospital ED and urgent care
- Developed user friendly VDH internal form to capture information: *Harmful Algal Bloom Initial Health Screening*
- Worked with VDH and partners in developing prevention messages, strategies and training
- Created capacity to document HAB human exposures not recorded before, specifically for A. *monilatum*

Thank you!

Freshwater - Cyanobacteria and Health effects

VDH VIRGINIA DEPARTMENT OF HEALTH
Protecting You and Your Environment

Amani Bassyouni
Waterborne Hazards Control Program Statistical Analyst

Overview

- Also known as blue-green algae
- Photosynthetic single-celled
- Naturally exists mainly in freshwater and some forms of saltwater
- Excessive nutrient leads to blooms, forming visible film or scum

Toxicity & Cyanobacteria

- Most species are not toxic,

but many can produce cyanotoxins

- Most common cyanotoxins:
  - Microsystin
  - Clyndrospermopsin
  - Anatoxin- group & Saxitoxins

- Most common cyanobacteria producing toxins:
  - *Anabaena, Clyndrospermosis, Microcystis, etc*.

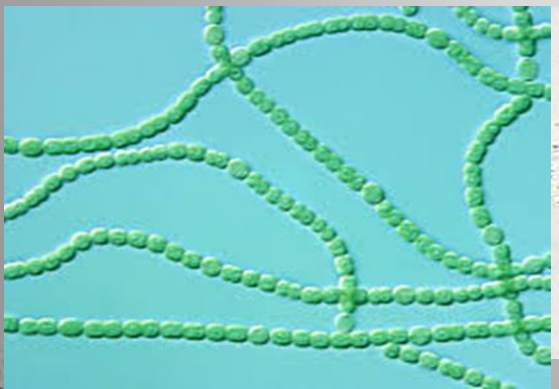
- Most common health effects:
  - Damage the liver, affect the nervous system and the skin
  - In US, most acute health issues/deaths have been pets and livestock

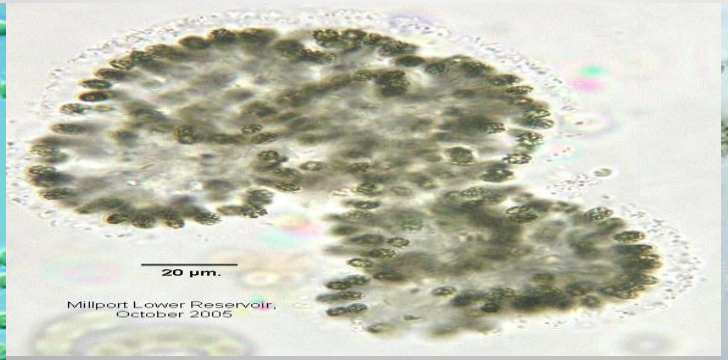
Toxicity & Health Effects

- **Hepatotoxins (liver damage):**

(Microcystin, Nodularins, Clindrospermosin)

  - Route of exposure: swallowing water contaminated with cyanobacteria or toxins
  - Signs & symptoms: elevated ALT, hepatomegaly, gastroenteritis (diarrhea, nausea, vomiting, abdominal pain), fever, malaise, headache
  - Symptoms onset: minutes to hours
  - Differential diagnosis: Acute Viral Hepatitis, Toxic Hepatitis





Toxicity & Health Effects

- **Neurotoxins (nervous system):**

(Anatoxin-a, Saxitoxins)

- Route of exposure: swallowing contaminated water

Signs & symptoms: tremor, twitching, muscles cramps, motor weakness, paresthesia, cardiac or respiratory paralysis

- Symptoms onset: minutes to hours
- Differential diagnosis: Pesticide poisoning, other toxic poisoning

Toxicity & Health Effects

- **Dermatotoxins (skin):**

(Aplysiatoxin, Lipopoly-saccharides, Lyngbyatoxin)

- Route of exposure: skin contact with contaminated water
- Signs & symptoms: itchy skin, red skin, hives, skin blistering/rashes,
- Symptoms onset: minutes to hours
- Differential diagnosis: Allergic Reactions

Cyanobacteria bloom at Grand Lake St. Marys, Ohio, 2010. Photo by Ohio EPA.

Health Impacts of Cyanotoxins

CLEAN WATER ACTION
CLEAN WATER FUND

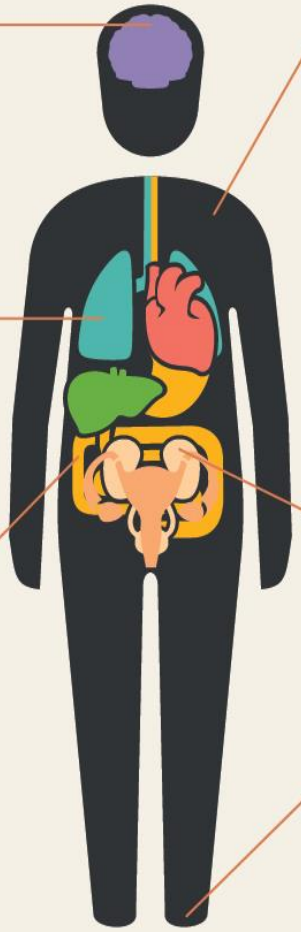
Note: *Not all cyanotoxins lead to all of these health impacts. These listed impacts are caused by microcystins or cylindrospermopsin, the two cyanotoxins that EPA has issued Health Advisories for.*

IN HUMANS

Brain
Source: Ingestion
Symptoms:
- Headache
- Incoherent speech
- Drowsiness
- Loss of coordination

Respiratory System
Source: Inhalation
Symptoms:
- Dry cough
- Pneumonia
- Sore throat
- Shortness of breath
- Loss of coordination

Digestive System
Source: Ingestion, drinking contaminated water, or eating contaminated fish
Symptoms:
- Abdominal pain
- Nausea
- Vomiting
- Diarrhea
- Stomach cramps



Body
Source: Contact, e.g. swimming
Symptoms:
- Irritation in eyes, nose, and throat
- Blistering around the mouth
- Skin rash, including tingling, burning and numbness
- Fever
- Muscle aches (from ingestion)
- Weakness (from ingestion)

Organs
Source: Ingestion
Symptoms:
- Kidney damage
- Abnormal kidney function
- Liver inflammation

Nervous System
Source: Ingestion
Symptoms:
- Tingling
- Burning
- Numbness

IN PETS

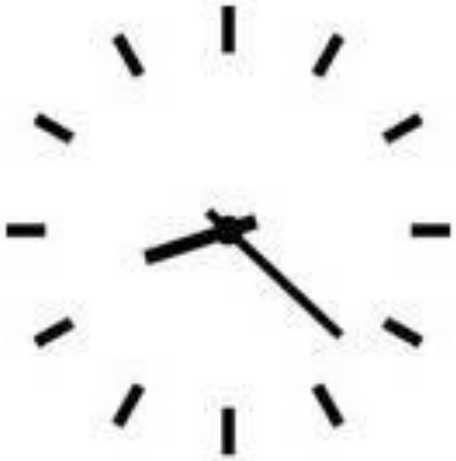
Symptoms:
Vomiting
Fatigue
Shortness of breath
Difficulty breathing
Coughing
Convulsions
Liver failure
Respiratory paralysis leading to death

Cyanobacteria Toxins & Health Effects

	Hepatotoxins: Route of exposure: Swallowing water contaminated with cyanobacteria or toxins Signs & symptoms: elevated ALT, hepatomegaly gastroenteritis (diarrhea, nausea, vomiting, abdominal pain), fever malaise, headache Symptoms onset: Minutes to hours Differential diagnosis: Acute Viral Hepatitis Toxic Hepatitis			**Neurotoxins:** Route of exposure: Swallowing water contaminated with cyanobacteria or toxins Signs & symptoms: Tremor, twitching, muscles cramps, motor weakness, paresthesia, cardiac or respiratory paralysis Symptoms onset Minutes to hours Differential diagnosis: Pesticide poisoning, other Toxic Poisoning					**Dermatotoxins:** Route of exposure: skin contact with water contaminated with cyanobacteria or toxins Signs & symptoms: itchy skin, red skin, hives skin blistering/rashes, Symptoms onset minnutes to hours Differential diagnosis: Allergic Reactions		
Cyanobacteria Genera	Microcystin	Nodularins	Clindrospermosin	Anatoxin-a	Anatoxin-a(s)	Homoanatoxin-a	Saxitoxins	B-N-methylamino-L-alanine	Aplysiatoxin	Lipopoly-saccharides	Lyngbyatoxin
Anabaena	Y		Y	Y	Y		Y	Y		Y	
Anabaenopsis	Y									Y	
Aphanizomenon			Y	Y			Y			Y	
Arthrospira	Y									Y	
Cyanobium	y									Y	
Clindorspermopsis			Y				Y			Y	
Gloeotrichia	Y									Y	
Hapalosiphon	Y									Y	
Limnothrix	Y									Y	
Lyngbya-Microcystis	Y			Y			Y	Y	Y	Y	Y
Nodularia		Y								Y	
Nostoc	Y									Y	
Oscillatoria	Y			Y		Y			Y	Y	Y
Phormidium	Y			Y						Y	
Planktothrix	Y			Y		Y	Y	Y		Y	
Raphidiopsis			Y	Y		Y				Y	
Schizothrix									Y	Y	Y
Synechocystis	Y									Y	
Umezakia			Y							Y	

When Bloom Hits

- Share some HAB Universal Talking Points
- Based on the sample results:
  - Post warning sign
  - Post advisory and closure sign



Q & A time

Freshwater Algal Bloom

Case Study and Lessons Learned

Paige Bordwine, MPH, MT(ASCP)
Southwest Regional Epidemiologist

Overview of Epidemiology Support for Freshwater Algae Bloom

- In February, 2017, a freshwater algae bloom was reported in a reservoir used recreationally for fishing and served as raw water source for a water treatment plant serving approx. 37,000.
- A Unified Command was established that included local, regional and state partners

Epidemiology Support

- Surveillance
  - ESSENCE
  - Social Media Monitoring
- Partner Resource Groups
  - Blue Ridge Poison Control Center
  - Virginia Biocomplexity Institute at Virginia Tech
    - Expertise for social media monitoring

Surveillance: ESSENCE

Four Queries Containing the Following Terms

Gastrointestinal

- abdominal pain
- gastroenteritis
- gastrointestinal
- vomit
- diarrhea
- hepatitis
- headache
- anorexia
- not eating/drinking
- dark urine
- yellow
- jaundice
- bloody stool

Neurological

- tingle/tingling
- numb
- itch
- skin crawling
- paresthesia
- tired
- fatigue
- malaise
- altered mental status
- tremor
- twitch
- fasciculation
- salivate/salivation
- uncoordinated
- weak
- paralysis

Skin irritation

- dermatitis
- skin
- irritate/irritation
- rash (*not diaper, poison ivy, or allergic)*
- eye pain,
- eye irritation,
- eye problem,
- something in eye,
- red eyes,
- rubbing eyes,
- swollen eyes

Exposure

- exposure (*not blood, body fluid, needle, poison ivy, sexually transmitted, flu, or strep)*
- water (*not pregnant with water breaking*)

Surveillance: Social Media Monitoring

ChatterGrabber: A twitter search method based social media data miner developed in Python

- –**Google Docs Interface** (GDI) for simplified partner access
- – **Natural Language Processing** (NLP) classifiers filter content
- — CSV data, charts, maps, word clouds, and animations are sent nightly to subscribers
- – Tracks shared links, hashtags, and images
- – Can be linked with **EpiDash** to provide an online dashboard

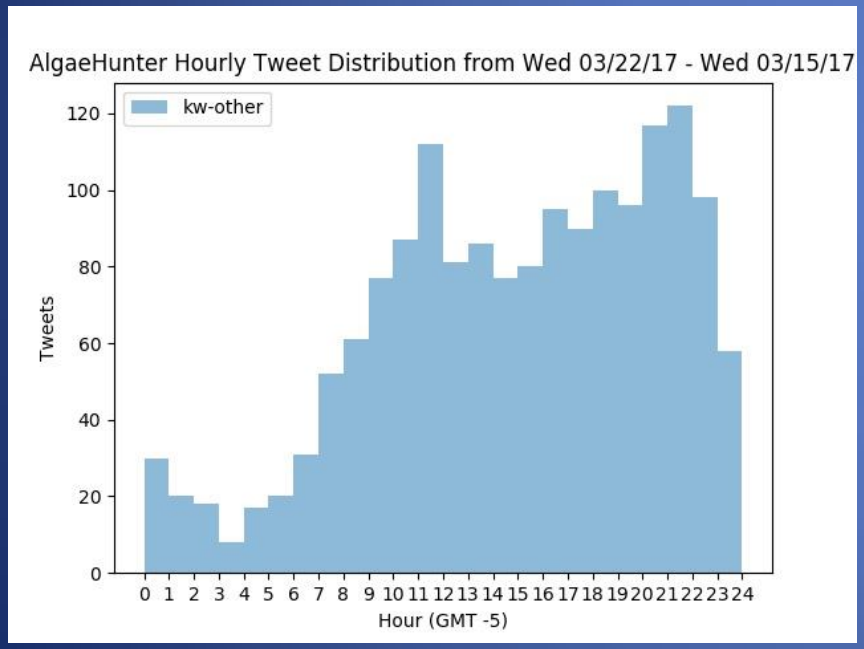
Surveillance: Social Media Monitoring ChatterGrabber Setup

Develop the following:

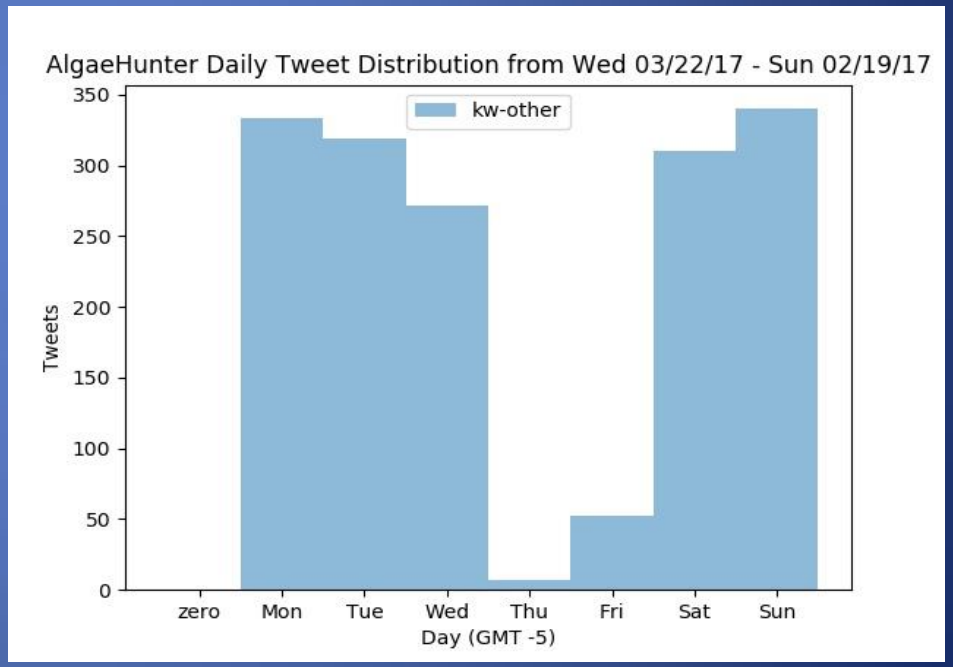
Terms	Qualifiers	Exclusions
Vomiting	nauseous	ate too much
Barf	unwell	alcohol

Surveillance: Social Media Monitoring Tweet Distribution

Hourly Distribution



Daily Distribution



Partner Resource Groups: Virginia Biocomplexity Institute at Virginia Tech

ChatterGrabber workshop:

- 4 hour, zero to hero workshop on running ChatterGrabber

https://drive.google.com/drive/folders/0B8VhE4yQ6s1FfnpHeEZaTHk0bU9IZjl6QmNlZmxVMUJmd3RIZGthbUl3NFRnNGZfekVhQk0

ChatterGrabber Github:

Open source software available at:

https://github.com/jschlitt84/ChatterGrabber

Partner Resource Groups: Poison Control

- Source of information regarding exposures
- Subject Matter Expertise regarding medical issues and recommendations for care
- Availability to provide information through their call center
- Provide Call center incident information, situation reports and talking points

Partner Resource Groups: Poison Control--Virginia Contacts

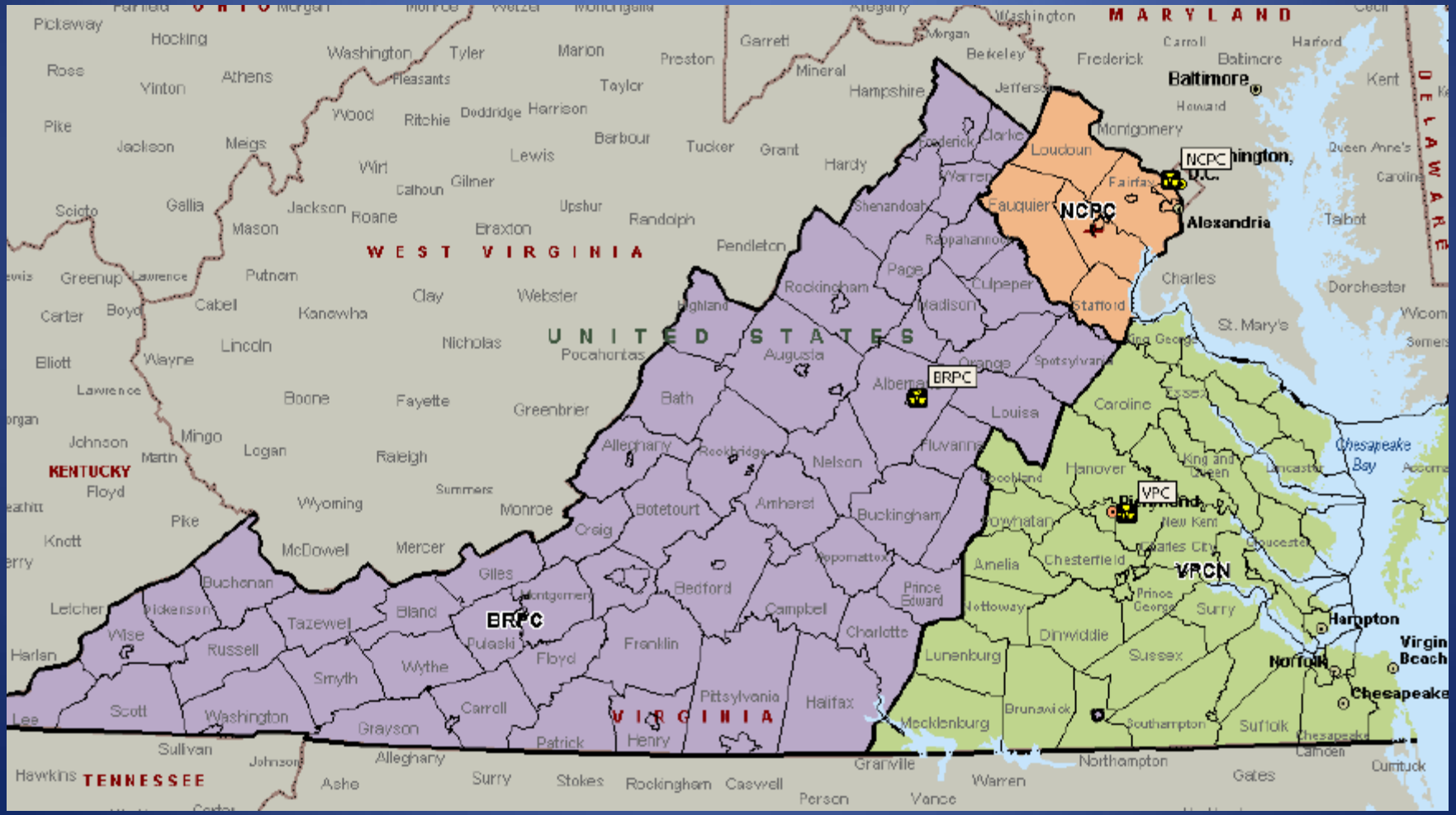
Poison Help Hotline: 1-800-222-1222

Virginia Poison Center
830 E. Main Street,
Richmond, VA 23298
1-800-222-1222
804-828-9123 (emergency line)
804-828-4780 (business office)

National Capital Poison Center
3201 New Mexico Avenue, NW, Suite 310
Washington, DC 20016
202-362-3867 (business office)

Blue Ridge Poison Center
1222 Jefferson Park Ave,
PO Box 800774
Charlottesville, VA 22908
800-451-1428 (emergency line)
434-924-5543 (business line)

Partner Resource Groups: Poison Control—Virginia Coverage



Thank you!

HAB-Related Health Effects Report Forms

CDC - One Health Harmful Algal Bloom System (OHHABS)

- Form used to report cases of human illness associated with a harmful algal bloom (HAB) or HAB toxins
- Composed of 6 pages that cover 6 parts
  - General Information
  - Human Exposure Information
  - Signs/Symptoms of Illness and Health Outcomes
  - Clinical Testing
  - Supplemental Information
  - Author and Agency Information
- Considers more details than HAB Initial Screening form
- Complete form submits to CDC

HAB Initial Health Screening Form

- Developed by VDH-DEE
- Considered as an initial tool to report HAB related illness
- Simpler/modified version of CDC - One Health Harmful Algal Bloom System (OHHABS)
- Purpose:

Since HAB can affect people through different ways (dermal, ingestion, inhalational) the form:

- Can assist in capturing suspected HAB different exposure pathways and associated illness.

Please Fax completed forms to Division of Environmental Epidemiology – Waterborne Hazards Program (804)864-8131

Harmful Algal Bloom Initial Health Screening

1. **Demographic and Contact info for complainant**

   Name_____ **DOB:**_____ **Age:**_____

   Address: _____ **Sex:** ☐F ☐M ☐Unk

   City/State/Zip: _____ **Phone:**_____

2. **Did the person have a suspected exposure to algae and/or algal toxins?**

   ☐Yes ☐No ☐Unknown

3. **Date of exposure** ----------
4. **Date of illness onset** ----------
3. **Duration of exposure** ----------
5. **Duration of illness**----------

6. **Suspected exposure source**

   ☐Recreational Water ☐Drinking Water ☐Food (finfish/shellfish) ☐Unknown
   ☐Other_____

7. **Water type (i.e., ocean, river, lake, community water, etc.)**_____

8. **Food type (i.e. grouper, oysters, etc.,)** _____

9. **Exposure activity description (i.e. swimming, eating shellfish, occupational, etc.)**

   _____

10. **Location of exposure (i.e. Body water's name and land mark)**

    _____

11. **Symptoms and signs of illness (e.g. tingling, burning, rash, nausea, vomiting, etc.)**

Sign/symptom	Date of sign/symptom	Duration of sign/symptom

12. **Health History**

Does a person have a history of	(Yes/No/Unknown)	If Yes, please describe

Chronic respiratory diseases		
Chronic skin diseases		
Chronic gastrointestinal diseases		
Neurological diseases (seizures, weakness, numbness)		
Allergies		

Epi-Comments: *example comments might include information regarding medical treatment sought, contact information, etc.*

For HAB exposures, linking the evidence of a bloom to a human/animal health effect can be challenging. If health effects reported coincide with suspected or ongoing HABs confirmed by environmental data, it may warrant additional review using the CDC OHHABS human report form. Completed HAB initial health screenings will be reviewed and tracked within an internal OEPI-DEE database. Completed CDC OHHABS forms will be entered into the CDC OHHABS database (within NORS). CDC OHHABS forms may be completed for individual cases.

HAB-Related Health Effects Report Forms

VDH - Harmful Algal Bloom Initial Health Screening

versus

CDC - One Health Harmful Algal Bloom System (OHHABS)

OHHABS against HAB Intimal Screening Form

- OHHABS form has been reviewed by some of Virginia HAB Taskforce members including epidemiologists. Their recommendations were:
  - OHHABS included too many details to be considered as an initial screening form
  - Regional, local, and district epidemiologists usually receive many random calls related to water illness. Most of them aren't relevant

OHHABS Against HAB Initial Screening Form

- OHHABS form may not be a useful tool to report all these events/calls
- Creates simpler initial form to report most of the calls and then filters based on their association to HAB
- Fills out OHHABS form and then submits to CDC

HAB Screening Form, Waterborne Illness Form, and REDCap

- DEE continuing effort to develop an algorithm that allows epis to report all waterborne illness, including HAB, using one form
- RedCap will be used to develop this algorithm and to store collecting data.
- Good opportunity to encourage all epis to request Redcap access if they do not already have one

HAB Screening Form, Waterborne Illness Form, and REDCap

- Purposes:
  - Easy to report all suspected waterborne illness using one standard form and database
  - Easy for DEE-Waterborne to track and filter submitted forms
  - Helps in decision-making process to fill out and submit OHHABS and/or NORA forms

Questions




Harmful Algae Bloom Sample Collection Protocols for Virginia Waters

Leah Anne Gibala-Smith
Laboratory Manager
Phytoplankton Analysis Laboratory
Old Dominion University

RECOMMENDED EQUIPMENT

- 500 ml plastic containers
- 250 ml amber glass bottles
- Lugol's iodine solution
- Field sheet, pen, and Sharpie
- Cooler

Virginia Dept. of Health sampling kit supplied to field offices

SAFETY

- Wear gloves and protective eyewear when sampling.
- Avoid inhaling spray or getting spray in eyes.
- Wear boots or waders when wading.
- Only enter the water when you have a field buddy … or an audience!

Unsafe collection attire

Safe collection attire worn by DEQ staff during Pfiesteria sampling on Rappahannock River in 1997

DEQ and ODU staff at York River State Park 2017

SAFETY

- Do not ingest or allow water to come into contact with skin.
- *If skin contact occurs, immediately wash with clean water.*
- Wash hands and equipment after each sampling event.

Unsafe collection technique

Safe collection technique by ODU and VDH staff

SITE DESCRIPTION

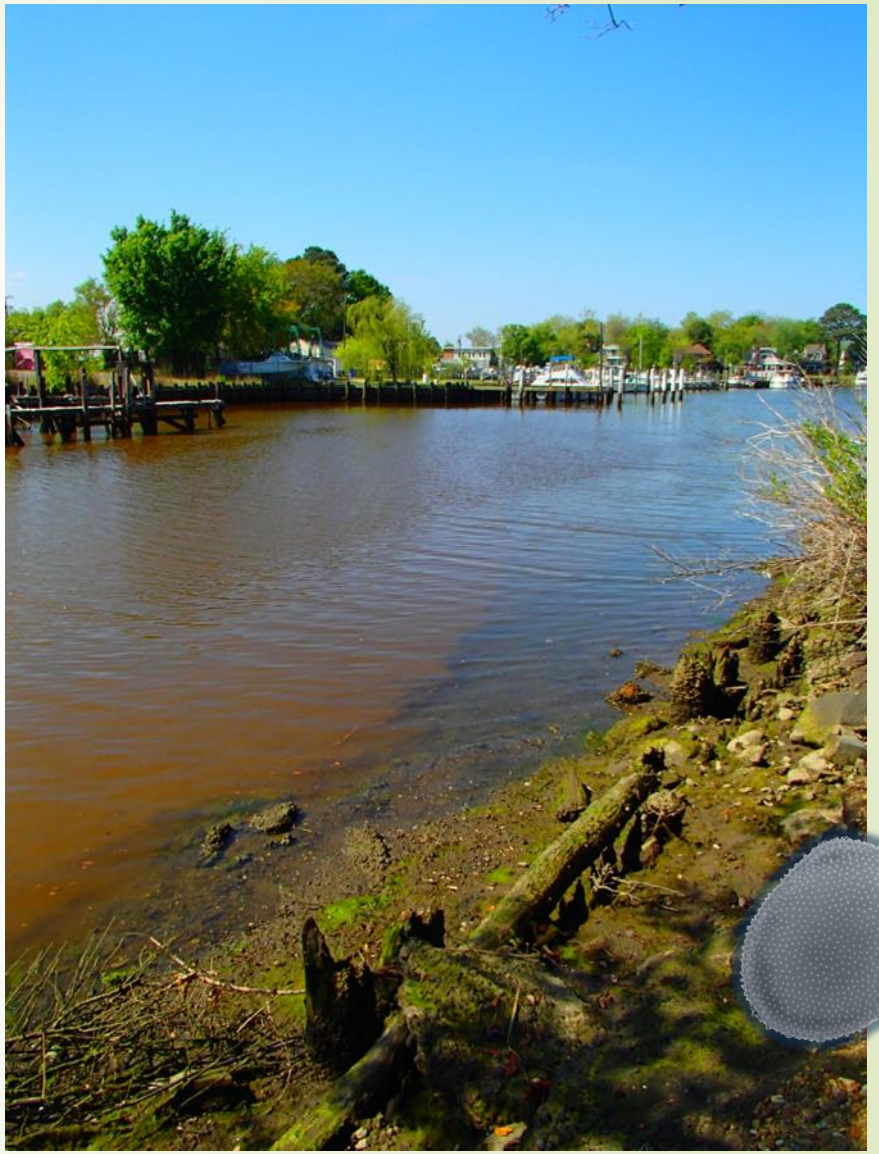
- Record observations for each sample taken (location in body of water, color of bloom, presence of odor, scum, dead fish, proximity to culverts, docks, recreational beaches, ect).

Historical blooms in Hampton Roads area

SITE DESCRIPTION

- Record observations for each sample taken (location in body of water, color of bloom, presence of odor, scum, dead fish, proximity to culverts, docks, recreational beaches, ect).

Pamunky Creek 2016 (Anabaena spp)



Lafayette River 2013 (Prorocentrum minimum)

SITE DESCRIPTION

- Record environmental parameters including water temperature, salinity, dissolved oxygen, secchi depth, conductivity, and turbidity.
- Record site name, latitude and longitude of sample location, and position of sample taken (ie: scum layer, sub surface layer (-.5m), bottom (+.5m), ect…).

Detailed record keeping in log books or on data sheets by ODU and VDH field staff

SITE DESCRIPTION

Where to collect the sample

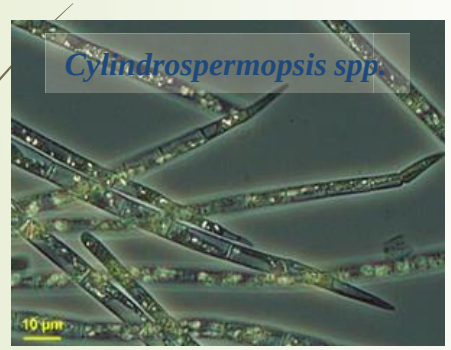
- For each event, take a sub surface (-.5m) sample from the center of the bloom.
- When there is a scum present, take a second sample at the scum-water interface. The cells present at the surface exposed to air and sun are often degraded, dying, or dead and not well suited for taxonomic enumeration.
- If there is a mat on the substrate, collect a water sample +.5m above the bottom. When water is ankle deep, collect at -15cm below the surface.

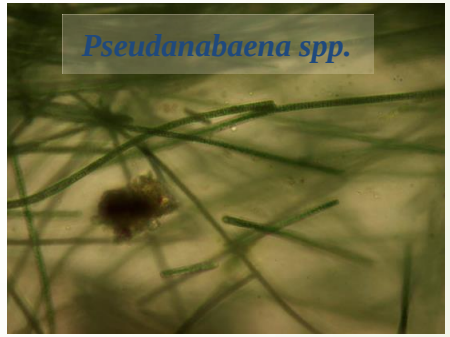
Sub surface grab from a boat

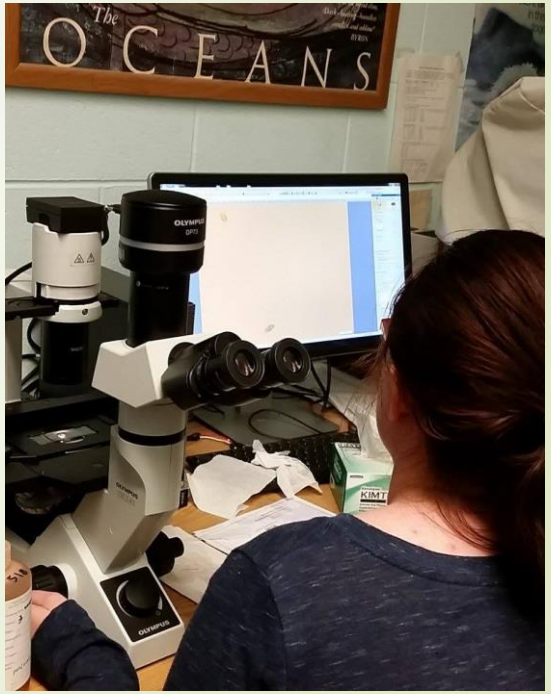
Scum – water interface grab from shore

PHYTOPLANKTON IDENTIFICATION AND ENUMERATION SAMPLE COLLECTION

Preserved samples are for biomass quantification and multi species identification. *Live samples are useful for determining color and motility in most phytoplankton or sheath formation in cyanobacteria.*







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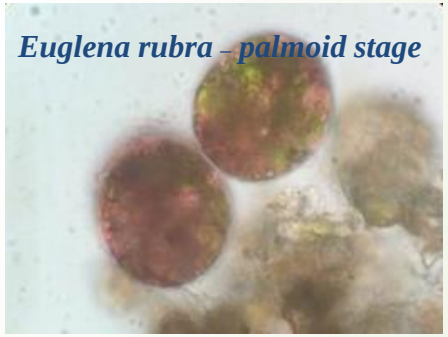
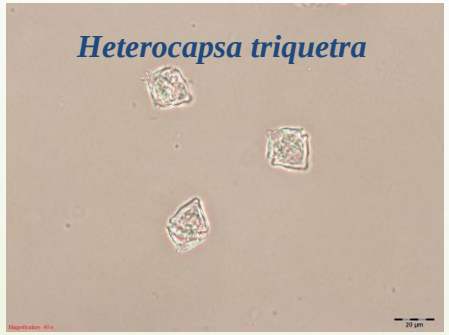
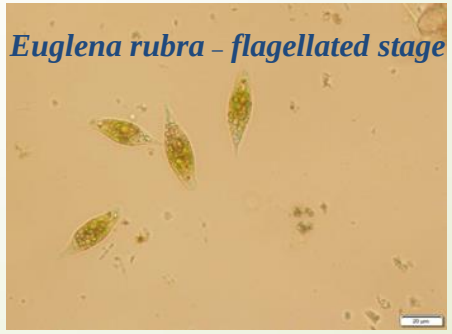






PHYTOPLANKTON IDENTIFICATION AND ENUMERATION SAMPLE COLLECTION

- For the preserved sample, collect 500 mL in a plastic bottle or cubitainer and administer Lugol's iodine solution at a ratio of 1:100. To achieve a ratio of 1:100, add approximately 1 mL of Lugol's to 100 mL of sample (5 mL for a 500 mL bottle) so that the final preserved sample color resembles weak tea.
- For the live sample, collect 500 mL in a plastic bottle or cubitainer. Do *not* add preservative.

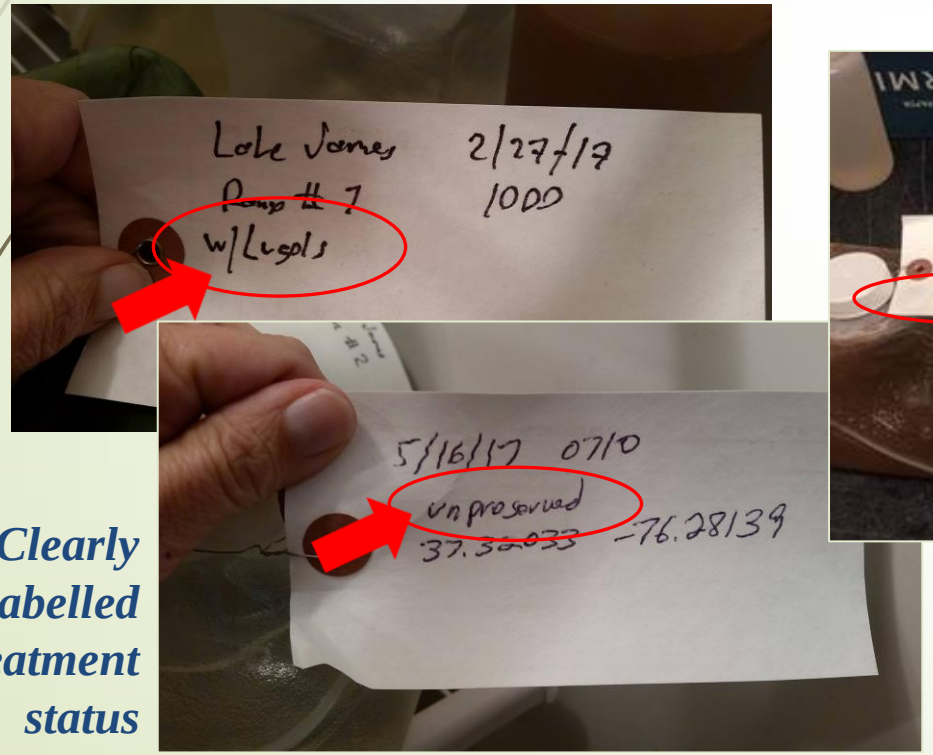
Preserved sample in cubitainer

Live sample in cubitainer

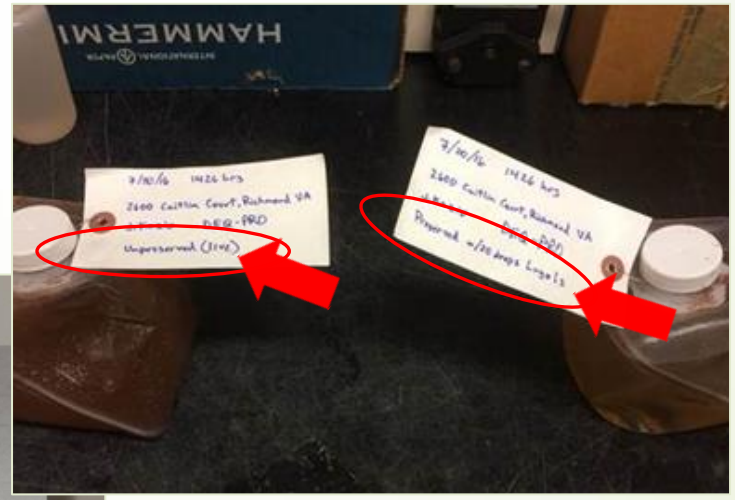
Preserved samples should resemble weak tea

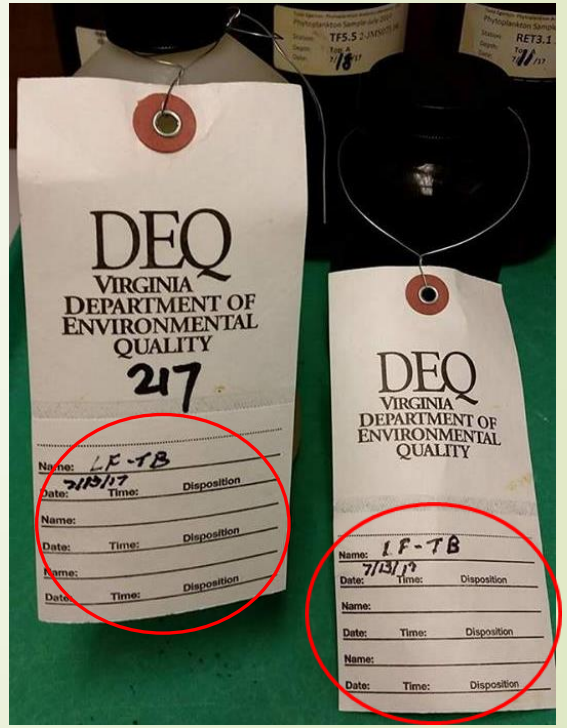
PHYTOPLANKTON IDENTIFICATION AND ENUMERATION SAMPLE COLLECTION

- Label each bottle clearly with site name, sample location, date, and treatment (ie: preserved or live).



Clearly labelled treatment status





Difficult to determine treatment status

TOXINS SAMPLE COLLECTION

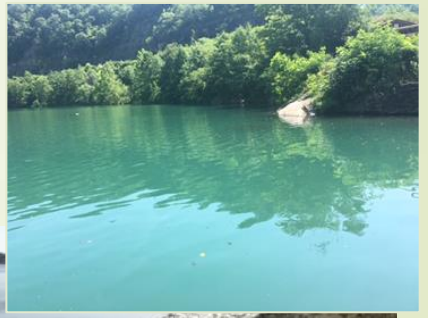
The purpose in collecting for toxins is to determine if there is a health exposure risk to the public. *Toxins samples should be taken when there is an obvious scum or fish kill present.*





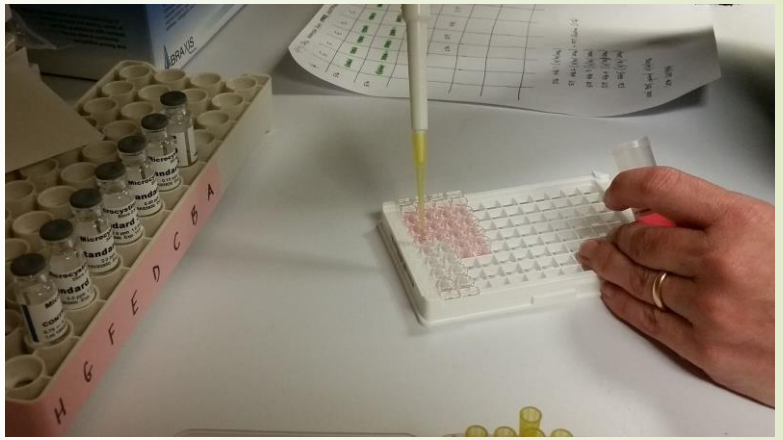

TOXINS SAMPLE COLLECTION

The purpose in collecting for toxins is to determine if there is a cyanotoxins exposure risk to the public. ***Toxins samples should be taken when there is an obvious scum or fish kill present.***



TOXINS SAMPLE COLLECTION

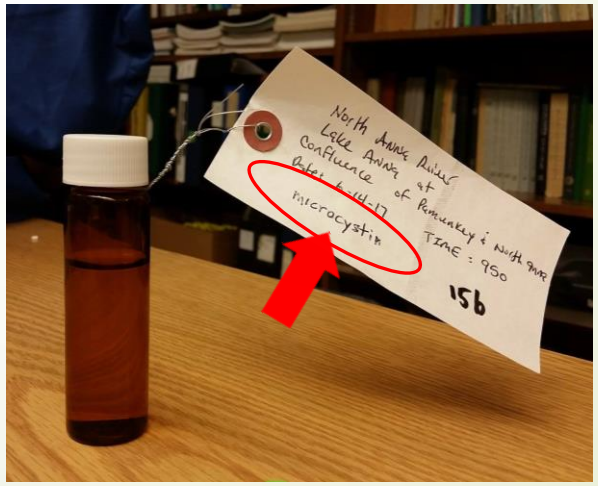
Microcystins are the most common toxin found in freshwater systems in Virginia that we test for. Please make sure to contact the lab prior to sending samples if there has been a history of blooms requiring cylindrospermopsin, anatoxin-a, or saxitoxin analysis at the site to ensure proper turn around time and scheduling.



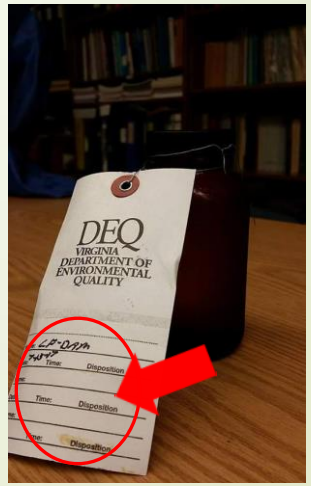
Microcystins analysis at ODU with Abraxis ADDA ELISA kit

TOXINS SAMPLE COLLECTION

- For microcystins and/or cylindrospermopsin assays, collect 250mL of sample in an amber glass bottle. The same bottle can be used for both assays.
- For saxitoxin and/or anatoxin-a assays, collect 250mL of sample in an amber glass bottle. In freshwater systems, add 10x Concentrated Sample Diluent to bottle before or during collection to prevent absorptive loss of toxin. Saltwater samples do *not* need the addition of this reagent. The same bottle can be used for both assays.
- Label each bottle clearly with site name, sample location, date, and analysis (ie: microcystins).



Clearly labeled bottle for microcystins analysis



Unclear as to what this bottle contains

SHIPPING

Shipping containers should be packed in such a way to prevent leakage or breakage as the shipping company will remove leaking coolers from their trucks, delaying or cancelling delivery. Shipping should be expedited overnight.

Samples and ice/cooler pack in sealed bag with field sheet/chain of custody form in sealed baggie in cooler

SHIPPING

- All shipping containers should be lined with a garbage bag to avoid leakage.

Lined cooler

SHIPPING

- Close sample bottle tightly, and place into a sealed bag.

Poorly packed cooler has sample bottles floating loosely in meltwater

Ideally packed cooler has sample bottles tied into their own bag, which is placed into the lined cooler with freezer packs

SHIPPING

- Samples should be kept cool with freezer packs or ice sealed in airtight bags.

Ice placed in a plastic bag, which is inside the bag lining the cooler

Tie the bag of ice closed so melt water is properly contained during shipping

SHIPPING

- All shipping containers should be firmly packed with Styrofoam, paper, or bubble wrap to avoid breakage.

Tightly packed cooler has sample bottles in their own bag separated from the cooler packs with crumpled newspaper, bubble wrap and packing peanuts

Partners

Chesapeake Bay Program
A Watershed Partnership

Old Dominion University 1930

DEQ
Virginia Department of Environmental Quality

VDH Virginia Department of Health
Protecting You and Your Environment

Hampton Roads Sanitation District

Thank you!

Recreational Advisories for Harmful Algal Blooms

Margaret Smigo

VDH-OEPI-DEE

VDH VIRGINIA DEPARTMENT OF HEALTH

Protecting You and Your Environment

www.vdh.virginia.gov

Overview of Freshwater HAB Recreational Advisories

- The Where, What, Why, When, How, and Who of Recreational Advisories
- Guidance
  - VDH Recreational Guidance for Microcystin/*Microcystis aeruginosa*
  - EPA draft guidance Microcystin/Cylindrospermopsin
- Resources
  - Process & communication flow chart
  - Signage
  - Press Releases

Where might a HAB Recreational Advisory be issued?

Microcystis aeruginosa is considered a freshwater species but may bloom in brackish (slightly saline) waters.

- Freshwater – ponds, lakes & slow-moving rivers
- Brackish waters – marshes & tidal rivers

Focus on **public access areas where exposure may occur**




What is a HAB Recreational Advisory?

A HAB recreational advisory is a formal notification to the public which is issued as a result of the detection of harmful algal species or their toxin(s) at levels which may pose a human health risk.

An advisory includes:

- Press release
- Waterbody signage

What "Recreational Activities" do HAB Advisories apply to?

- Swimming or wading
- Kayaking, SUP, jet skiing, water skiing






What are VA's HAB Recreational Advisories based on?

The concentration of Microcystin <u>or</u> *Microcystin aeruginosa* cells

Guidance values developed using a methodology that evaluates toxin concentration, exposure, and risk of adverse health effects associated with differing levels of exposure.

- **Toxin concentration guidance value: 6ug/L (6ppb)**
  - Ingestion is the most complete exposure pathway
  - VA guidance values calculated from Tolerable Daily Intake, body weight, and ingestion rate
- **Cell concentration guidance value:**
  - Dermal symptoms reported beginning at 5,000 cells/ml, with majority of reported cases between 20,000-100,000 cells/ml

What are Virginia's Freshwater Recreational Advisory action levels for Microcystin / *Microcystis aeruginosa* blooms?

Concentration	Action
5,000 to <20,000 Microcystis cells/mL	Local agency notification; initiate bi-weekly sampling
20,000 to 100,000 Microcystis cells/mL	Public notification indicating a harmful algal bloom is present in recreational water; initiate weekly sampling
> 100,000 Microcystis cells /mL, OR > 6 µg/L microcystin concentration, OR blue-green algal scum or mats on surface	Immediate public notification to avoid all recreational water contact where bloom may be present; continue weekly sampling

Why does VDH issue HAB Recreational Advisories?

- To prevent HAB-related health effects by limiting or preventing exposure
- Code of Virginia §32.1 - 248
  - Closing of waters; modification or revocation of regulation or order; toxic substances
  - *"Such regulation or order may be temporary or permanent and may be issued initially on an emergency basis. "*
  - By authority of the State Health Commissioner

When should HAB Recreational Advisories be issued?

Advisories should be issued for *Microcystis aeruginosa or* Microcystin when:

LABS

- Confirmation of HAB species counts are elevated (>20,000cells/ml)
- When microcystin levels are > toxin advisory thresholds (6ug/L)
- **OR** if scum is present on **recreational** water surface

How are HAB Advisories Issued and Lifted?

Steps To Issue Advisory:

1)HAB Investigation

2)Lab analysis results > 20Kcells/ml or 6ug/L

3)DEE recommends advisory to EHS, EPI, PIO, & Health Director

4) Local HD staff drafts advisory press release & posts waterbody signage*

*assistance by DEE

To Lift Advisory:

1)Weekly testing yields **2 consecutive samples** <20Kcells/ml **AND** <6ug/L

2)DEE recommends lifting advisory: EHS, EPI, PIO, & Health Director

*If cells conc. are between 5,000cells/ml and 20,000cells/ml, biweekly monitoring should continue

3)Local HD drafts advisory press release to lift advisory & removes waterbody signage*

*assistance by DEE

Who issues and lifts HAB Recreational Advisories?

Unless the affected waterbody crosses multiple health regions, advisories are issued at the discretion of the local health district.

ALL RESPONSE IS LOCAL

Who is the target audience of a Recreational Advisory?

- Users of the waterbody; access point signage important
  - Marinas, boat ramps, public fishing docks, popular shoreline access points
  - Recreational water excursion operators
    - Kayak, tubing, fishing
- Other media may be necessary to supplement outreach
  - Social media, radio, local newspapers
- Consider outreach for nearby residents/landowners, veterinarians, schools, medical providers & hospitals, and the poison control center.

Is it safe to FISH in a waterbody under a freshwater HAB advisory?

It is considered safe to consume fish fillets harvested from a waterbody under a HAB advisory, providing fish are properly cleaned, including the removal of all organs and skin, and cooked to proper temperature.**

Precautions:

- Never harvest fish if there are dead or dying animals present
- Protect skin from exposure to the HAB waterbody
- Wash skin and surfaces used for cleaning fish thoroughly with soapy water

(2012) VDH Recreational Guidance for Microcystin/*Microcystis aeruginosa*

www.HarmfulAlgaeVA.com

EPA draft Guidance Microcystin/Cylindrospermopsin

Table 1. Draft Recreational AWQC for Cyanotoxins

Microcystins	Cylindrospermopsin
4 µg/L [a, b]	8 µg/L [a, b]

a) Swimming Advisory: not to be exceeded on any day

b) Recreational Criteria for Waterbody Impairment: not exceeded more than 10 percent of days per recreational season up to one calendar year.

Virginia's Recreational Guidance Value for:

- **Microcystins = 6ug/L**
- **Cylindrospermopsin = No guidance value**

What about Drinking Water?

- In 2015 EPA issued advisory 10-day thresholds for drinking water for two cyanotoxins:

10-DAY HEALTH ADVISORIES	LEVEL
Microcystins	
Children pre-school age and younger (under 6 years old)	**0.3 µg/L**
School-age children (6 years and older)	**1.6 µg/L**
Cylindrospermopsin	
Children pre-school age and younger (under 6 years old)	**0.7 µg/L**
School-age children (6 years and older)	**3.0 µg/L**

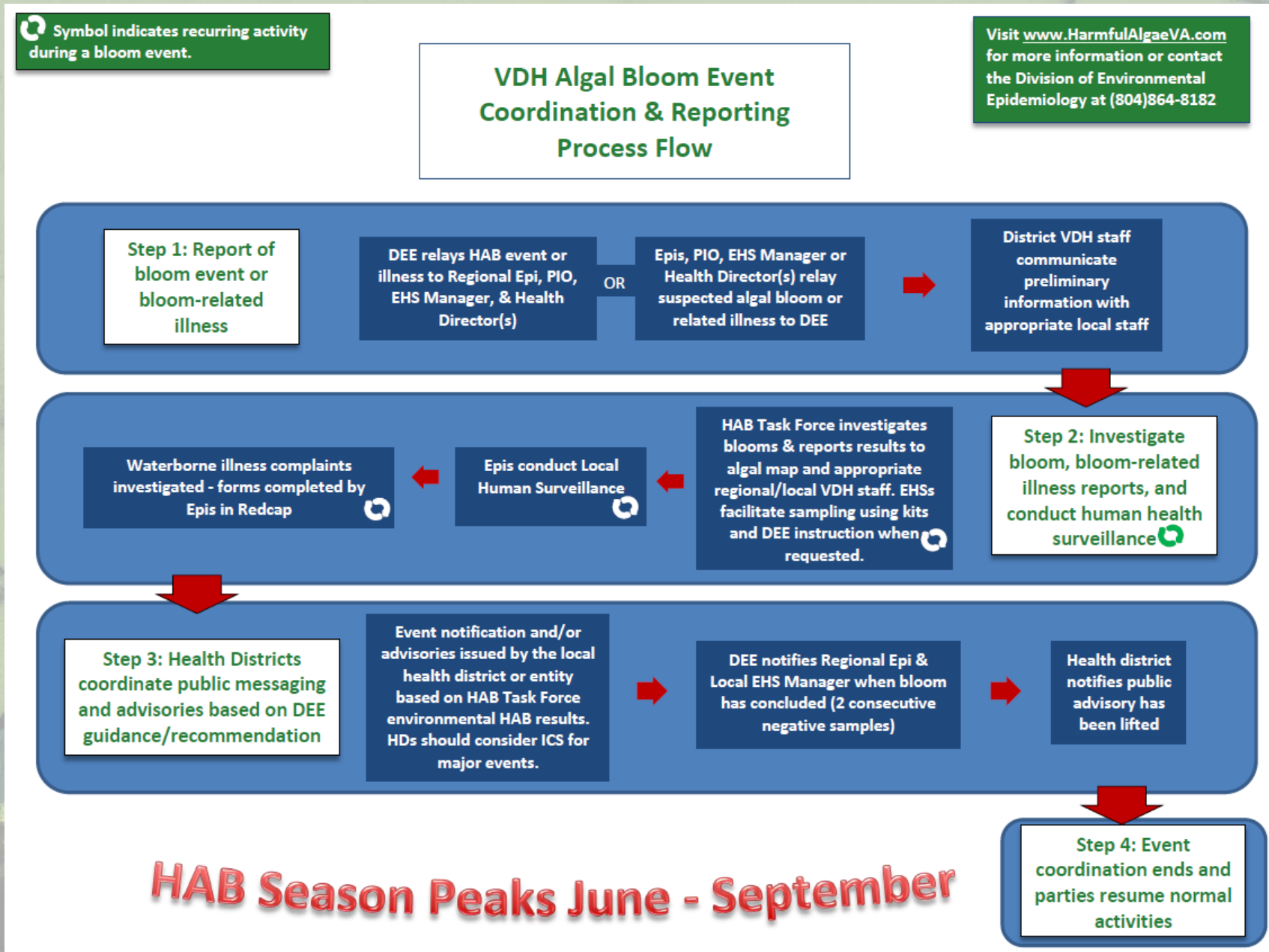
Table 1. U.S. EPA's National 10-Day Health Advisories

Infants and children younger than six years old are more vulnerable to HAB toxins, ODW would utilize the lower threshold during a HAB event should drinking water be affected.

Office of Drinking Water responsible for:

-Coordinating with public utilities for development of source water protection plans
-HAB Response Plan for Drinking Water
-HAB monitoring guidance public utilities and ODW field staff
-Issuing drinking water advisories

Resources – Process & Communication Flow for HAB Events



Resources

Example Harmful Algal Bloom Press Release

VDH DEPARTMENT OF HEALTH
Protecting You and Your Environment

News Release

109 Governor Street, Richmond, Virginia 23219 • **www.vdh.virginia.gov**

FOR IMMEDIATE RELEASE **Month, XX, 20XX**

For More Information Contact **Release #XX**

Contact name and number (and title if not a PIO--PIO contact preferred)

TOXIC HARMFUL ALGAL BLOOM OCCURRING IN X WATERBODY

Public advised to avoid water contact

(City/County, Va.)— High levels of toxic algae have been found in X Waterbody. A harmful algal bloom of *Microcystis aeruginosa* is occurring in the waterbody. This type of blue-green algae produces a toxin that can cause rashes and other illness. The Virginia Department of Health is warning citizens to stay out of the water and to keep their pets and children out as well. Due to low body weight, children and pets are at greater risk of severe illness if the water is ingested.

Resources – HAB Messaging

Universal talking points for discussing harmful algal blooms:

- Algae are naturally occurring, tiny, floating plants that use sunlight and nutrients from water to feed and reproduce. They are an important food source for aquatic animals. There are many different species of algae.
- Nutrients flow into water bodies from storm water runoff, fertilizer, agricultural runoff and from regulated facilities like sewage treatment plants. Sunlight, nutrients and warm temperatures are perfect conditions for an algae "bloom." Blooms are more likely to occur during hot, dry weather from June to September.
- Most algal blooms are harmless.
- Some algae can produce toxins or irritating chemicals during blooms. A few algae also can produce toxins when present in smaller numbers, not during a bloom.
- Algal blooms usually change the color of the water – green in freshwater, often with surface scum; red or brown in salt water. Blooms also may kill fish due to reduced oxygen in the water.
- WHEN IN DOUBT – STAY OUT! Never swim in water that is discolored, has an odor, or if there are dead fish or other animals present.
- If you get algae on your skin, rinse well with clean water. Symptoms from harmful algae exposure can include upset stomach (nausea, vomiting, diarrhea), skin rash, tingling or burning and coughing. Children and pets are most vulnerable because they are more likely to swallow the water; even a small amount can cause illness. If you have health concerns from algae exposure, contact your medical provider.
- Report suspected health effects of harmful algal blooms ("HABs") to 888-238-6154. Report algal blooms online at www.HarmfulAlgaeVa.com.

Good ones to memorize!

Resources – Outreach Materials & Website

ALGAL BLOOM SURVEILLANCE MAP

The map is updated regularly during the months of March – November. Please click on map points for the most recent s

Harmful Algal Bloom (HAB) Map 2017 ☆

Map Legend *Click on sites within map above for sample results and de*

- **Active Algal Bloom – No Human Health Advisory** *algal species are not known t humans, pets, or fish.**
- **Active Algal Bloom – No Human Health Advisory** *algal species are not known t humans* or pets but may be capable of producing a toxin harmful to fish.*
- **Active Algal Bloom – No Human Health Advisory** *algal species capable of prod humans, pets, and fish. Current results indicate toxins are below levels believed to humans*, pets and fish. Surveillance ongoing to monitor toxin concentration*
- **Active Algal Bloom – Human Health Advisory in Effect** *algal species capable of harmful to humans, pets, and fish. Current results indicate toxin concentrations humans, pets and fish. Surveillance ongoing to monitor toxin concentration leve*
- **Prior Bloom Event** – *surveillance discontinued due to the dissipation of the bloo*
- **Bloom On Private Lake** – *VDH and the Harmful Algal Bloom Taskforce can pro monitoring and testing for privately owned lakes and prioritizes support of publ of private lake management companies is available at the Dept. of Game and In website at: https://www.dgif.virginia.gov/wp-content/uploads/Private-Pond-C*

ALGAE BLOOM INVESTIGATION – JOHN W. FLANNAGAN RESERVOIR

HAB Hotline: 888-238-6154

FREQUENTLY ASKED QUESTIONS (FAQs): John W. Flannagan – Algae Bloom Investigation

Posted: March 19, 2017

Officials determined the algae bloom which occurred from late February through early March 2017 in the Flannagan Reservoir did not pose a human health risk.

On Feb. 28, the U.S. Army Corps of Engineers (USACE) reported to the Virginia Department of Health (VDH) a bloom of blue-green algae in John W. Flannagan Reservoir in Dickenson County.

The reservoir water is withdrawn and treated to provide a source of drinking water for approximately 37,000 customers in Buchanan and Dickson Counties, and small parts of Wise and Tazewell counties, and is a popular fishing and recreational destination.

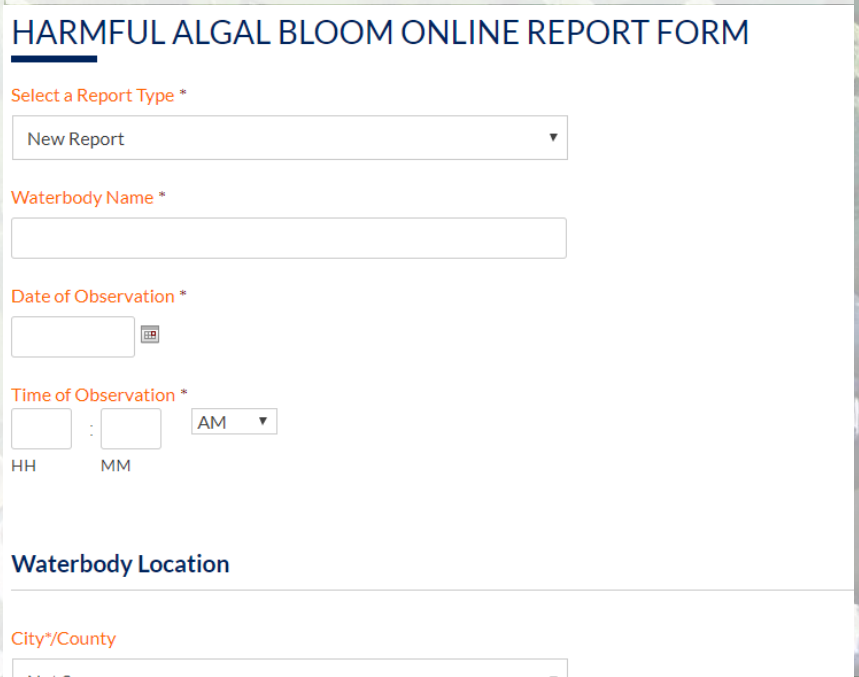
The Virginia Department of Environmental Quality (VDEQ), VDH, USACE, Old Dominion University (ODU) and other organizations have conducted several tests on the reservoir water to determine the safety for recreational uses, in addition to pre and post-treated drinking water within the water treatment plant to ensure the safety of the treated drinking water. The tests assessed the presence and abundance of blue-green algae species in addition to evaluating potential toxins and health risks associated with them.

Reporting HABs to VDH/HAB Task Force

- 24/7 HAB Hotline
  - HAB-related human health effects
- Online HAB Report Form
  - Blooms & Fish kills

#866-842-5779

www.HarmfulAlgaeVA.com


HARMFUL ALGAL BLOOM ONLINE REPORT FORM

Select a Report Type *

New Report

Waterbody Name *

Date of Observation *

Time of Observation *

AM

HH MM

Waterbody Location

City*/County

Resources - Signage

BE AWARE OF ALGAE BLOOMS

During an algae bloom, water may have surface scum, mats, or films with red, green, white streaks or glops.

REPORT BLOOMS TO THE

Harmful Algal Bloom Hotline 888-238-6154

It is safe to eat properly cooked fish caught from waters with an algae bloom. Thoroughly clean the fish. Discard the carcass and guts. Wash hands, surfaces, and utensils with soapy water.

The Virginia Harmful Algal Bloom Task Force works to protect public health during algae blooms.
Learn more at www.HarmfulAlgaeVA.com

Contact Your Local Health Department at:

VDH VIRGINIA DEPARTMENT OF HEALTH
Protecting You and Your Environment

ATTENTION

POTENTIALLY HARMFUL ALGAE HAVE BEEN DETECTED

Water quality is being monitored to determine if health risks may be present.

- Avoid swimming and wading in areas where surface scum is present
- Keep away children, pets, and animals, who are more likely to swallow water
- Thoroughly wash skin with clean fresh water after contact

SOME ALGAE MAY CAUSE ILLNESS

Call your doctor or veterinarian if you or your animals experience illness or signs of poisoning.

While fish consumption is not affected by toxic algae, thoroughly cleaning the fish, discarding the carcass & guts, & washing hands & surfaces afterward with soapy water is advised.

Report algal blooms and illnesses to VDH Hotline:	Call your Local Health Department:
888-238-6154	

For more information:
http://www.vdh.virginia.gov/environmental-epidemiology/harmful-algal-blooms-habs/

VDH VIRGINIA DEPARTMENT OF HEALTH
Protecting You and Your Environment

WARNING

HARMFUL ALGAE PRESENT

PEOPLE AND ANIMALS SHOULD AVOID SWIMMING AND WADING UNTIL FURTHER NOTICE

EXPOSURE TO ALGAL TOXINS MAY CAUSE ILLNESS

Call your doctor or veterinarian if you or your animals have sudden or unexplained sickness or signs of poisoning.

While fish consumption is not affected by toxic algae, thoroughly cleaning the fish, discarding the carcass & guts, & washing hands & surfaces afterward with soapy water is advised.

Report algal blooms and illnesses to VDH Hotline	Contact your Local Health Department
888-238-6154	

For more information:
http://www.vdh.virginia.gov/environmental-epidemiology/harmful-algal-blooms-habs/

VDH VIRGINIA DEPARTMENT OF HEALTH
Protecting You and Your Environment

Resources - HAB Sampling Kits

Thank you!

Special thanks to DEQ, ODU, and VIMS Task Force responders!

Margaret Smigo
Waterborne Hazards Control
Program Coordinator
VDH-OEPI-DEE
Margaret.Smigo@vdh.virginia.gov
(804)864-8128

QUESTIONS

OVERVIEW OF HAB TOOLKIT & RESOURCES

Overview of HAB Toolkit & Resources

www.HarmfulAlgaeVA.com

- Contact Us
- Beach Monitoring
- Vectorborne Disease Control
- Waterborne Hazards Control
- Zoonoses
- Rabies Control
- Harmful Algal Blooms (HABs)
  - Algal Bloom Surveillance Map
  - HAB Resources
  - Cyanobacteria
  - HAB Task Force
  - What are Harmful Algal

HARMFUL ALGAL BLOOMS (HABS)

Algal Bloom Map
Click here for recent sample results

HAB Hotline: 1-888-238-6154

NEW – Click Here to Report a HAB Online

Algae are naturally-occurring microscopic organisms that are found in fresh and salt waters of Virginia and around the world. Many are beneficial because they are major producers of oxygen and food for many of the animals that live in these waters.

Most algae do not harm people, wildlife, or the environment. But some types of algae in Virginia can be dangerous. Algae species in fresh and salt water may multiply rapidly when environmental conditions are favorable for their development. The great number of algal cells in the water results in what is called an algal bloom.

A bloom often (but not always) results in a color change in the water. Algal blooms can be any color, but the most common ones are red or brown and are known as either "red" or "brown" tides. Most algal blooms are not harmful but some do affect fish and humans, as well as other animals like birds and marine mammals. These are known as Harmful Algal Blooms (HABs). If water is discolored, murky, has an odor, or if there appears to be a film on the water surface, swimming is not advised for humans or pets. Please contact the HAB Hotline to report your observations and so that surveillance of the area can be conducted.

Contact Us

Beach Monitoring

Vectorborne Disease Control

Waterborne Hazards Control

Zoonoses

Rabies Control

Harmful Algal Blooms (HABs)

Algal Bloom Surveillance Map

HAB Resources

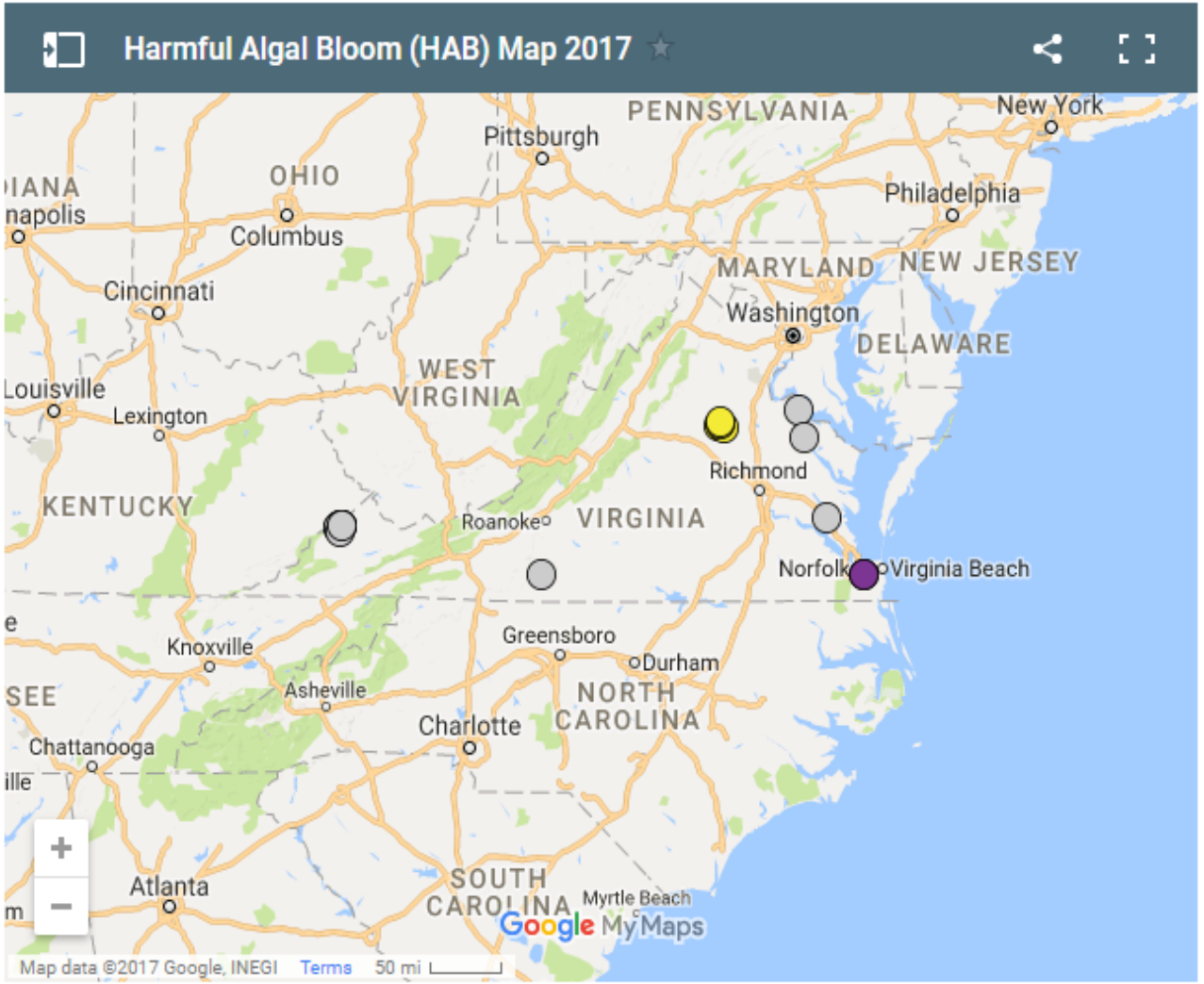
Cyanobacteria

HAB Task Force

What are Harmful Algal

ALGAL BLOOM SURVEILLANCE MAP

The map is updated regularly during the months of March – November. Please click on map p



HAB Resources

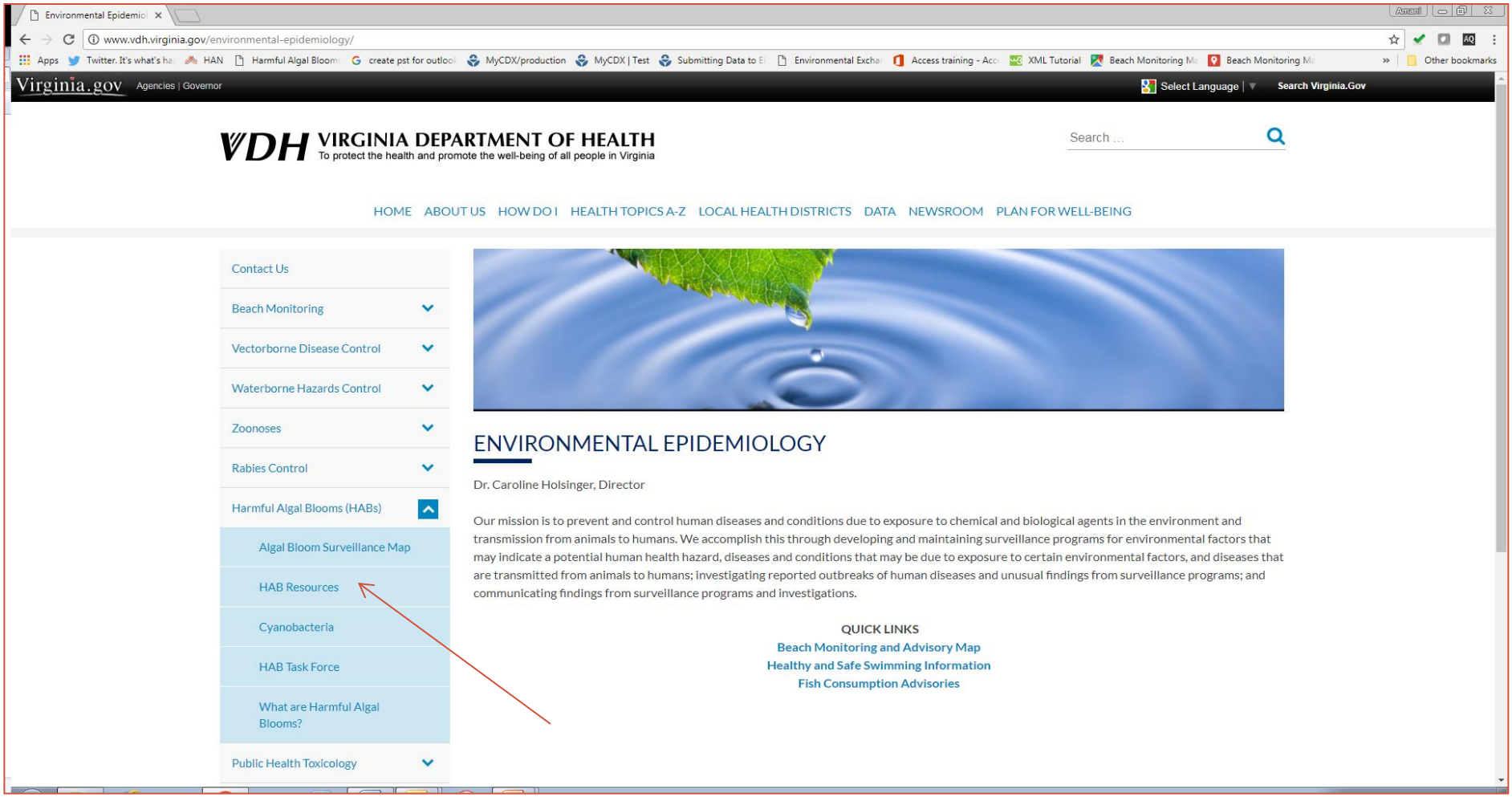
- Recently the DEE-Waterborne Hazard Control Program developed a webpage called “HAB Resources” within the

www.HarmfulAlgaeVA.com

- Contains all the necessary HAB webpages and resources categorized by specialties

- Easy to access

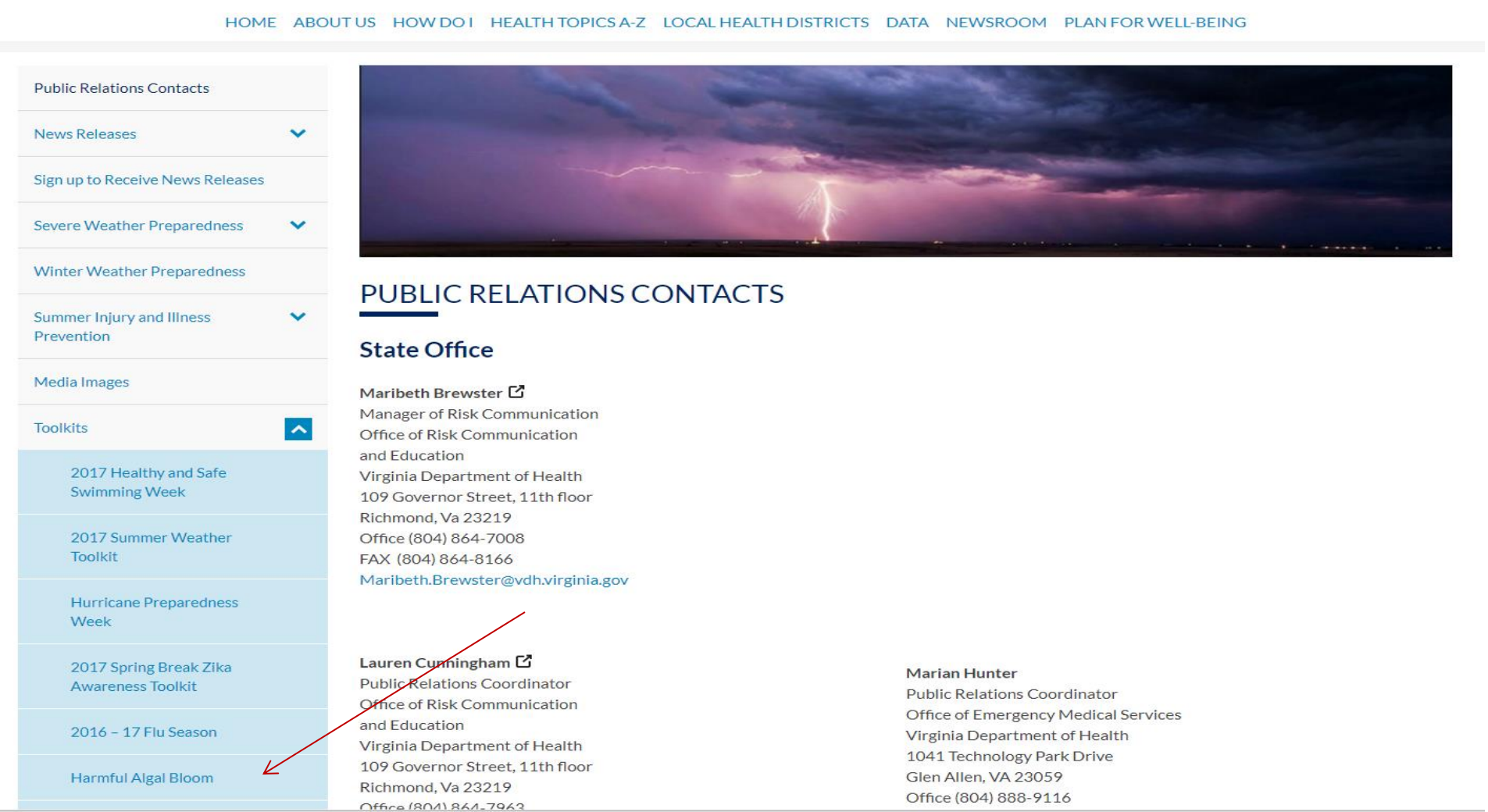
One Tab That is All:



Overview of Toolkit & Resources

Also can be reached through

http://www.vdh.virginia.gov/ under the NEWSROOM navigation tab and then under the Toolkits tab click on Harmful Algal Bloom tab.



Contact Us
Beach Monitoring
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Zoonoses
Rabies Control
Harmful Algal Blooms (HABs)
Algal Bloom Surveillance Map
HAB Resources
Cyanobacteria
HAB Task Force
What are Harmful Algal Blooms?
Public Health Toxicology
Related Links
Publications A-Z

HAB RESOURCES

HAB Resources pdf.

HAB Webpage, Surveillance Map & General Information	
Harmful Algal Bloom – Main Page It is the official VDH-DEE-HAB website. It contains information and resources related to the Harmful Algal Bloom Program.	www.HarmfulAlgaeVA.com
Harmful Algal Bloom Surveillance-Map It reflects the status of algae blooms during HAB season (March-November), as well as the results of algae bloom samples. The map is updated weekly or as needed year around.	http://www.vdh.virginia.gov/environmental-epi map/
HAB Online Report Form The form provides an option for online HAB report submittal. It can be utilized by the publics and environmental health professionals. It provides an easy way for the primary task force members to communicate HAB reports received by them with one another and to request assistance.	http://www.vdh.virginia.gov/environmental-epi
Temporary Feature Page – *A.monilatum* Example of a bloom webpage for featuring a bloom of significance and a link to the FAQs. These pages facilitate public outreach during bloom events.	http://www.vdh.virginia.gov/environmental-epi james-rivers-and-chesapeake-bay/ http://www.vdh.virginia.gov/environmental-epi monilatum

Algal Bloom Guidance & Resources

Webpage, Surveillance Map & General Information	
t contains e Harmful	www.HarmfulAlgaeVA.com
ring HAB he results of ed weekly	http://www.vdh.virginia.gov/environmental-epidemiology/harmful-algal-blooms-habs/algal-bloom-surveillance-map/
HAB report cs and provides an mbers to them with	http://www.vdh.virginia.gov/environmental-epidemiology/harmful-algal-bloom-online-report-form/
m ring a bloom hese pages events.	*http://www.vdh.virginia.gov/environmental-epidemiology/alexandrium-monilatum-hab-in-lower-york-lower-james-rivers-and-chesapeake-bay/* *http://www.vdh.virginia.gov/environmental-epidemiology/frequently-asked-questions-faqs-alexandrium-monilatum/*
f, public- function, y taskforce provided by	http://www.vdh.virginia.gov/content/uploads/sites/12/2017/07/Virginia_HAB_ResponsePlan_Final_2017.pdf
	http://www.vdh.virginia.gov/content/uploads/sites/12/2017/07/Talking-points-for-discussing-harmful-algal-blooms.pdf
isms of	http://www.vdh.virginia.gov/content/uploads/sites/12/2016/04/HABsBrochure.pdf http://www.vdh.virginia.gov/content/uploads/sites/12/2016/02/Cyanobacteria_Bro.pdf
ed to utilize dy-bloom events.	http://www.vdh.virginia.gov/content/uploads/sites/12/2017/07/Virginia-Poison-Control-Centers.pdf
Epidemiology Resources & Information	
job aide for g, and	http://www.vdh.virginia.gov/content/uploads/sites/12/2017/07/HABCommunicationProcessFlow_FINAL.pdf

***VDH HAB Human Screening Form** Is intended to facilitate the investigation of a reported waterborne exposure, such that the local health district can more easily determine whether or not the more comprehensive OHHABS human report form is necessary.	http://www.vdh.virginia.gov/content/uploads/sites/12/2 ful-Algal-Bloom-Health-Survey_Final.pdf
CDC-One Health Harmful Algal Bloom System (OHHABS) Online Guidance and Training Resources The newly launched OHHABS system provides a database for collecting and storing environmental, animal, and human HAB exposure information. *OHHABS- Human Form and Guidance May be utilized by Epi Staff when one or more exposures are reported Event and Case Definitions Tables offer definition of HAB event and human HAB associated case.	http://www.cdc.gov/habs/ohhabs.html http://www.cdc.gov/habs/pdf/ohhabs-human-form.pdf https://www.cdc.gov/habs/pdf/ohhabs-human-form-gui https://www.cdc.gov/habs/pdf/ohhabs-case-and-event- table-3-14-17.pdf
CDC – HAB Associated Illness and Syndromes	http://www.cdc.gov/habs/illness.html
VDH – Marine Toxins and Associated Syndromes	http://www.vdh.virginia.gov/content/uploads/sites/12/2 ne-Toxins-and-Associated-Syndromes.pdf
VDH – Cyanobacteria Toxins and Health Effects	http://www.vdh.virginia.gov/content/uploads/sites/12/2 obacteria-Genera_Toxins-Health-Effect.pdf.pdf
** Fax completed forms to DEE (804-864-8131)*	
Resources for Environmental Health Specialists	
VDH – Provisional Recreational Water Guidance for Microcystin and Microsystis Blooms This document supports decision-making by public health & environmental officials in response to the occurrence of a Microcystis algal bloom in Virginia's waters.	http://www.vdh.virginia.gov/content/uploads/sites/12/2 MicrocystisGuidance.pdf
HAB Public Notification *Press Releases* Template press releases for issuing or lifting recreational advisories. *HAB Signs* Signs for raising HAB-awareness and posting HAB-affected waterways. *EPA – Template Social Media Posts* Issuing an advisory Lifting an advisory	http://www.vdh.virginia.gov/environmental-epidemiolo notification-templates/ http://www.vdh.virginia.gov/environmental-epidemiolo recreational-awareness-advisory-signs/. https://www.epa.gov/sites/production/files/2017-07/so issue-advisory.docx https://www.epa.gov/sites/production/files/2017-07/so advisory.docx
Standard Operating Procedure For Sample	http://www.vdh.virginia.gov/content/uploads/sites/12/2

Standard Operating Procedure For Sample Collection This document explains the safety procedures, supplies, collection, and shipping steps necessary for HAB water samples.	http://www.vdh.virginia.gov/content/uploads/sites/12/2017/07/Harmful-Algae-Bloom-Sample-Collection-Protocol-for-Virginia-Waters-FINAL-VERSION-July-17-2017.pdf
Visual Guide to Observing Blooms This guide is provided by CA Surface Water Ambient Monitoring Program (SWAMP). It contains images of various HAB to help users identifying and reporting non-toxic algae versus cyanobacteria.	http://www.mywaterquality.ca.gov/habs/resources/field.html

We are going to remodel our webpages, but that won't affect the HAB Resources webpage since we are going to update the link momentarily.

Let us know if you have any thoughts.


Thank you!

Harmful Algal Blooms (101) – Bloom Basics and Public Health Response

Training Recap

Keith Skiles, VDH-DSS

Learning Objective #1:

Staff will be able to explain their roles during a HAB event.

Epidemiologists & Nursing Staff

- Conducts human illness surveillance and epi-interviews for suspected HAB-related illnesses
- Submits HAB Health-effects Screening Forms to DEE
- Coordinates outreach for HAB-associated event information with medical providers, hospitals, poison control centers, and others as necessary

Learning Objective #1

Staff will be able to explain their roles during a HAB event.

Environmental Health Staff

- Supports HAB-investigations by facilitating sample collection when requested
- Coordinates with the Health Director and PIO to issue/lift recreational advisories and to post signage
- Coordinates outreach and press releases for HAB-associated event information with the PIO and DEE

Learning Objective #1

Staff will be able to explain their roles during a HAB event.

Public Information Officers

- Supports HAB-investigations by coordinating consistent messaging to the public
  - Press releases for advisories
  - Coordinates media interviews with staff/subject matter experts as necessary

Learning Objective #2

Identify characteristics of algae blooms and the health effects which are possible.

- Usually occur during the summer in tidal rivers and the Chesapeake Bay, or in freshwater lakes.
  - Marine/brackish blooms - red or brown in color and may bioluminesce
  - Freshwater blooms - green or red and may produce scum on water surface
- Harmful Algal Blooms (HABs) – a bloom can be harmful to public health when it produces irritating or toxic compounds.
- Exposure to HABs may occur by several modes:
  - **Consumption** of fish or shellfish, contaminated drinking water, or possibly by dietary supplements
  - **Dermal** exposure as a result of recreational or occupational activities, or possibly by cosmetics
  - **Respiratory** via aerosolized toxins or accidental aspiration while recreating.
  - **Medically** via hemodialysis
- Health effects are usually caused by neurotoxins, hepatotoxins, or dermatotoxins which can produce symptoms within minutes to hours which may include:
  - Twitching muscles or motor weakness
  - Gastroenteritis – diahhrea, vomiting, nausea, abdominal pain
  - Skin rash, stinging or tingling, blisters

Learning Objective #3

Describe best practices to avoid exposure to blooms or what to do if exposed.

- **WHEN IN DOUBT – STAY OUT!** Never swim in water that is discolored, has an odor, or if there are dead fish or other animals present.

- If you get algae on your skin, rinse well with clean water. Symptoms from harmful algae exposure can include upset stomach (nausea, vomiting, diarrhea), skin rash, tingling or burning and coughing. Children and pets are most vulnerable because they are more likely to swallow the water; even a small amount can cause illness. If you have health concerns from algae exposure, contact your medical provider.

Learning Objective #4

Explain to the public where to find information on blooms and how to report blooms or fish kills.

- Report suspected health effects of harmful algal blooms (“HABs”) to 888-238-6154.
- Find more information and Report algal blooms online at www.HarmfulAlgaeVa.com

Acknowledgements

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- Keith Skiles, VDH-DSS
- Margaret Smigo, VDH-DEE
- Amani Bassyouni, VDH-DEE
- Harmful Algal Bloom Task Force Partners:
  - Office of Drinking Water, Aaron Moses
  - Department of Environmental Quality
  - Virginia Marine Resources Commission

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(757) 683-8461

Please complete the course survey in TRAIN.
Your feedback is important!

TRAIN Course ID:1070588

This training was recorded and will be posted at:

www.HarmfulAlgaeVa.com

Final Questions