A One Health Surveillance of Harmful Algal Bloom-related Illnesses – A Reporting System Pilot

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National Center for Emerging and Zoonotic Infectious Diseases
Division of Foodborne, Waterborne, and Environmental Diseases
Acknowledgments

- **Great Lakes Restoration Initiative (GLRI)**
  - Regional working group

- **HAB 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
  - Karna, LLC
  - IT Development: Northrup Grumman
Waterborne Disease and Outbreak Surveillance System (WBDOSS)

- Initiated in 1971 for drinking water outbreaks by:
  - The Centers for Disease Control and Prevention (CDC)
  - The Environmental Protection Agency (EPA)
  - The Council of State and Territorial Epidemiologists (CSTE)

- Recreational water outbreaks added in 1978

- Primary source of national data about the scope and effects of waterborne disease outbreaks among persons in the United States

- Data uses
  - Summary reports, other publications, data and statistics
  - Development and support of programs, health promotion, and policies.
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
  - Microbial pathogens, chemicals/toxins

- Reporting system for
  - Waterborne disease outbreaks
  - Foodborne disease outbreaks
  - Enteric disease outbreaks associated with other exposures

More information: http://www.cdc.gov/nors
Data Sources: the NORS surveillance process

1. People exposed to infectious/non-infectious pathogen
2. People get sick, may seek treatment
3. Health departments notified of possible outbreaks
4. CDC checks data for accuracy and analyzes
5. Health department enters outbreak data into NORS
6. Health department conducts outbreak investigation
7. Data summarized and published
HAB-related Case Surveillance in the United States

- Harmful Algal Bloom-related Illness Surveillance System (HABISS)
  - One Health: HABs, human illness, animal illness
  - Funded select states to improve HAB and HAB-related illness surveillance
  - Closed FY2013
Informing Great Lakes Restoration Efforts

- CDC funded since FY2013 by the Great Lakes Restoration Initiative (GLRI) to expand public health surveillance
  - Harmful algal blooms (HABs) & ambient waterborne disease in the Great Lakes (GL)
  - Collect better data to assess GL ecosystem health & GLRI project impacts

- Project Activities
  - Build Great Lakes state surveillance capacity and communication network
  - Build regional capacity through state and federal partnerships, data and information sharing
  - Build a web-based reporting system for One Health HAB surveillance.
One Health Harmful Algal Bloom System (OHHABS)

- **“One Health” approach**
  - 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 is critical.

- **Systematic collection of data on HABs and single cases of HAB-related human and animal illnesses**
  - Identified by HABISS
  - Event-based
  - State reporting after investigation complete

- **Web-based reporting system linked to the National Outbreak Reporting System (NORS)**
OHHABS as a Tool for Understanding and Preventing HAB-related illnesses

- Definition and characteristics of human and animal HAB-related illness?
  - How to define cases and interpret clinical, epidemiological, and environmental data.
  - Toxin concentrations that cause illness?
  - Symptoms caused by specific toxins? Time to onset? Duration of illness?
  - Differences due to age, exposure route, immune status, other factors?

- Frequency and geographic distribution over time?
  - Illnesses occurring annually? Where?
  - Illnesses occurring more/less frequently?

- Health policies or other actions?
  - Needs? Impacts on the occurrence of HAB-related illness?
HABs are an Emerging Public Health Issue

- Needs include:
  - Clinical diagnostic tests for algal toxin exposures (e.g., urine)
  - Rapid and affordable water sampling tests for HABs and toxins
  - Local and state resources/capacity for surveillance, water monitoring, investigation, and reporting
  - Refined case definitions (clinical and environmental data)
  - Increased awareness of HAB-related illnesses (e.g., general public, clinicians)
    - HAB-related health education and awareness resources
  - National health-based regulations and guidelines for drinking water and recreational water exposures
  - New and improved tools to facilitate data collection and analysis
    - Electronic database linkages to optimize use of health and environmental data
  - Multidisciplinary partnerships, training and communication resources
OHHABS Timeline

State-Federal working group
NOAA-sponsored workshop
Draft form revisions
IT work initiated
Forms Finalized
Case and event definitions finalized
OHHABS Pilot live (August)
OMB request

Fall, 2013

Nov 2013 – Mar 2014

Initial funding

Apr 2014 – Jan, 2015

Draft form revisions
IT work initiated

Feb 2015 – Oct 2015

Forms Finalized
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OHHABS Pilot live (August)
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Nov 2015-2016 activities/plans

Preparation for full launch

OHHABS Pilot

Training resources

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OHHABS Pilot

Training resources
Harmful Algal Bloom Surveillance Working Group

- Initiated January 2014
- State
- Federal
  - ATSDR
  - CDC
  - EPA
  - FDA
  - NOAA
  - NPS
  - USGS
- Other
  - IJC

Map of the United States with stars indicating states and purple stars indicating states that are part of the Harmful Algal Bloom Surveillance Working Group.

Legend:
- Purple = Working Group
- Red = Working Group, OHHABS Pilot State
<table>
<thead>
<tr>
<th>Working Group Activities</th>
<th>Outputs</th>
</tr>
</thead>
</table>
| Reporting Forms          | • HAB environmental data form  
|                          | • Human illness case form  
|                          | • Animal illness case form  |
| Reporting Criteria       | • Human illness case definitions (suspected, probable, confirmed)  
|                          | • Animal illness case definitions (suspected, probable, confirmed)  
|                          | • HAB event definitions (suspected, confirmed)  |
OHHABS Reports

HAB Report

Environmental Form

Human Case Form

Animal Case Form

E- viro- me- tal Form

Animal Case Form
Login through NORS
Access through NORS

Message Board

Date: 10/09/2015

10/15/2015 *** SITE UPDATES AND EXPECTED DOWNTIME

Several changes to the NORS interface are scheduled to be released this Friday, 9/25/15, from 8am to 10am ET. The NORS interface and NORSdirect are expected to be down during this time.

Updates include changes to the geographic location, etiology, and settings sections. We are planning to hold two informal calls to review and discuss these changes with interested NORS users. Users may also contact us with questions or concerns at any time at NORSAdmin@cdc.gov.

NORS Call #1 Tuesday, 9/29/15, 1:30pm ET
Conference line: 1-866-707-1257, code 78500178
Foodshield link: https://foodshield.connectsolutions.com/388c7mkqyrg/

Create or Edit Report
- Create New Report
- Open/View a Report
- Change Report Name

Recently Opened Reports
- CDCTestOct192015
- MIST_Test_Blank_11414
- 2011-08-054
- 2011-03-024
- 2011-25-128
- UR-32070311

Administrative Tasks

- Administration
  - Add or Edit Agency
  - Report Admin
  - Temporary Read/Write Access
  - Update Message Board
  - User Management

- My Account
  - Change Password

Download/Upload Report Data

- PDF Download
- Full Download
- NORSdirect

Resources

- Guidance Document
- NORS Rules of Behavior
- NORSdirect Terms of Use
- Contact Us

- Harmful Algal Blooms
### OHHABS - One Health Harmful Algal Bloom System

#### All Reports

<table>
<thead>
<tr>
<th>CDC Report ID</th>
<th>State Report ID</th>
<th>Reporting State &amp; Location</th>
<th>Date Created</th>
<th>Report Author</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>EPA Test</td>
<td>Illinois</td>
<td>10/22/15</td>
<td>JYu</td>
<td>Active</td>
</tr>
<tr>
<td>3</td>
<td>GA8675309</td>
<td>Georgia</td>
<td>08/28/15</td>
<td>dwade</td>
<td>Active</td>
</tr>
<tr>
<td>6</td>
<td>IN Report</td>
<td>Indiana Lake Michigan</td>
<td>09/03/15</td>
<td>JYu</td>
<td>Active</td>
</tr>
<tr>
<td>7</td>
<td>MI Report</td>
<td>Michigan Saginaw Bay</td>
<td>09/16/15</td>
<td>JYu</td>
<td>Active</td>
</tr>
<tr>
<td>5</td>
<td>MN Report1</td>
<td>Minnesota Clearwater Lake</td>
<td>09/03/15</td>
<td>JYu</td>
<td>Active</td>
</tr>
<tr>
<td>11</td>
<td>NOAA Test</td>
<td>Missouri</td>
<td>10/07/15</td>
<td>JYu</td>
<td>Active</td>
</tr>
<tr>
<td>4</td>
<td>NY Test Report</td>
<td>New York Oneida Lake</td>
<td>08/31/15</td>
<td>JYu</td>
<td>Active</td>
</tr>
<tr>
<td>8</td>
<td>Test UC</td>
<td>Illinois</td>
<td>09/16/15</td>
<td>JYu</td>
<td>Active</td>
</tr>
</tbody>
</table>

#### Actions
- Create New Report
- Download Report Data
- Go to NORS
- Resources:
  - Contact us
  - Pilot Guidance

#### 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: [ ]
Each state establishes the naming convention for its State Report IDs and Case IDs.
No personally identifiable information (PII) is collected in the human case form.
## Environmental Summary

**Date bloom was first observed:** 8/15/2015

**Date of notification to Local, Territory, Tribal, or State Health Authorities:** 8/15/2015

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

- **Date Remarks:**

### General

**State Report ID:** MN_Report1

<table>
<thead>
<tr>
<th>Dates</th>
<th>Geographic Description</th>
<th>Water Body Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/15/2015</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Bloom Description

**Author:** JYu

**Water Body:** Clearwater Lake

**Event Date:** 8/15/2015

### Laboratory Testing

**CDC Report ID:** 5

**Status:** Active

**Water Body:** Clearwater Lake

**Date Created:** 9/3/2015
Report Summary

- New reports created with human or animal forms first will have a environmental form automatically created.
OHHABS and NORS

- **OHHABS reports**
  - Event-based reporting by states
  - Human and animal cases of illness and HAB events
  - Waterborne and foodborne HAB exposures
- **HAB outbreaks will continue to be reported in NORS**

**OHHABS**

- O- e Health Harmful Algal Bloom System
  - (Single human & animal cases)

**NORS**

- National Outbreak Reporting System
  - (≥ 2 human cases)
Conclusion

- O- e Health surveilla- ce
  - OHHABS will be able to link huma- a- d a- imal ill- ess data with HAB eve- ts
  - Health surveilla- ce for HAB-related ill- ess relies more tha- traditio- al i- fectious disease or huma- ill- ess surveilla- ce part- erships

- Capacity exte- ds beyo- d a- electro- ic system
  - Resources, tools, relatio- ships, educatio- , a- d outreach
  - Future database li- kages to optimize data use

- Data to i- form Great Lakes restoratio- efforts, mitigate health effects of HABs, a- d preve- t ill- esses
  - e.g., beach ma- ageme- t, policy, commu- icatio- s a- d educatio- al materials
Thank You!

For more information

• Virginia Roberts (evl1@cdc.gov)
• Joana Yu (jyo3@cdc.gov)

1600 Clifton Road NE, Atlanta, GA 30333
Telephone: 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
Visit: www.cdc.gov | Contact CDC at: 1-800-CDC-INFO or www.cdc.gov/info

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
Extra slides
What is the OHHABS pilot?

- An opportunity for HAB working group states to evaluate the reporting process and needs
  - State public health agencies reserve the right to grant access to OHHABS. New users must get approval from their state’s NORS Reporting Site Administrator (RSA) about OHHABS access

- An opportunity for federal partners to see the system through demonstrations and provide feedback

- Pilot goals:
  - Refine forms, HAB event, human case, & animal case definitions
  - Develop training and guidance for reporting partners
  - Identify and prioritize OHHABS needs

- Pilot (August 2015) → Full Launch (Spring 2016)
Required Fields in OHHABS

- **Necessary identifiers for the report and forms**
  - *State Report ID*: 50 character max (e.g. alphanumeric, symbols)
  - *Form Type*: (e.g. Environmental, Human, Animal)
  - *Case ID*: 50 character max (e.g. alphanumeric, symbols)

- **Auto-populate fields in report and form summaries**

- **Minimal number of fields**
  - Unique to each form
    - Environmental (i.e. dates, state)
    - Human (i.e. dates, exposure state)
    - Animal (i.e. dates, exposure state, single or group of animals)
Rules of Behavior

Rules of behavior for the National Outbreak Reporting System (NORS) provide general instructions on the appropriate use of NORS and apply to any persons with a NORS user account. All users are required to read this document and confirm acceptance before access to NORS is granted. The NORS rules of behavior do not replace existing policy. Rather, they supplement standard security policies. Written guidance cannot cover every contingency, therefore NORS users should augment the rules of behavior using their best judgment and highest ethical standards to guide their actions. These principles are based on federal laws, regulations, and directives. There are consequences for failure to comply with the rules of behavior. Violation of these rules may result in suspension of access privileges and criminal and civil penalties. CDC NORS administrators may periodically monitor both the system and user activities for purposes including, but not limited to, troubleshooting, performance assessment, usage patterns, indications of attack or misuse, and the investigation of a complaint to suspected incident. Users are provided system access for the purpose of facilitating federal, state, local, and agency public health missions. Users should not have an expectation of privacy in anything created, processed, sent, received, or stored in NORS or in any action performed while using NORS resources. By signing this document, users consent to authorized system monitoring and acknowledge that CDC and/or reporting site administrators may, as directed or required by law, share collected information with management and/or law enforcement personnel. Users who do not comply with the prescribed rules of behavior are subject to penalties that can be imposed under existing policies and regulations, including suspension of system privileges and criminal prosecution.

I have read the above document and agree to the Rules of Behavior

Continue
Environmental Form – Geographic Description

General

Location
(For foodborne intoxication, report where food was caught/harvested)

State/Jurisdiction: [Minnesota]

Counties (select all that apply):
- Aitkin
- Anoka
- Becker
- Beltrami
- Benton
- Big Stone
- Blue Earth
- Brown
- Carlton

Did an algal bloom impact water quality in any other states?

- Yes
- No
- Unknown
- Not applicable

Select State(s)
- CDC
- Alabama
- Alaska
- Arizona
- Arkansas
- California
- Colorado
- Connecticut

Official Name of Water Body: Clearwater Lake

Common Name of Water Body:

Specific location name: Clearwater Beach

Nearest city/town:

Location Coordinates:
- Degrees Minutes Seconds (ex: DD MM SS)
- Decimal Degrees (ex: 12.345678)
E- viro- me- tal Form – Health Advisories/War- i- g
## Table 1. Definition of a HAB environmental event

<table>
<thead>
<tr>
<th>Definition</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HAB Environmental Event</strong></td>
<td>Laboratory-based HAB data¹</td>
</tr>
<tr>
<td>1. Suspect</td>
<td>Required</td>
</tr>
<tr>
<td>2. Confirmed</td>
<td>Required</td>
</tr>
<tr>
<td>3. Confirmed</td>
<td>Required</td>
</tr>
</tbody>
</table>

¹ Laboratory detection (e.g., microscopic confirmation or DNA analyses) of cyanobacteria, other potentially toxin-producing algae, or algal/cyanobacterial toxins in a water body or finished drinking water supply

² 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 support the presence of an algal bloom

Blue shaded cells: you must have at least one of the criteria described in the shaded cell.
Table 2. Definition of a Human HAB-associated case

<table>
<thead>
<tr>
<th>Definition</th>
<th>Exposure¹</th>
<th>Signs/symptoms²</th>
<th>Public health assessment³</th>
<th>Professional medical diagnosis⁴</th>
<th>Other causes of illness ruled out</th>
<th>Observational or environmental data⁵</th>
<th>Laboratory-based HAB data⁶</th>
<th>Clinical data⁷</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human HAB-associated Case</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required to have 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Suspect</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Probable</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td></td>
<td>+/-</td>
<td>Required to have 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Probable</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>+/-</td>
<td>+/-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Confirmed</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>+/-</td>
<td>+/-</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>5. Confirmed</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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).
## Current OHHABS Access

### Reporti- g Site

- **NORS Users**
  - **A**
  - **B**

- **OHHABS Users**
  - **A**

### User Access Table

<table>
<thead>
<tr>
<th>User</th>
<th>System Access</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Both NORS &amp; OHHABS</td>
<td>User A can access both NORS &amp; OHHABS</td>
</tr>
<tr>
<td>B</td>
<td>Only NORS</td>
<td>User B can access NORS but not OHHABS</td>
</tr>
</tbody>
</table>
Future OHHABS access

<table>
<thead>
<tr>
<th>User</th>
<th>System Access</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Both NORS and OHHABS</td>
<td>User A can access both NORS and OHHABS</td>
</tr>
<tr>
<td>B</td>
<td>Only NORS</td>
<td>User B can access NORS but not OHHABS</td>
</tr>
<tr>
<td>C</td>
<td>Only OHHABS</td>
<td>User C can access OHHABS but not NORS</td>
</tr>
</tbody>
</table>
**Harmful Algae**

- **Harmful Algal Bloom (HAB)**
  - A proliferation of microscopic organisms found in water that release or contain toxins or otherwise adversely affect humans, animals, and ecosystems – may or may not be visible

- **Impacts**
  - **Public health**
    - Animal
    - Human
    - Exposure pathways: ingest (water or food), inhalation, dermal contact
  - **Ecologic**
  - **Eco-omic**

- **One Health issue**

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*Photography credits (From top: Andy Reich, Lorrie Backer)*