

# Using Knowledge Coproduction to Engage Stakeholders in Great Lakes Research

9.26.18

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Cooperative Institute for Great Lakes Research



# What does a stakeholder engagement specialist do?

- Bridge the communication gap between stakeholders and scientists
- Ensure that research products are useful and easily used

## How?

- Using Knowledge Coproduction as a theoretical framework
  - Involving stakeholders throughout the research process to create useable knowledge and influence decision-making (Mitchell et al., 2006)



# Goals

- Share my experience developing a coproduction stakeholder engagement approach

Example projects in Lake Erie:

1. Experimental HAB Tracker,
  2. Lake Erie Hypoxia Forecast
- Prompt discussion of how the usability of ***your*** research may be increased

# Cooperative Institute for Great Lakes Research

- 1 of 16 Cooperative Institute Across the U.S.
- Conduct research to support NOAA's goals & expand their resources
- Sponsored by the NOAA Great Lakes Environmental Research Lab
- Hosted by the University of Michigan



# Why did CIGLR hire a stakeholder engagement specialist?



CIGLR/NOAA GLERL  
Harmful Algal Bloom Research Team

- Forecasting, monitoring, remote sensing of lake conditions





# In 2014, Toledo Water Crisis Brought Lake Erie HABs into National Spotlight

## The Washington Post

Washington Post • Thursday, August 6, 2014 • Edition: Metro • Page: B1

### When a bold move ends in the basement

AVA whistleblowers in Phoenix experience an old federal tradition

BY DAVID A. FARRENTHOUD

PHOENIX — On her 71st birthday in the basement, Paula Pedone had something fun to look forward to: the fact an email to run, up on the first floor.

"Oh, I get to go get the papers. Exciting!" she said. "I get to go upstairs and, you know, see people."

The task itself was no thrill. Retrieve the morning's newspapers and bring them back to the library of the Phoenix Veterans Affairs hospital. The pleasure was in the journey. Down a long, much hallway. Back again, seeing friends in the bustle of the hospital's main floor.

Then, Pedone got back in the elevator and to "B." The day's big excitement was over. It was 7:40 a.m.

"I will not be able to do this forever," Pedone said later that day.

Pedone, 66, is the former chief spokeswoman for this VA hospital. Now, she is living in a basement's urban legend. After complaining to higher-ups about mismanagement at this hospital, she has been reassigned — technically — to a desk in the basement.

BASEMENT CONTINUED ON A14

**Kan. tea party stalwart tests a vulnerable GOP senator**

BY ZACHARY A. GOLDBERG

TOPEKA, Kan. — On Tuesday, Sen. Pat Roberts, meeting a "House Life" staff and sitting at the edge of the room at

### THE CASE OF CAMERON TODD WILLINGHAM

## Fresh doubts over a Texas execution

New evidence revives concerns that a man was wrongly put to death in 2004



Willingham, above, was the man in court, leading to the execution of Willingham, right.

BY MACKENZIE POKLEY

The Marshall Project

CORPUS CHRISTI, TEX. — For more than 20 years, the prosecutor who convicted Cameron Todd Willingham of murdering his three young daughters has insisted that the authorities made no mistake in the testimony of the jailhouse informant who told jurors that Willingham confessed the crime to him.

But now new evidence has raised questions about Willingham's guilt. In taped interviews, Willingham, who has previously both recanted and affirmed his testimony, gave his first detailed account of how he led on the

witness stand in return for efforts by the former prosecutor, John H. Jackson, to reduce Willingham's sentence for robbery and to arrange thousands of dollars in support from a wealthy Christian minister. Newly uncovered letters and court files show that Jackson worked diligently to interfere for Willingham after his testimony and to coordinate with the minister, Charles S. Pearce Jr., to keep the minister's influence in the



EXECUTION CONTINUED ON A6



FOX 2 WATER BAN STILL IN EFFECT FOR TOLEDO, PARTS OF MONROE COUNTY 6:05 77°

## Algae's lake effect reveals putrid, pea green disaster

Distribution centers offer free relief to community

By MARGARET MCGEE

TOLEDO, Ohio — The city's distribution centers are offering free relief to the community. The city's distribution centers are offering free relief to the community. The city's distribution centers are offering free relief to the community.



Officials won't give test results on 2nd day

By JEFFREY

TOLEDO, Ohio — Officials won't give test results on the 2nd day. Officials won't give test results on the 2nd day. Officials won't give test results on the 2nd day.



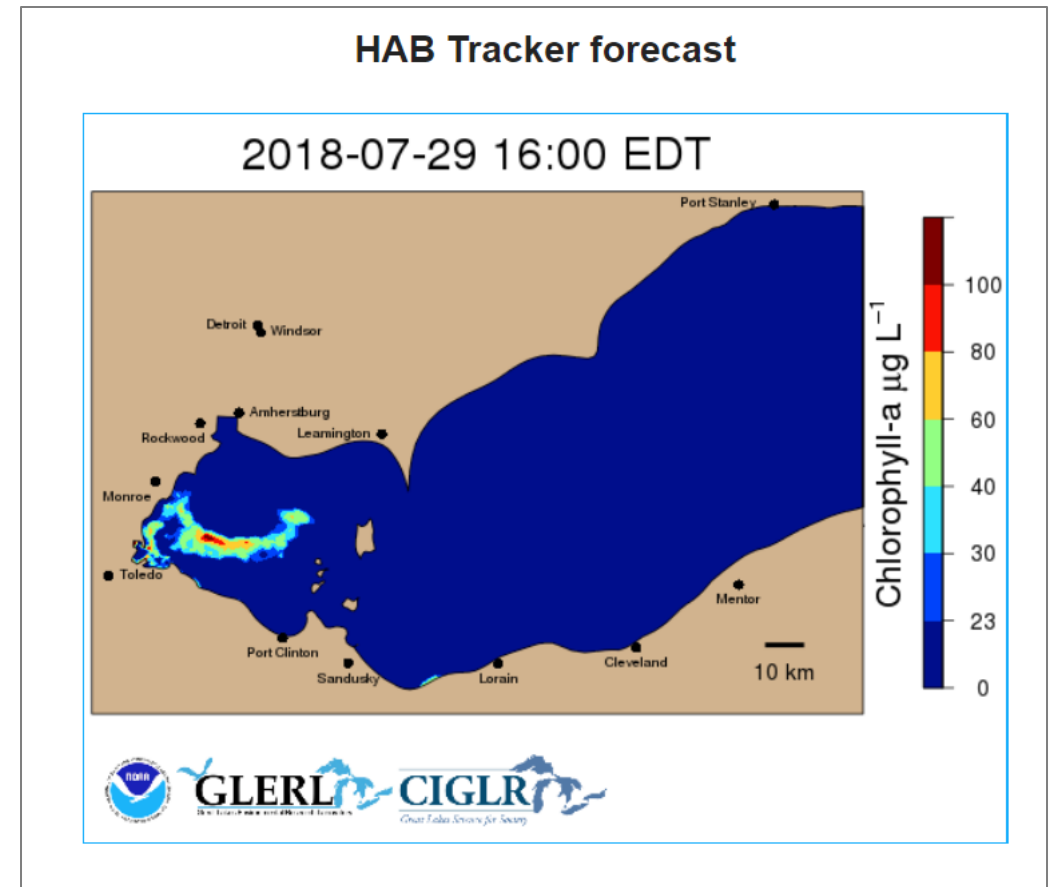
Eden Rogers, 13, uses a stick to scoop algae off the shoreline at the walk the beach at Maumee Bay State Park in Oregon, Ohio, with her sisters. The girls said they came to look at the toxic algae bloom along the shore of Lake Erie, which has left more than 400,000 residents in the area without safe drinking water for a second day while local water supplies were being tested. The lake provides the bulk of the area's drinking water. Story, A3



# Experimental Lake Erie HAB Tracker

Forecast harmful algal blooms (HABs) in Western Lake Erie

- ✓ Where are blooms?
- ✓ How big are they?
- ✓ Where are they likely headed?



# How do we identify who may find our forecast useful?



CIGLR/NOAA GLERL  
HAB Tracker Developers

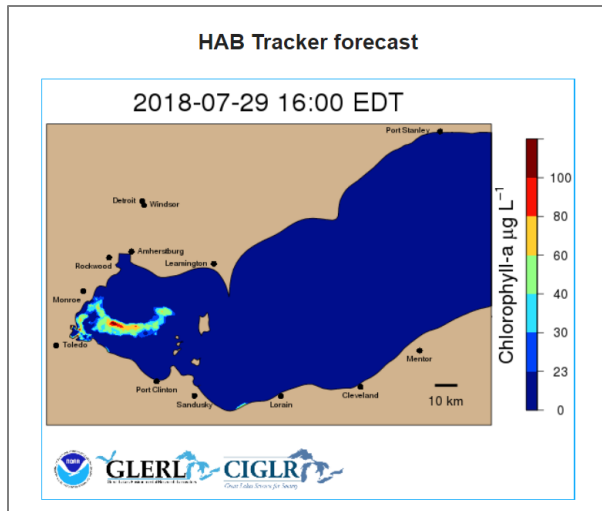


Public Drinking  
Water Systems

Decision-Support



& Other Users???





# How do we identify who may find our forecast useful?





# Solution? Hire a graduate student!

## Charter Captain & Recreational Angler Focus Group Study

### Research Questions

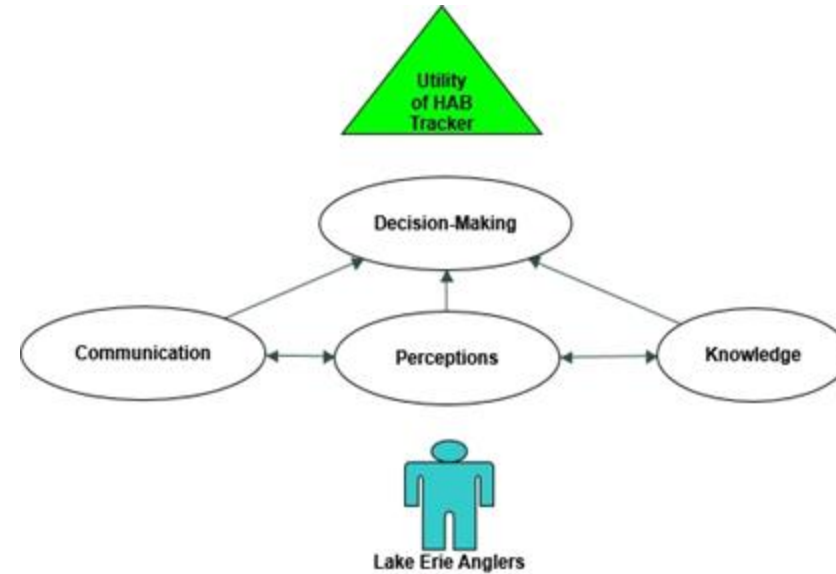
1. How are Lake Erie Anglers impacted by HABs?
2. Will the HAB Tracker support angler decision-making while fishing on Lake Erie? Why or why not?



# Needs Assessment

## Research Questions

1. How are Lake Erie Anglers impacted by HABs?
2. Will the HAB Tracker support angler-decision-making while fishing on Lake Erie? Why or why not?



- 7 focus groups
- 41 participants
- 22 charter captains, 21 rec. anglers
- >14 interview hrs

# Product Evaluation in Terms of User Needs

## Methods

1. Focus Groups
2. Transcribe
3. Code
4. Compare
5. Develop themes
6. Generate recommendations

172 TJ: Algae is mostly in that real top layer of the water.

173 JH: I was with someone that works with the natural resources conservation office, that farm type  
174 agriculture agency, and he would make a point of going beyond the blooms. So several times two years  
175 ago, we went out beyond West Sister Island where it had thinned out specifically to avoid the algae. And  
176 so he was superstitious that he couldn't catch perch in the algae bloom, and so just for a variety of  
177 reasons avoiding it was at the top of his list. And then like the other guys have said, you can look at the  
178 maps, the MODIS satellite images and go east far enough to avoid it.

179 MJ: Yeah, that's a good one....

180 FS: Exactly.

Communication/Web/MODIS



# Product Evaluation in Terms of User Needs

## Results

1. How are Lake Erie anglers impacted by HABs?

<u>Angler Decisions in HABs</u>	<u>Variables that influence decision-making</u>
<ul style="list-style-type: none"><li>• Whether to Fish</li><li>• Where to Fish</li><li>• Whether to Eat the Fish</li></ul>	<ul style="list-style-type: none"><li>• Fishing aesthetics</li><li>• Angler perceptions of health risks</li><li>• Angler perceptions of ability to catch fish</li><li>• Charter captain customer perceptions of fishing in HABs</li><li>• Communication with peers</li></ul>

# Product Evaluation in Terms of User Needs

## Results

2. Will the HAB Tracker support angler decision-making while fishing on Lake Erie?  
Why or why not?

Although anglers differed in the degree to which they sought to avoid HABs, all anglers preferred not to fish in HABs; therefore the HAB Tracker may be useful to anglers by helping them to find clear water.

### Recommendations for HAB Tracker Improvement

- Improve explanation of reliability and accuracy of forecast model
- Explain what NOAA/CIGLR are doing to address HABs
- Communicate regularly with fishing groups
- Link HAB Tracker to other frequently used NOAA products
- Include wave height, wind direction, wind velocity, and other lake conditions
- Explain how to interpret the color scale
- Increase size of maps or add a zoom feature

# Develop communication products

## Products & Outcomes

### 1. How are Lake Erie anglers impacted by HABs?

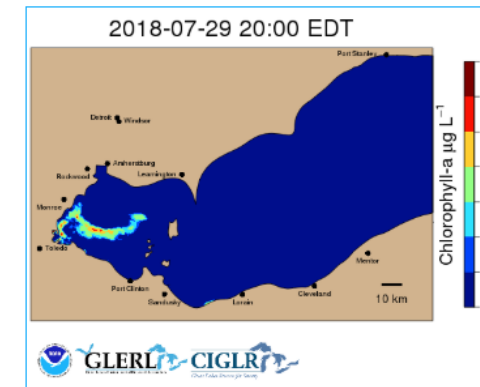
- Webpage
- HAB Tracker Tutorial Video
- Presentations
- News articles
- Meetings

#### Experimental Lake Erie Harmful Algal Bloom (HAB) Tracker

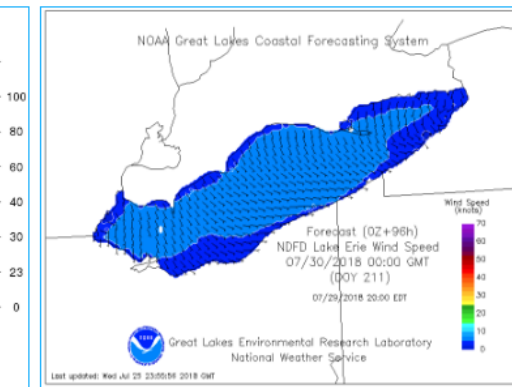
The upper left panel below shows the HAB Tracker lake surface forecast. The other panels provide additional information on lake conditions. See [panel descriptions](#) below. For more information on the HAB Tracker, visit the [About the Lake Erie HAB Tracker](#) page. For the latest images, refresh your browser and/or clear its cache.

[Click to view the HAB Tracker for 2017](#)

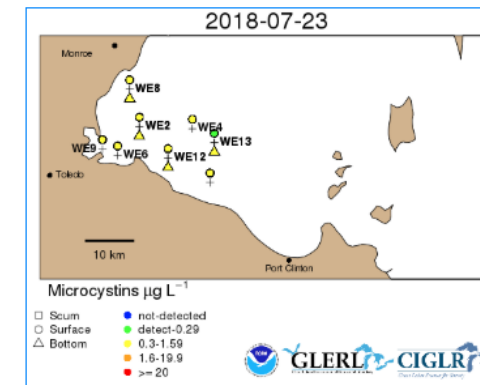
HAB Tracker forecast



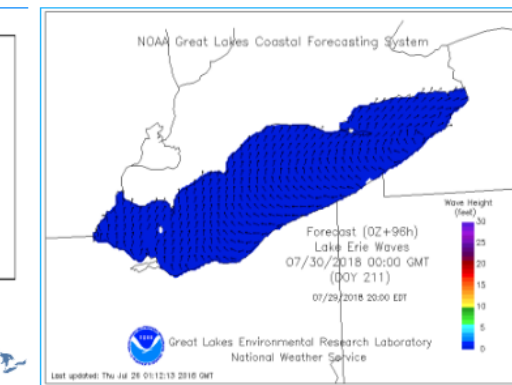
GLCFS nowcast & 5-day wind speed forecast



Latest reported microcystins concentrations



GLCFS nowcast & 5-day wave height forecast

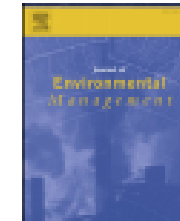




Contents lists available at [ScienceDirect](#)

## Journal of Environmental Management

journal homepage: [www.elsevier.com/locate/jenvman](http://www.elsevier.com/locate/jenvman)



### Research article

## Fishing in greener waters: Understanding the impact of harmful algal blooms on Lake Erie anglers and the potential for adoption of a forecast model



Devin Gill<sup>a,\*</sup>, Mark Rowe<sup>a</sup>, Sonia Joseph Joshi<sup>b</sup>

<sup>a</sup> Cooperative Institute for Great Lakes Research (CIGLR), University of Michigan, 4840, S. State Rd., Ann Arbor, MI, USA

<sup>b</sup> School for Environment and Sustainability, University of Michigan, 440 Church St., Ann Arbor, MI, USA



# Reflection

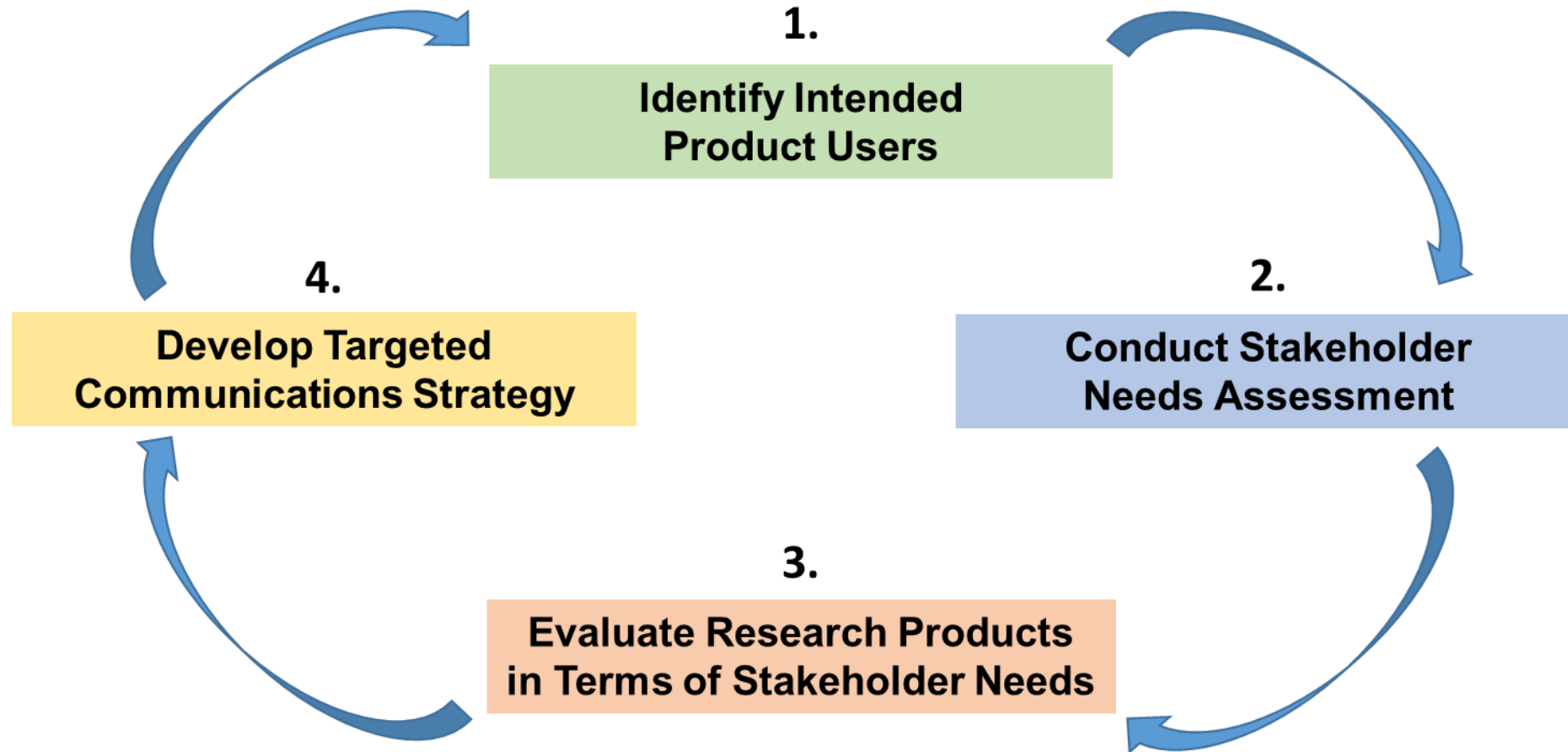
## What worked?

- Increased network & quality of relationships
- Improvements to product based on needs, not assumptions
- Aided in identification of usability barriers beyond product design
- Base line data for assessing broader trends in stakeholder needs

## What didn't?

- Targeting anglers without including them in study design
- Presenting study results during an existing angler meeting

# Formalizing a Coproduction Engagement Approach



# Step 1) Identify intended product users

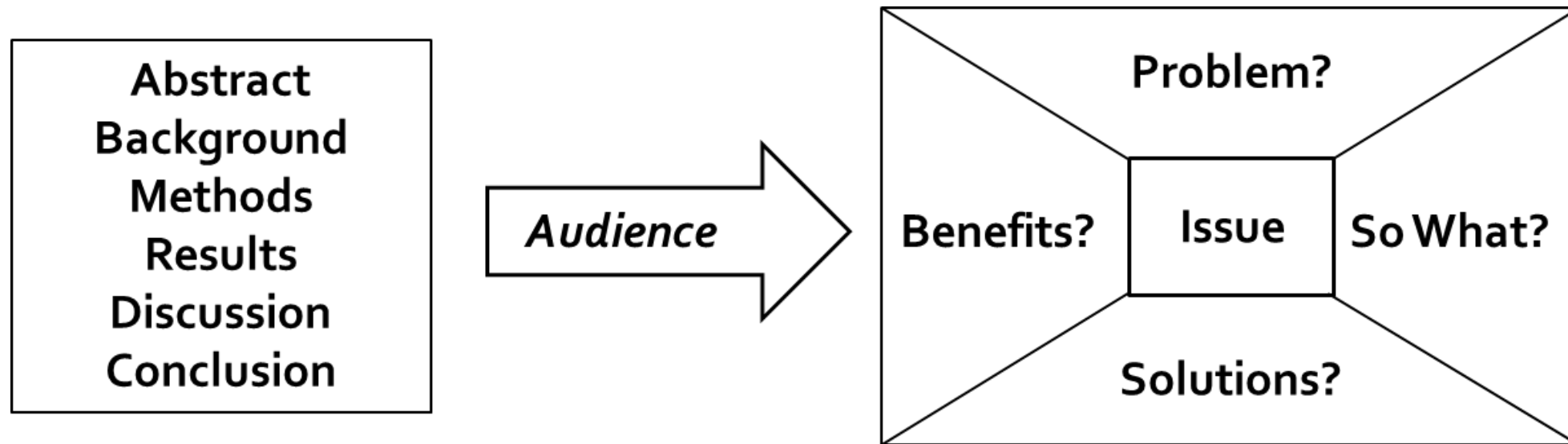
## **Guidelines for Prioritizing Intended Product Users**

- Has this group already expressed an interest in the proposed decision support tool?
- Does CIGLR have an existing relationship with this group?
- What are the measures of influence of this group?
  - Political importance
  - Population size
  - Economic importance
  - Networking abilities
- Does this group exhibit stakeholder burnout?

# Step 4) Develop targeted communication strategy

Create a strategy before developing products

- Create shared language for project participants
- Incorporate story-telling

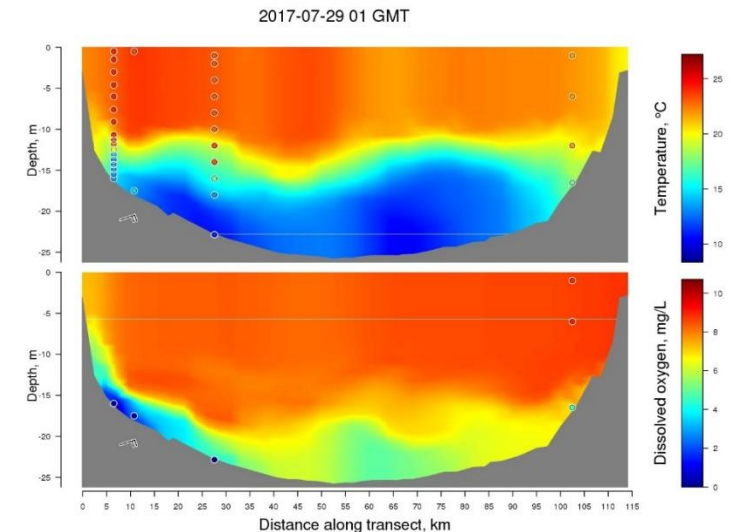
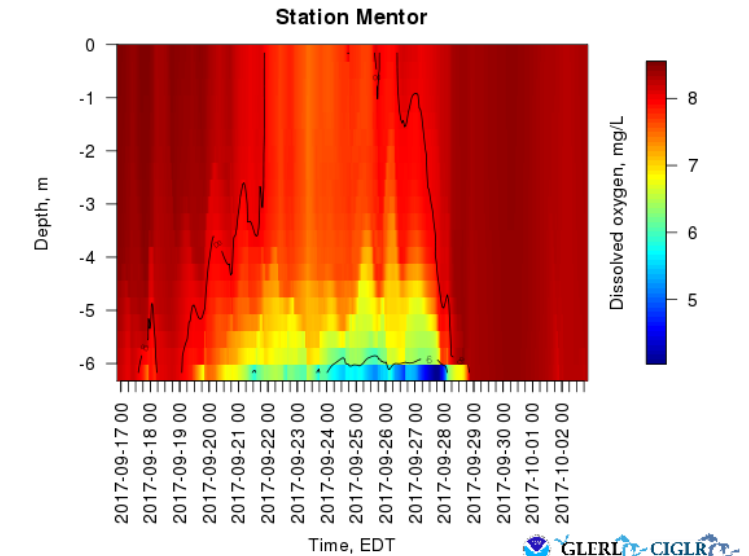
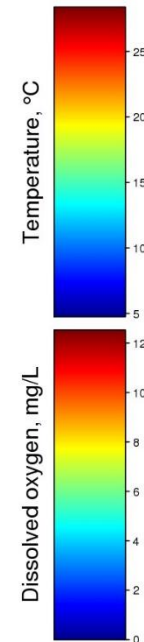
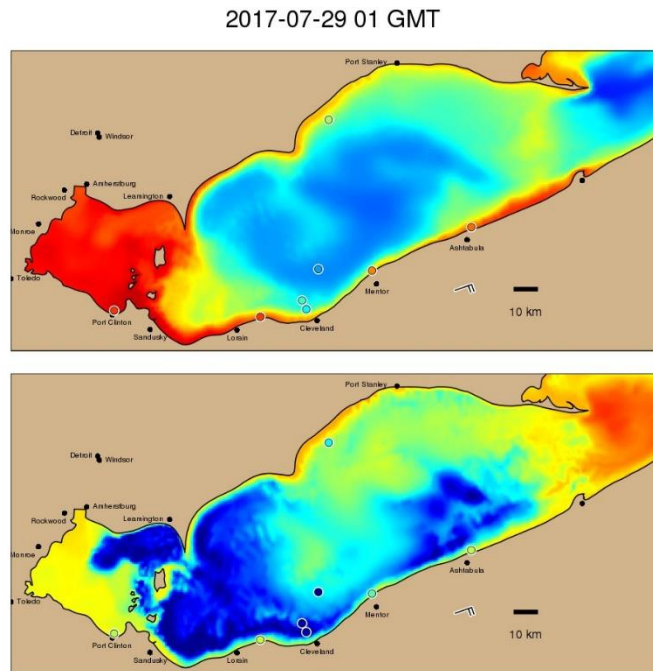




# New Project: Experimental Lake Erie Hypoxia Forecast

Predict low dissolved oxygen conditions and upwelling events that may cause hypoxic water in the hypolimnion to shift.

[www.glerl.noaa.gov](http://www.glerl.noaa.gov)



# Step 1) Identify intended product users

Public Water Systems

## Guidelines for Prioritizing Intended Product Users

- ✓ Has this group already expressed an interest in the proposed decision support tool?
- ✓ Does CIGLR have an existing relationship with this group?
- ✓ What are the measures of influence of this group?
  - Political importance
  - Population size
  - Economic importance
  - Networking abilities
- ✓ Does this group exhibit stakeholder burnout?

# Step 2) Needs Assessment

## Research Questions:

1. How are PWS who draw water from Central Lake Erie impacted by hypoxia?
2. What are their hypoxia forecast information needs?

## Study Metrics:

9 Focus Groups

10 Treatment Plants

32 Participants

>12 hrs interview data

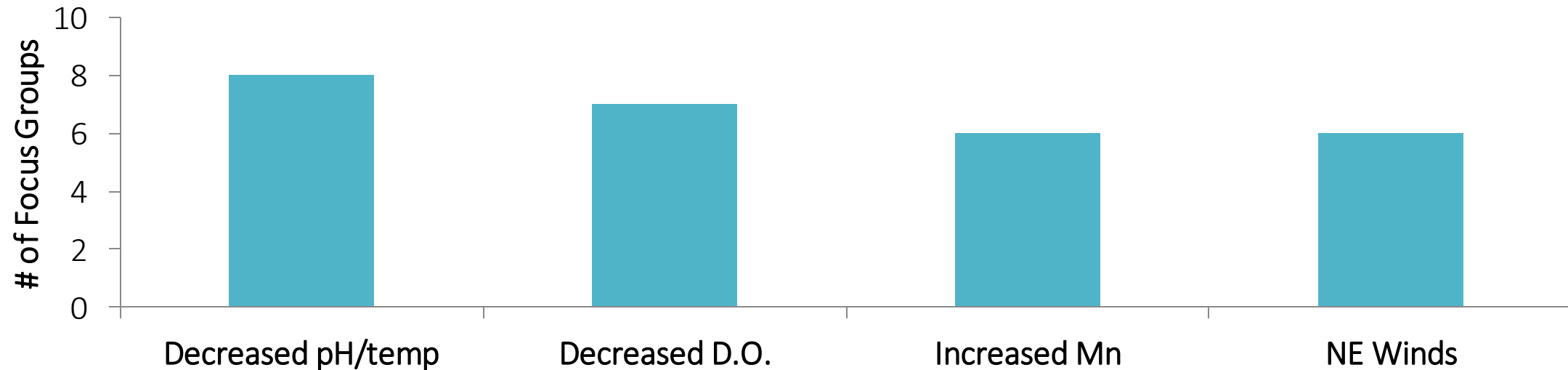


## Step 2) Needs Assessment

### Knowledge/definitions of hypoxia differed among focus groups

- Not every plant monitors D.O.
- Most plants expressed concern for drops in pH (service pipe corrosion)
- More than half have experienced “yellow water” events
- Strong associations with water quality changes and NE winds

Indicators of Hypoxic Events Reported by Focus Groups (n=9)



# Step 3) Evaluate your product in terms of their needs

## Anticipated Benefits of Hypoxia Forecast for PWS

- Enables early treatment

*“The biggest thing is making the operators aware that they may see [hypoxic water], to keep a close eye on it. The sooner we catch any changes, the smaller the corrections you have to make to your treatment.”*

- Allows for preparation

*“We would be better prepared. We could let the operators know that this could happen...maybe run some extra monitoring or pay more attention to current monitoring. If we know something is coming, we can check our chemicals to make sure that we’ve got enough in stock.”*

# Step 4) Develop targeted communication strategy

- Still on step 3
- Adopting recommendations

[www.glerl.noaa.gov](http://www.glerl.noaa.gov)

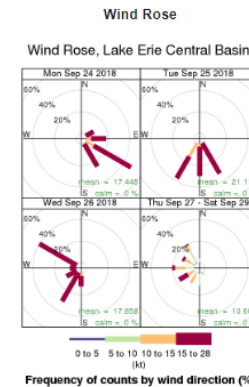
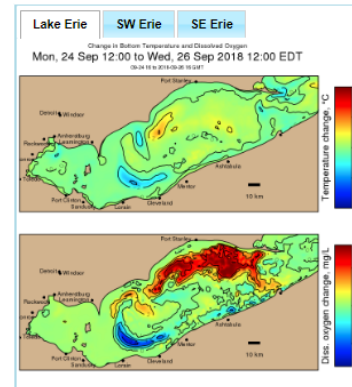
## Experimental Lake Erie Hypoxia Forecast

The panels below show Experimental Lake Erie Hypoxia Forecasts for the entire lake and 2 sub-regions, a forecast model in development for transition to NOAA operations. Other panels provide additional information on lake conditions. See [panel descriptions](#) below. For the latest images, refresh your browser and/or clear its cache.

[Additionally, click here or scroll down for time-series buoy data offshore from Cleveland, OH.](#)

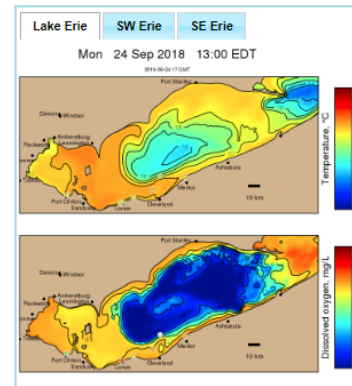
Forecast change in bottom temperature and dissolved oxygen:

[Click to view large animation of forecasted change maps below](#)

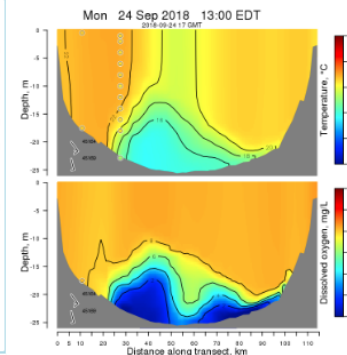


Forecast bottom temperature and dissolved oxygen:

[Click to view animation of forecast maps below](#)



## Cleveland to Port Stanley (Canada) Cross-section





# Evaluating Project Success

## Measures of Success

- Increased knowledge
- Better prepared for hypoxic events
- Favorable review of the hypoxia forecast
- Favorable review of study participation



# Evaluation Survey

Pre & post surveys conducted as written questionnaires

31 respondents

- Sample size: 32 participants in 9 focus groups for plants that draw water from Lake Erie's Central Basin
- Missing post-survey data from 1 respondent, pre-survey data of respondent omitted from analysis (n=31)

*This one-page survey will help us understand your thoughts. Your responses are voluntary and will be kept confidential. We appreciate your time and support!*

1. How much would you say you know about hypoxia and how it occurs in Lake Erie?

☐ Not heard of deal    ☐ Nothing at all    ☐ Some    ☐ Quite a lot    ☐ A great deal

2. How much would you say you know about how changes in wind, lake currents, and temperature affect the occurrence of hypoxia at water intakes near the shoreline?

☐ Not heard of deal    ☐ Nothing at all    ☐ Some    ☐ Quite a lot    ☐ A great deal

3. How much would you say you know about the impacts of hypoxia on public water systems?

☐ Not heard of deal    ☐ Nothing at all    ☐ Some    ☐ Quite a lot    ☐ A great deal

4. Would you like to increase your knowledge of how and when hypoxia affects Lake Erie water intakes?

☐ Definitely not    ☐ Probably    ☐ Maybe    ☐ Probably not    ☐ Definitely

5. To what degree has hypoxia impacted the operations of your plant?

☐ Strongly impacted    ☐ Somewhat    ☐ Neutral    ☐ Slightly    ☐ Not impacted at all

6. At your plant, how frequently do you talk about ways to respond to hypoxic water intrusion?

☐ Never    ☐ Occasionally    ☐ Sometimes    ☐ Often    ☐ Always

Participant ID: \_\_\_\_\_

# Evaluation Results

Survey and focus group data represent short-term results (yr 2 of 4)

To gather longer-term results, focus groups and survey will be repeated two years after the original data collection period.

## Measures of success

- Increased knowledge
- Better prepared for hypoxic events
- Favorable review of the hypoxia forecast
- Favorable review of your involvement in this study

# Increased knowledge of lake processes that create hypoxia

## Pre-Survey:

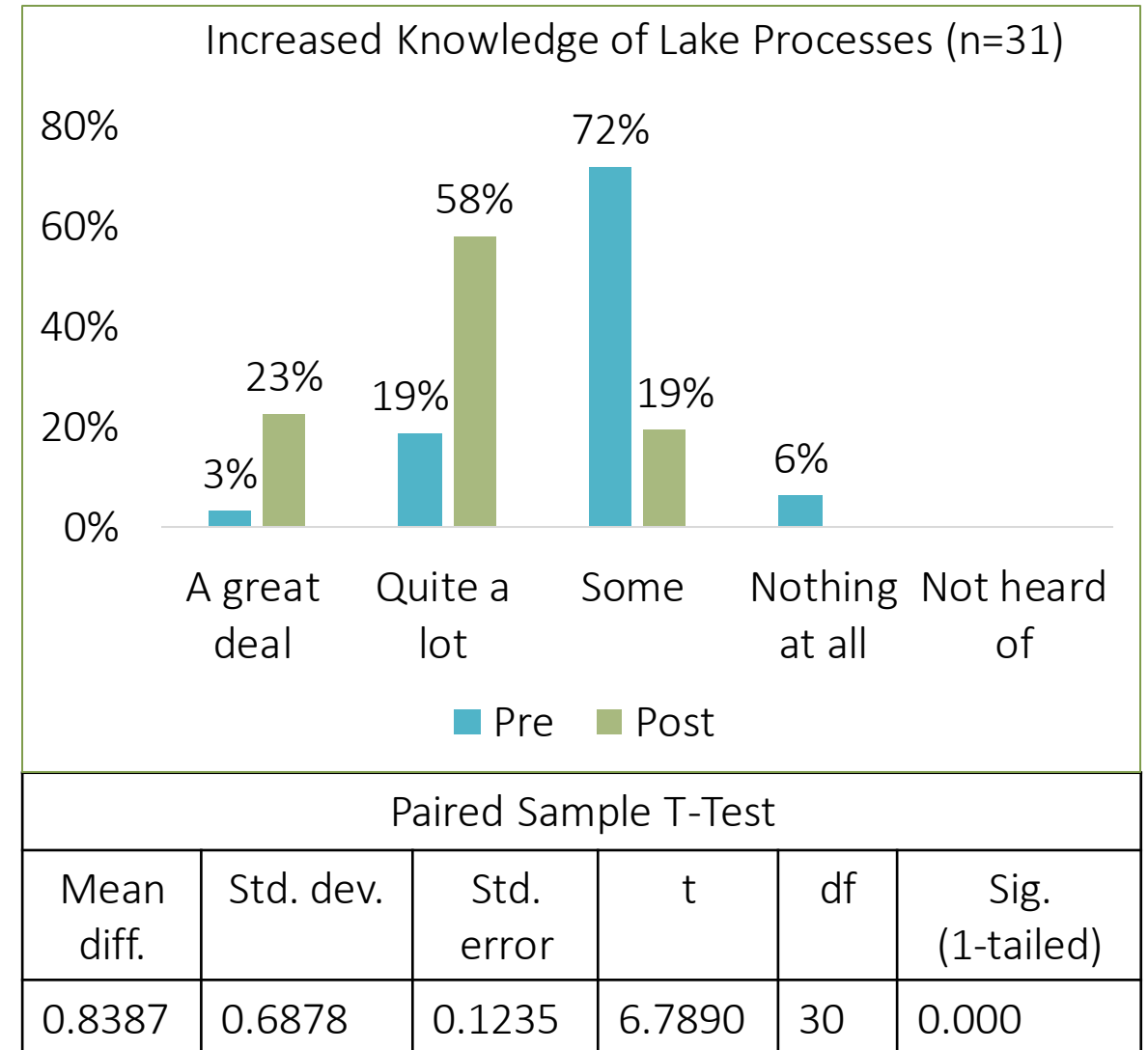
- Most participants said they knew “some” about Lake Erie’s physical processes (72%).
- Only 22% said they knew a lot

## Post-Survey:

- Participants who said they knew a lot about lake processes increased to 81%.

Participant knowledge about the lake processes that create hypoxia increased significantly after participation in the focus group (paired  $t(30)=6.78$ ,  $p=0.00$ ).

*This was the area of greatest knowledge gain (Mean diff.=0.8387).*



# Reflection

## What has worked?

- Emphasis on step 1 and co-design of research proposal
- Increased communication between researchers & public water systems
- Identified utility of forecast – changing manganese regulations in drinking water

## What needs improvement?

- Timing of communication strategy workshop
- Plans for disseminating project results (beyond annual meeting?)
- Don't overburden participants with requests for data

# Conclusions

- Coproduction approaches should be tailored to target stakeholders
- Ensure that the needs of stakeholders are identified, and that *some* needs are being addressed through the project
- Coproduction is iterative and time/resource intensive...but worth it!

**Devin Gill**

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