

Harmful Algal Blooms and Public Health Surveillance: The One Health Harmful Algal Bloom System (OHHABS)

Virginia Roberts

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EPA Region 5 Workshop

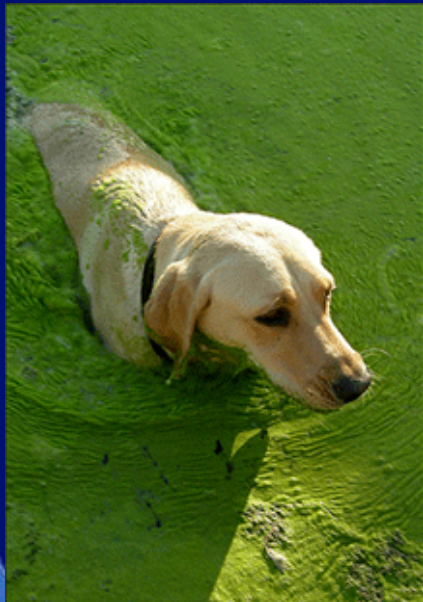
04/28/2016

Acknowledgments

- ❑ **Great Lakes Restoration Initiative (GLRI)**
 - Regional working group
- ❑ **Harmful Algal Bloom Surveillance Working Group**
 - State Partners
 - FL, IL, IN, IA, KS, MD, MA, MI, MN, NY, OH, OR, SC, VA, WA, WI
 - Federal and Other Partners
 - ATSDR, CDC, EPA, FDA, NOAA, NPS, USGS
 - IJC
- ❑ **CDC Surveillance Partners**
 - CDC/National Center for Emerging and Zoonotic Diseases
 - CDC/National Center for Environmental Health
 - CDC/National Center for Immunization and Respiratory Diseases
 - IT Development: Northrup Grumman

Harmful Algal Blooms (HABs)

- ❑ Adversely affect humans, animals, and the environment
 - Economic (e.g., beach closures, shellfish harvest closures)
 - Ecologic (e.g., oxygen depletion, sunlight deprivation)
 - Health (e.g., human and animal illnesses)—exposure through ingestion (water or food), inhalation, dermal contact



Source: Jill Segrist



Source: USGS



Source: Dave Zapotosky

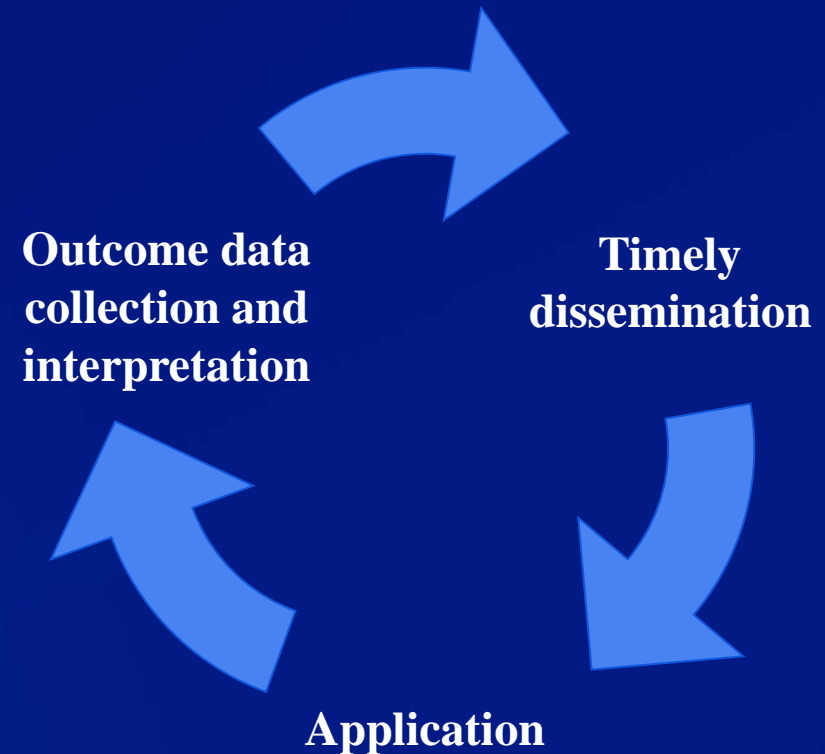
An Emerging Public Health Issue

- ❑ **Challenges: identifying and characterizing HAB-related illnesses**
- ❑ **Questions include:**
 - **Frequency and geographic distribution**
 - How many cases of illness annually? Where? When?
 - Illnesses occurring more/less frequently?
 - **Case definitions**
 - What are the symptoms of HAB-related illness? How do they vary by toxin? Concentration?
 - How to interpret the clinical, epidemiological, and environmental data?
 - **Risk factors**
 - How do factors such as age, route of exposure, and immune status affect susceptibility?
 - **Prevention efforts—needs? impacts?**

Public health surveillance can help to answer these questions

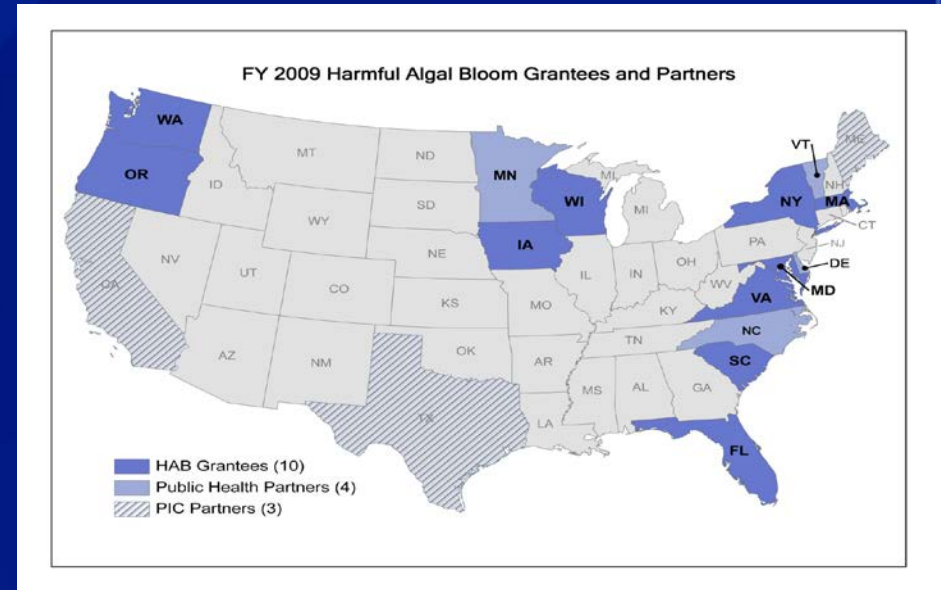
□ Public health surveillance:

- *The ongoing, systematic collection, analysis, and interpretation of outcome-specific data for use in the planning, implementation, and evaluation of public health practice.*

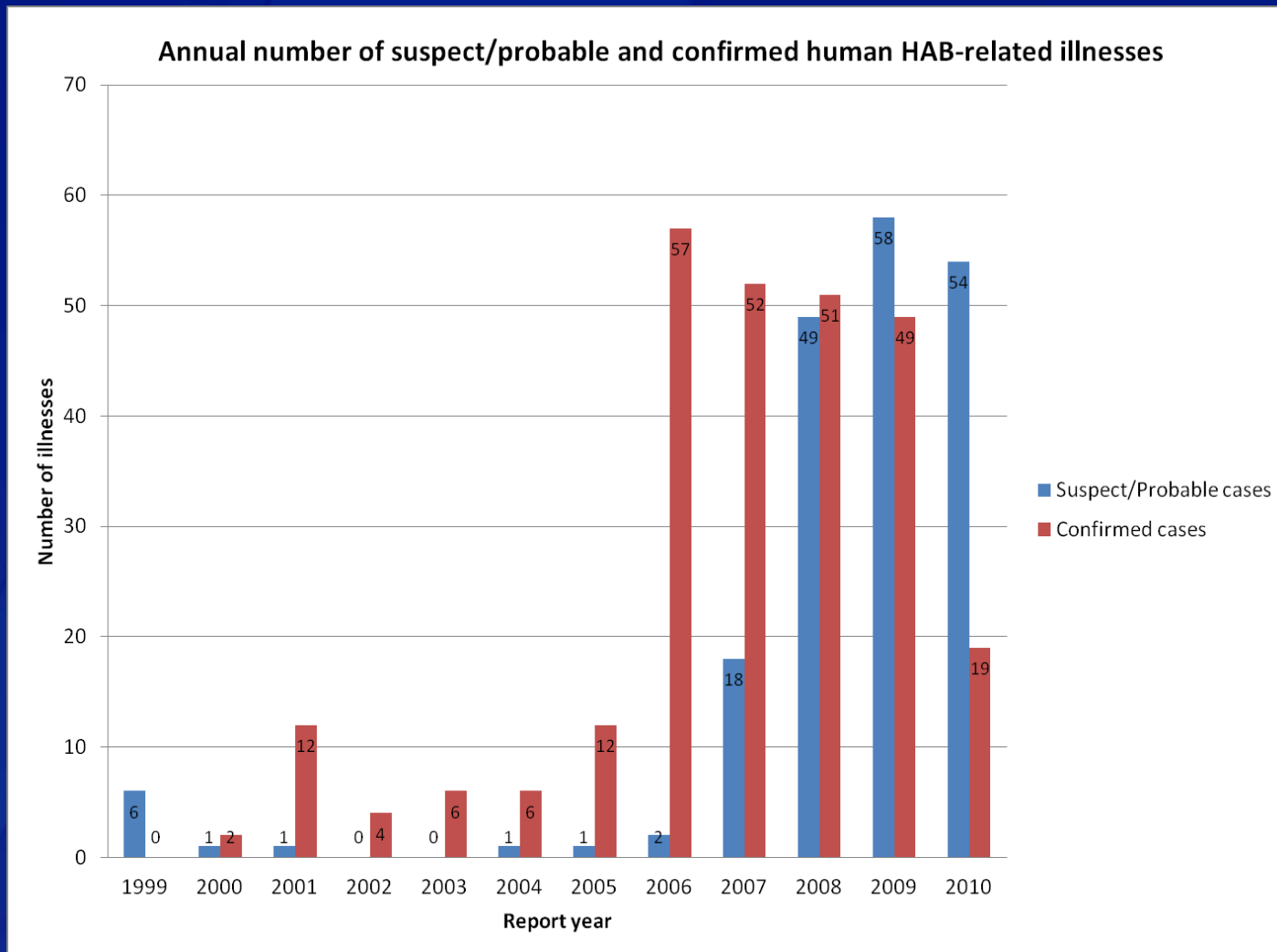


Harmful Algal Bloom-related Illness Surveillance System (HABISS)

- ❑ 2009-2013
- ❑ Data
 - Temporally and geographically related
 - HABs, human cases, and animal cases
 - Select number of states
- ❑ Goals
 - Detection, mitigation, prevention
 - Link cases of illness with environmental data
 - Generate case definitions
- ❑ Developed a network and increased expertise



Reported HAB-related Human Illnesses



One Health

- ❑ Human health is connected to animal health and the environment
- ❑ Animals are also susceptible to HABs, and animal illnesses can serve as early indicators of algal bloom toxicity
- ❑ Cooperation among human health, animal health, and environmental health communities will be critical



National Outbreak Reporting System (NORS)

- ❑ Electronic web-based reporting system
 - Launched in 2009
 - Voluntary reporting by local and state health departments
 - Aggregate data on outbreaks
 - Passive surveillance (no active search)
 - Outbreaks reported after investigation complete

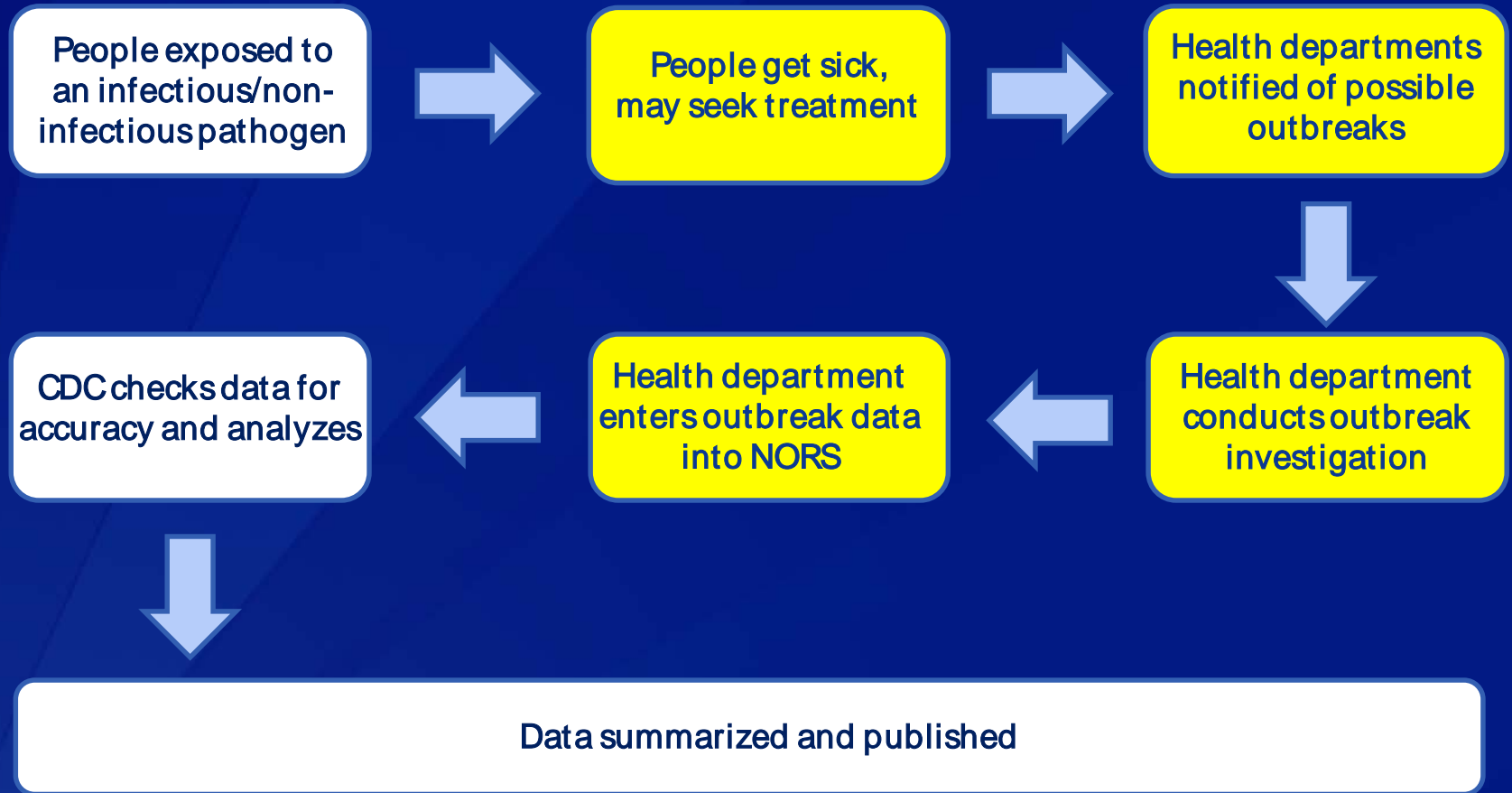
- ❑ **Outbreak**: ≥ 2 human cases of illness epidemiologically linked by time, exposure and illness characteristics
 - Waterborne disease outbreaks
 - Foodborne disease outbreaks
 - Enteric disease outbreaks associated with other exposures

- ❑ Waterborne and foodborne outbreak data feed into national surveillance systems that have been in existence since the 1970s



More information: <http://www.cdc.gov/nors>

The NORS surveillance process



Data uses:

Summary reports, other publications, data and statistics

Development and support of programs, health promotion, and policies

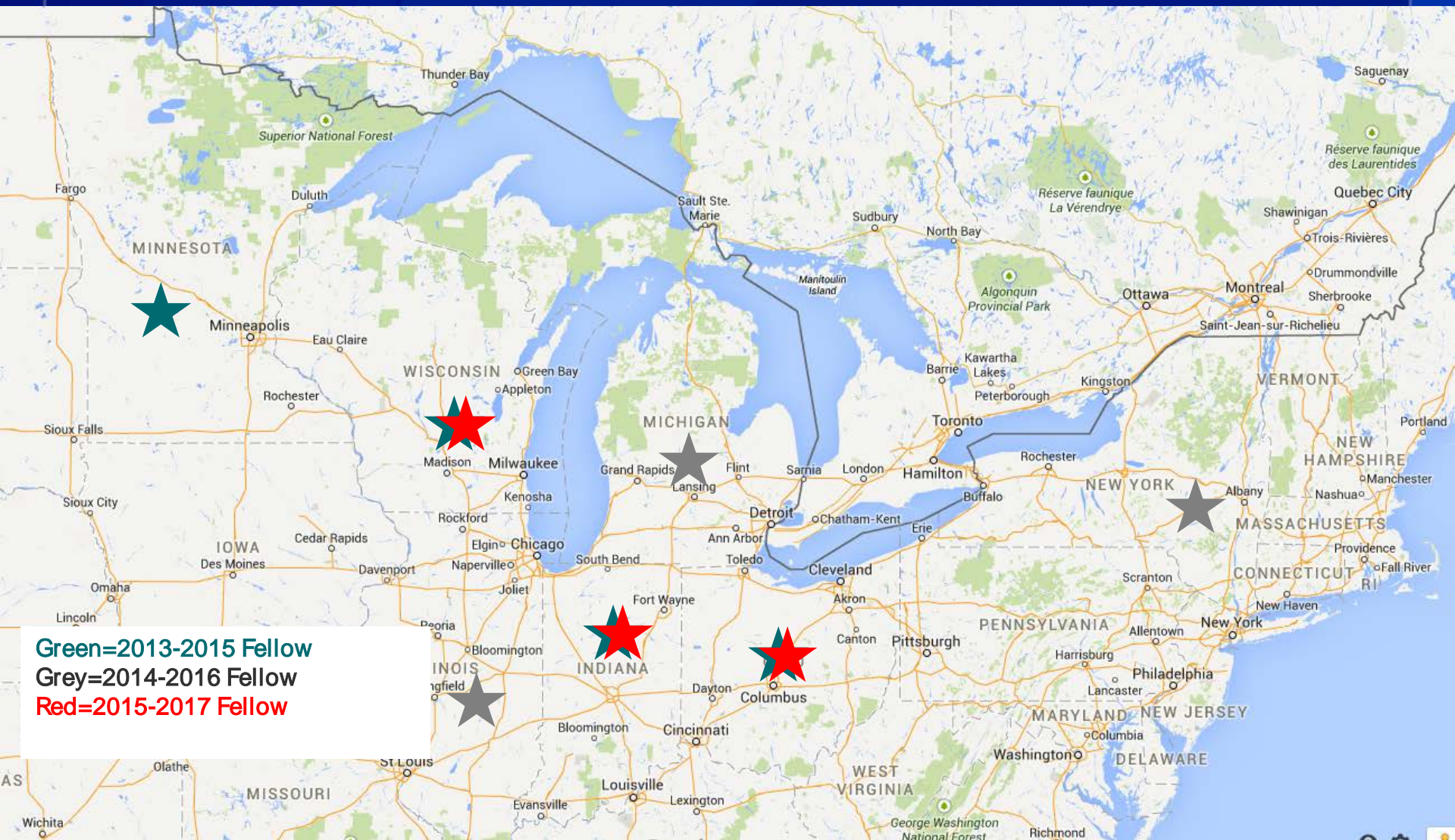
Great Lakes Restoration Initiative (GLRI)

- ❑ CDC funded since 2013 by the Great Lakes Restoration Initiative (GLRI) to expand public health surveillance
 - Build state and regional public health capacity related to harmful algal blooms and ambient waterborne disease in the Great Lakes
 - Engage in state and federal partnerships, data and information sharing
 - Collect better data to assess Great Lakes ecosystem health & GLRI project impacts

- ❑ Project activities include
 - Placement of 2-year waterborne disease epidemiology fellows in state health departments
 - Building a web-based reporting system for harmful algal bloom-related health events



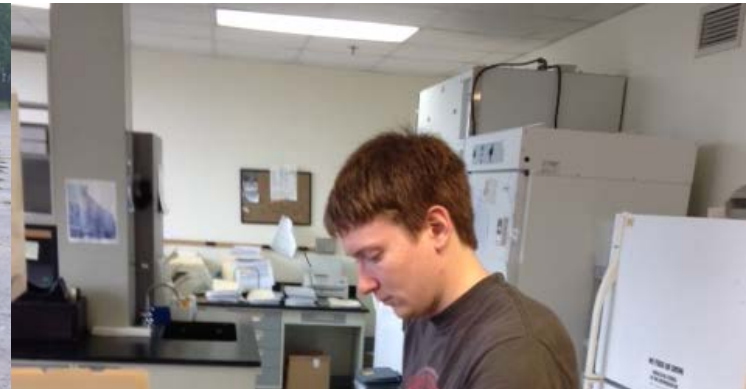
Surveillance Capacity and Network: Great Lakes Waterborne Disease Epidemiology Fellows



Harmful Algal Bloom–Associated Illness Surveillance: Lessons From Reported Hospital Visits in New York, 2008–2014

We identified hospital visits with reported exposure to harmful

Mary Figgatt, MPH, Neil Muscatiello, MPH, Lloyd Wilson, PhD, MA, and David Dziewulski, PhD



Keep Harmful Algal Bloom-Related Illness on Your Differential List this Summer

The Wisconsin Division of Public Health Seeks to Increase Illness Reporting with Veterinarians' Help

Sarah Koske, DVM, MPH, Wisconsin Department of Health Services, Division of Public Health

Great Lakes Restoration Initiative (GLRI)

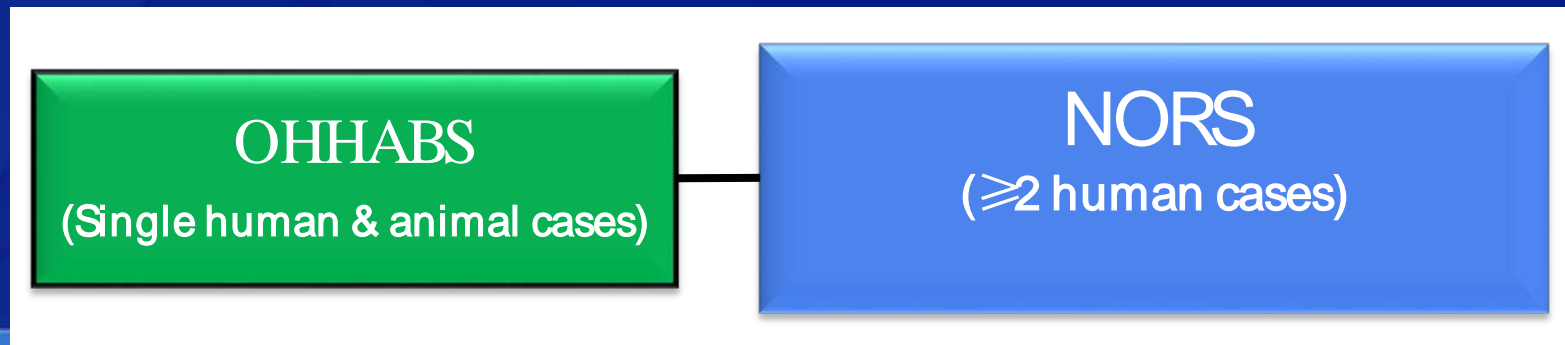
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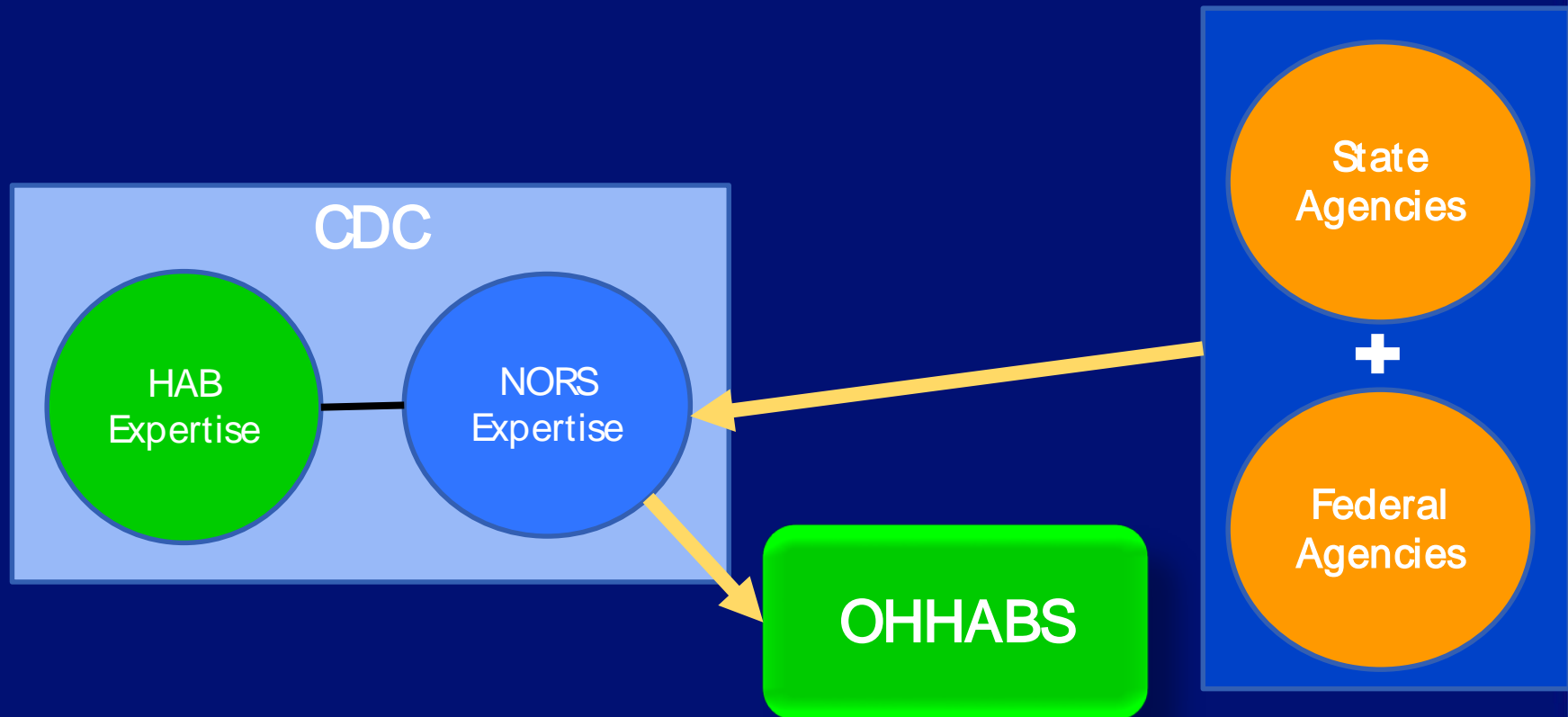
One Health Harmful Algal Bloom System (OHHABS)

- ❑ Systematic collection of data on HABs and single cases of HAB-related human and animal illnesses
 - Informed by HABISS
 - “One Health” approach
 - Event-based (not routine water monitoring)
 - Voluntary reporting by states after investigation completed
 - Waterborne and foodborne illnesses
- ❑ Web-based reporting system linked to the National Outbreak Reporting System (NORS)

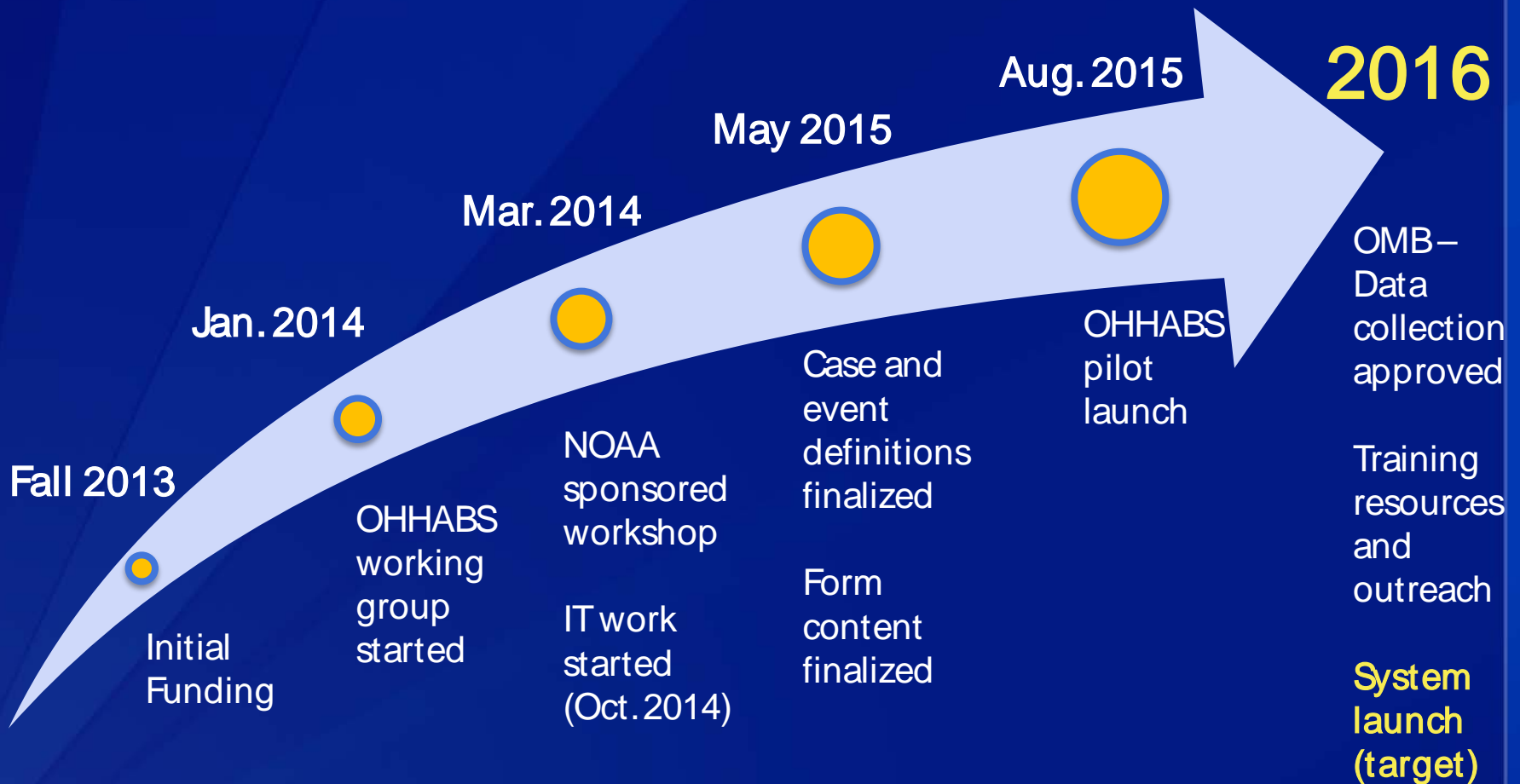


Surveillance Partnerships

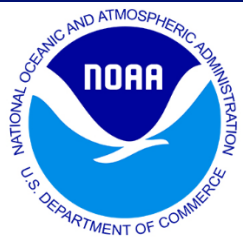
- Internally at CDC
- Externally with state and federal partners



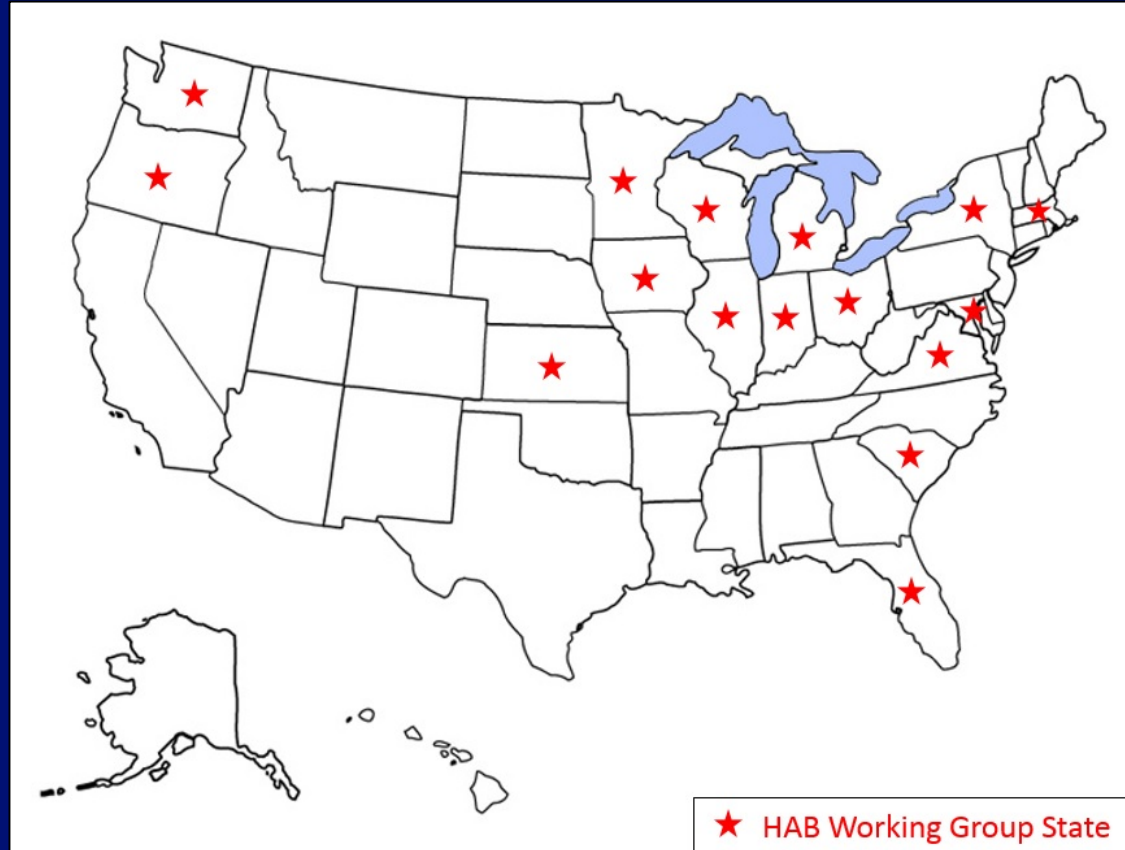
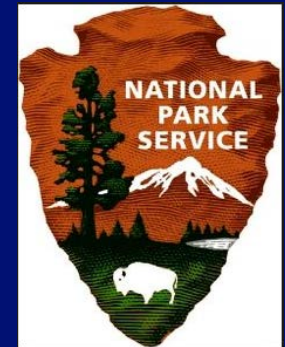
OHHABS Development Timeline



OHHABS Working Group



U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry



OHHABS Working Group Surveillance Materials

- **Reporting Criteria**
 - HAB event definition (suspected, confirmed)
 - Human case definition (suspected, probable, confirmed)
 - Animal case definition (suspected, probable, confirmed)
- **Forms**
 - Environmental form
 - Human case form
 - Animal case form
- **User guidance (in development)**

OHHABS Human Case Definitions

Table 2. Definition of a Human HAB-associated case

Definition	Criteria							
	Exposure ¹	Signs/ symptoms ²	Public health assessment ³	Professional medical diagnosis ⁴	Other causes of illness ruled out	Observational or environmental data ⁵	Laboratory- based HAB data ⁶	Clinical data ⁷
1. Suspect	Required	Required	Required					
2. Probable	Required	Required	Required			Required to have 1		
3. Probable	Required	Required	Required	Required	+/-	+/-	+/-	
4. Confirmed	Required	Required	Required	Required to have 1		+/-	+/-	Required
5. Confirmed	Required	Required	Required	Required	Required		Required	

¹ Exposure (i.e. physical contact, inhalation, ingestion) to water, algae, or seafood, dietary supplements

² Self-reported signs/symptoms after exposure

³ Public health assessment is defined as the action of compiling all data available and deciding that the illness in question is likely HAB-related

⁴ Professional medical diagnosis being provided by a medical practitioner (e.g. doctor, nurse, physician assistant) based on his or her medical assessment of the patient's symptoms, medical history, exposure, etc.

⁵ Observational (e.g. scum, algae, water color change, sheen, photographic evidence, satellite data) or environmental (e.g. pH, chlorophyll, nutrient levels) data from a water body to supporting the presence of an algal bloom

⁶ Laboratory detection of cyanobacteria or other potentially toxin-producing algae, (e.g. microscopic confirmation or DNA analyses) or algal/cyanobacterial toxins (e.g. bioassay, HPLC) in a water body, finished drinking water supply, seafood or dietary supplements

⁷ Laboratory documentation of cyanobacteria, other potentially toxin-producing algae, or algal/cyanobacterial toxins in a clinical specimen

Blue shaded cells: you must have at least one of the criteria described in the shaded cell.

+/-: indicates that this criteria is optional and while it strengthens the case, but it does not change case classification (e.g. suspect to probable, probable to confirmed).

OHHABS Reports

OHHABS Report

Environmental
Form



Hum

Human

Human Form



Anim

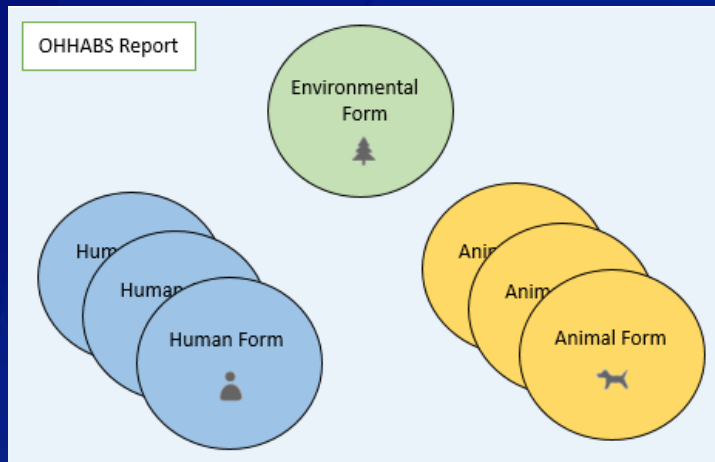
Animal

Animal Form

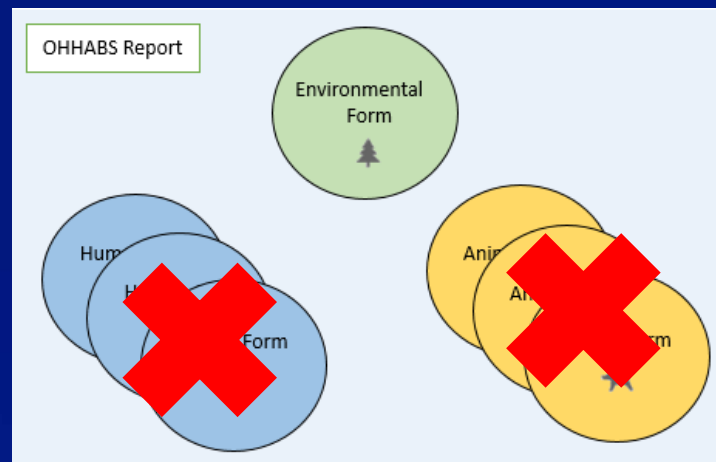


What Can Be Reported to OHHABS

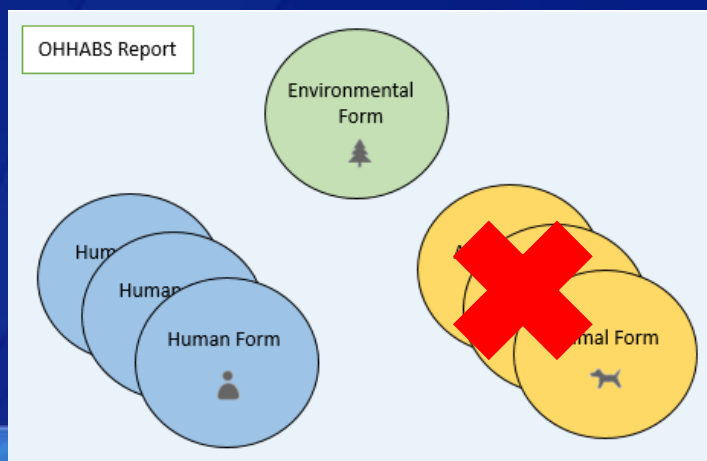
1. Environmental data, human case data, and animal case data



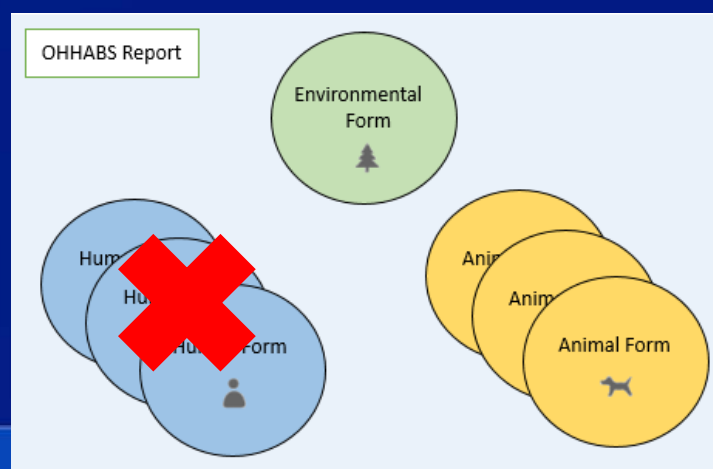
2. Only environmental data about a HAB or HAB-related event



3. Human case data with environmental data about the HAB



4. Animal case data with environmental data about the HAB



Direct login through OHHABS



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OHHABS - One Health Harmful Algal Bloom System

Log In

Username:

Password:

Log In

DISCLAIMER: *The information contained herein is the property of the Centers for Disease Control and Prevention and its participating partners in the National Outbreak Reporting System (NORS). The holder shall keep all information contained herein confidential, shall disclose the information only to its employees with a need to know, and shall protect the information from disclosure and dissemination to third parties with the same degree of care it uses to protect its own confidential information.*

Content source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)

OHHABS Landing Page

OHHABS - One Health Harmful Algal Bloom System

All Reports

Welcome, VRoberts

[Logout](#)

Search Reports

Type CDC or State Report ID:

Select state(s):

- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky

Select Report Date Created:

From:

To:

Type Water Body or Location:

[Search](#)

View and Select Reports

CDC Report ID	State Report ID	Reporting State & Location	Date Created	Report Author	Status				
17	EPA Test	Illinois	10/22/15	JYu	Active				
							1	1	0
3	GA8675309	Georgia	08/28/15	dwade	Active				
							1	2	0
6	IN Report	Indiana Lake Michigan	09/03/15	JYu	Active				
							1	1	0
7	MI Report	Michigan Saginaw Bay	09/16/15	JYu	Active				
							1	3	2
5	MN Report2	Minnesota Clearwater Lake	09/03/15	JYu	Active				
							1	2	3
11	NOAA Test	Missouri	10/07/15	JYu	Active				
							1	1	1
4	NY Test Report	New York Oneida Lake	08/31/15	JYu	Active				
							1	0	1
8	Test IJC	Illinois	09/16/15	JYu	Active				
							1	1	1

Actions

[Create New Report](#)

[Download Report Data](#)

E H A

NORS



[Go to NORS](#)

Resources

[Contact us](#)

[Pilot Guidance](#)


Environmental Form

OHHABS - One Health Harmful Algal Bloom System

Go to: [All Reports](#) [Report Summary: MN_Report1](#)

Welcome, VRoberts

[Logout](#)

 State Report ID: MN_Report1


Environmental Summary:

Water Body: Clearwater Lake

Author: JYu

Event Date: 8/15/2015

Report Summary:

State Report ID: MN_Report1 

Status: Active

Water Body: Clearwater Lake

CDC Report ID: 5

Author: JYu

Date Created: 9/3/2015



General

Bloom Description

Laboratory Testing

Other Systems

Supplemental Info


Author and Agency


Dates

Geographic Description

Water Body Characteristics

Save

Date bloom was first observed 

Date of notification to Local, Territory, Tribal, or State Health Authorities: 

If no bloom date is available, select one below and explain in Date Remarks:



Date Remarks:


Human Case Form




- ❑ No personally identifiable information (PII) is collected in the human case form

OHHABS - One Health Harmful Algal Bloom System

Go to: [All Reports](#) [Report Summary: MN_Report1](#) Welcome, JYu
[Logout](#)

 Human Case ID: Hu1 

Human Case Summary:		Report Summary:	
Sex: Male	Author: JYu	State Report ID: MN_Report1 	CDC Report ID: 5
Age: 14	Date Created: 9/3/2015	Status: Active	Author: JYu
		Water Body: Clearwater Lake	Date Created: 9/3/2015

  
1 2 3

General | Human Exposure Info | Illness and Outcomes | Clinical Testing | Supplemental Info | Author and Agency

Human Description | Dates

Sex: Male Age(years):

State of residence:

Animal Case Form



- Single case or large group of cases (e.g., fish kill)

OHHABS - One Health Harmful Algal Bloom System

Go to: [All Reports](#) [Report Summary: MN_Report1](#)

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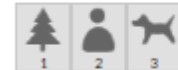
 Animal Case ID: Dog1 

Animal Case Summary:

Type: Dog **Author:** JYu
Single Animal **Date Created:** 9/3/2015

Report Summary:

State Report ID: MN_Report1  **CDC Report ID:** 5
Status: Active **Author:** JYu
Water Body: Clearwater Lake **Date Created:** 9/3/2015



General

Exposure Description

Illness and Outcomes

Clinical Testing

Supplemental Info

Author and Agency

Animal Description

Dates

Save

What is the category of animal(s) being reported?

Domestic pet 

What type of animal(s) are you reporting?

Dog 

Additional animal description (e.g. dog or cat breed, type of bird, amphibian, reptile, other, and other mammal)?

Beagle

Does this illness report describe a single animal or a group of animals (i.e., fish kills, flocks, or herds)?

Single animal

Group of animals

Report Summary

- New reports created with human or animal forms first will have an environmental form automatically created

OHHABS - One Health Harmful Algal Bloom System

Go to: [All Reports](#)

State ReportID: **MN_Report1**

Welcome, VRoberts

[Logout](#)

CDC Report ID: 5 Report Author: JYu Report Creation Date: 9/3/2015 Status: Active

View and Edit Report

	MN_Report1	State/Jurisdiction: Minnesota	Water Body: Clearwater Lake	Date Bloom Observed: 8/15/2015	Author: JYu	
	Hu1	Sex: M Age: 14	Location Name: Clearwater Beach	Date Illness Onset: 08/16/2015	Author: JYu	
	Hu2	Sex: F Age: 10	Location Name: Clearwater Beach	Date Illness Onset: 08/15/2015	Author: JYu	
	Dog1	Type of Animal: Dog	Single Animal	Date Illness Onset: 08/15/2015	Author: JYu	
	Duck Kills	Type of Animal: Bird	Group of Animals	Date Created: 09/03/2015	Author: JYu	
	Fish Kills	Type of Animal: Fish	Group of Animals	Date of Discovery: 08/18/2015	Author: JYu	

Actions:

Create New Form:



Additional Considerations

□ Needs include

- Local and state resources/capacity for surveillance, water monitoring, investigation, and reporting
- Clinical diagnostic tests for algal toxin exposures (e.g., urine)
- Refined case definitions (clinical and environmental data)
- Increased awareness of HAB-related illnesses (e.g., general public, clinicians)
- National health-based regulations and guidelines for drinking water and recreational water exposures
- New and improved tools to facilitate data collection and analysis
- Optimization of environmental and health databases (e.g., data linkages)
- Multidisciplinary partnerships, training and communication resources

Conclusion

- ❑ One Health surveillance
 - OHHABS will be able to link human and animal illness data with HAB events
 - Health surveillance for HAB-related illness relies more than traditional infectious disease or human illness surveillance partnerships
- ❑ Capacity extends beyond an electronic system
 - Resources, tools, relationships, education, and outreach
 - Future database linkages to optimize data use
- ❑ Data to inform Great Lakes restoration efforts, mitigate health effects of HABs, and prevent illnesses
 - e.g., beach management, policy, communications and educational materials




Next Steps

□ OHHABS launch

- Training and resources (e.g., fillable PDFs for state internal use)
 - Technical support for users
 - New CDC Harmful Algal Bloom informational website
 - Communications
- For more information
- Virginia Roberts (evl1@cdc.gov)
 - Joana Yu (jyo3@cdc.gov)



Thank you!


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SEARCH

CDC A-Z INDEX ▾

Harmful Algal Bloom-Associated Illnesses

[f](#) [t](#) [+](#)



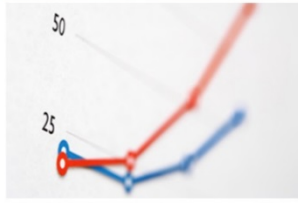
Coming Soon!

Harmful algal blooms (HABs) are the rapid growth of algae that can cause illness in animals, people, and the local ecology. A HAB can look like foam, scum, or mats on the surface of water and cause respiratory irritation. HABs can produce toxins that have caused a variety of illnesses in people and animals. HABs occur in warm, shallow, or brackish waters with abundant nutrients and are becoming more frequent with climate change.

GENERAL INFORMATION ILLNESS & SYMPTOMS

SOURCES OF EXPOSURE & RISK FACTORS PREVENTION & CONTROL

Publications, Data, & Statistics




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