Using Knowledge Coproduction to Engage Stakeholders in Great Lakes Research

9.26.18

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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 Enviornmental Research Lab
- Hosted by the University of Michigan

Cooperative Institute for Great Lakes Research
CIGLR
Great Lakes Science for Society

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

When a bold move ends in the basement

A VA whistleblower in Phoenix experiences an old federal tradition

Kan. tea party stalwart tests a vulnerable GOP senator

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

Toledo's drinking water crisis continues

Eden Rogers, 13, uses a stick to scoop algae off the shoreline as she walks 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


Algae's lake effect reveals putrid, pea green disaster

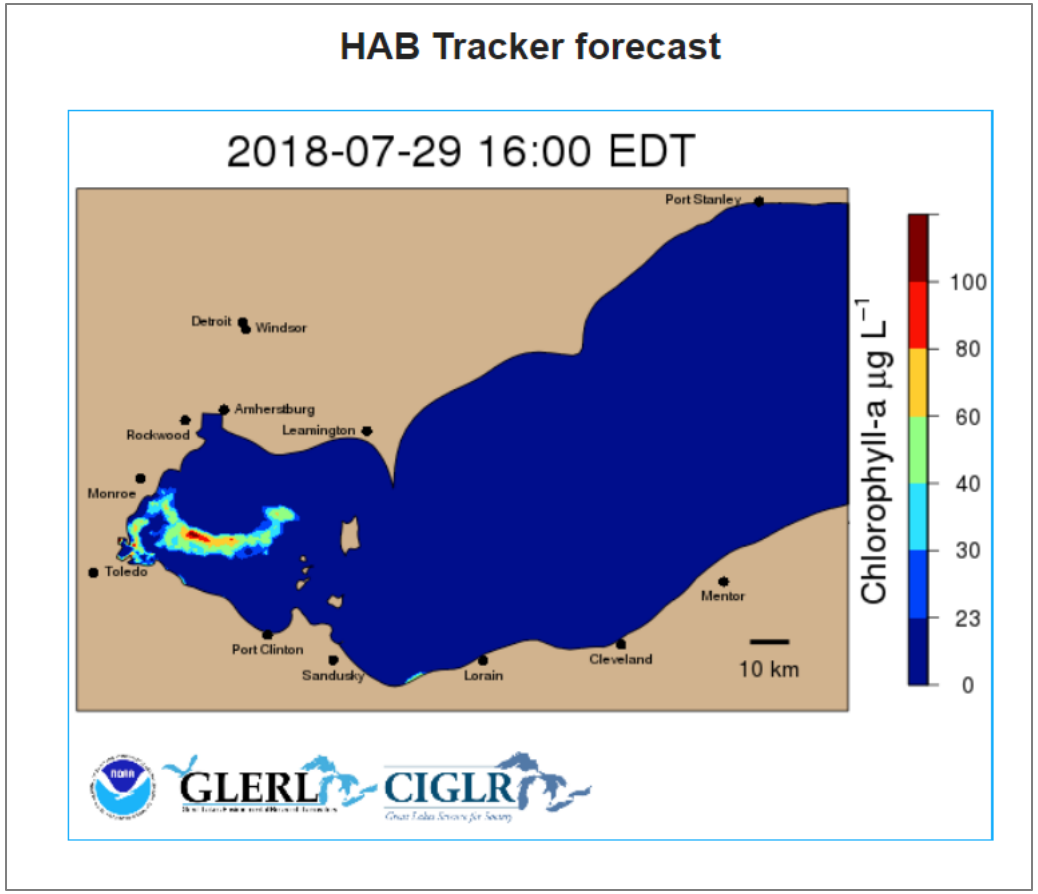
Distribution centers offer free relief to community

Officials won't give test results on 2nd day

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?

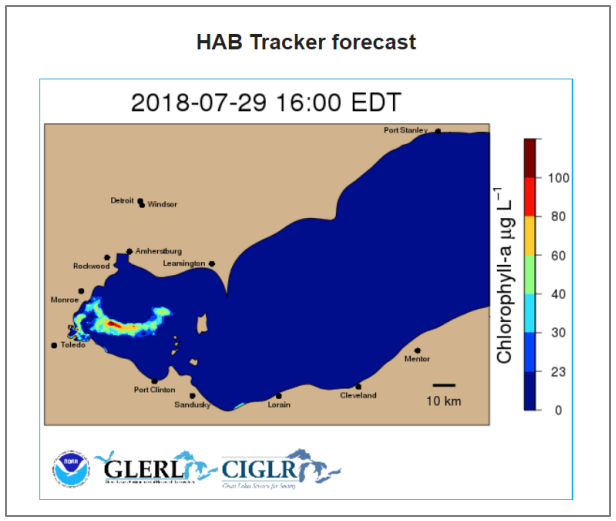


How do we identify who may find our forecast useful?



CIGLR/NOAA GLERL
HAB Tracker Developers

Developed



Decision-Support

Public Drinking
Water Systems

& 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

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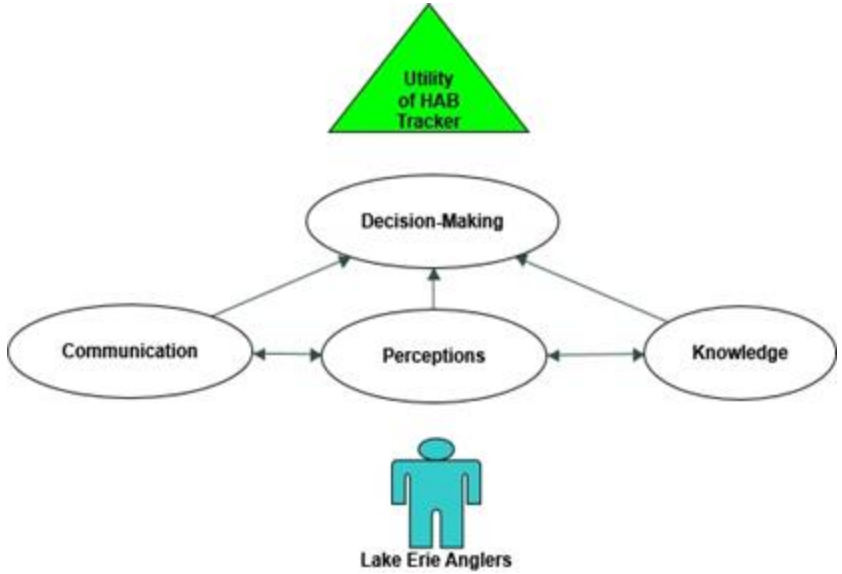


- 7 focus groups
- 41 participants
- 22 charter captains, 21 rec. anglers
- >14 interview hrs

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?

Angler Decisions in HABs	Variables that influence decision-making
• Whether to Fish • Where to Fish • Whether to Eat the Fish	• Fishing aesthetics • Angler perceptions of health risks • Angler perceptions of ability to catch fish • Charter captain customer perceptions of fishing in HABs • Communication with peers

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.

<u>Recommendations for HAB Tracker Improvement</u>

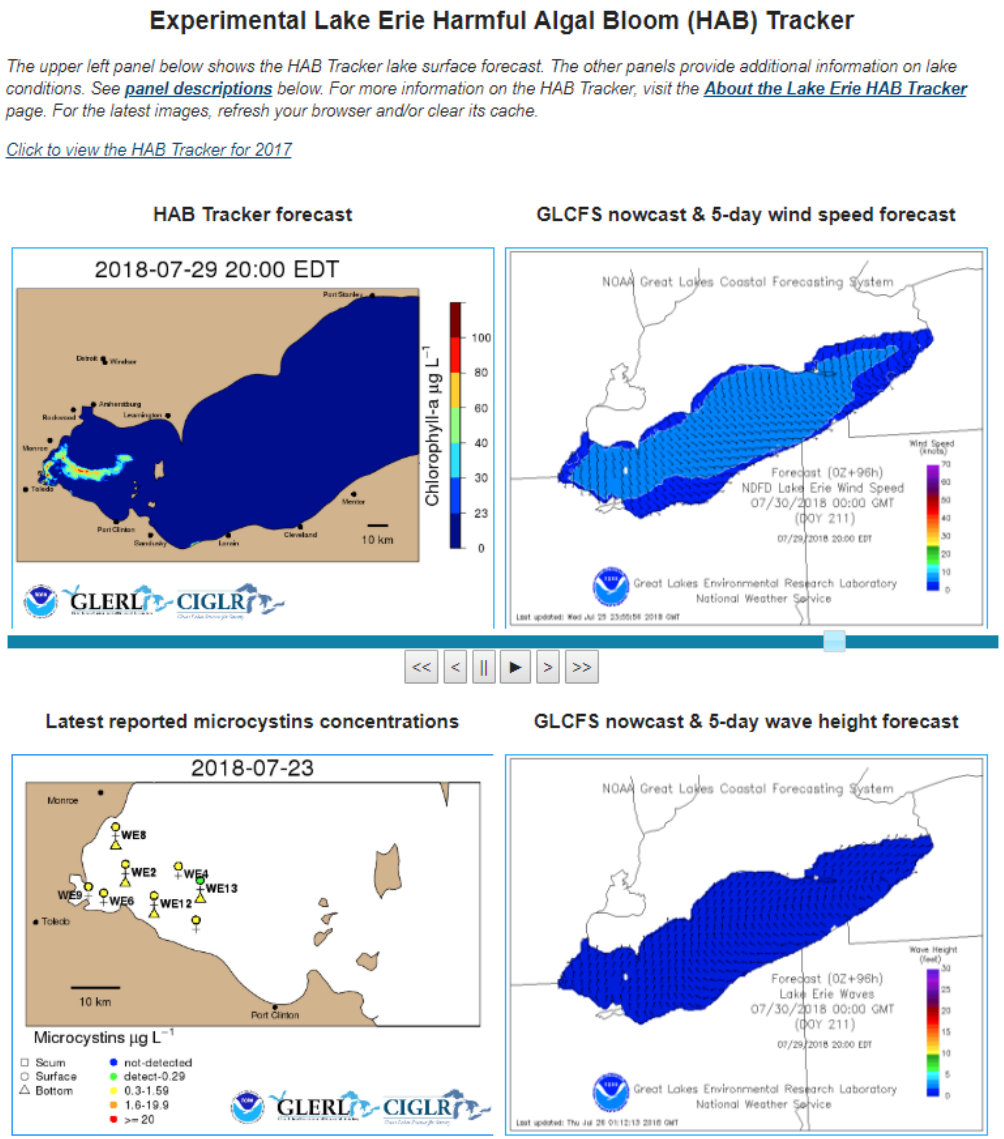
- Improve explanation of reliability and accuracy of forecast model
- Explain what NOAA/CIGLR are doing to address HABs
- Communicate regularly with fishing groups
- Link HAB Tracker to other frequently used NOAA products
- Include wave height, wind direction, wind velocity, and other lake conditions
- 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



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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

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Reflection

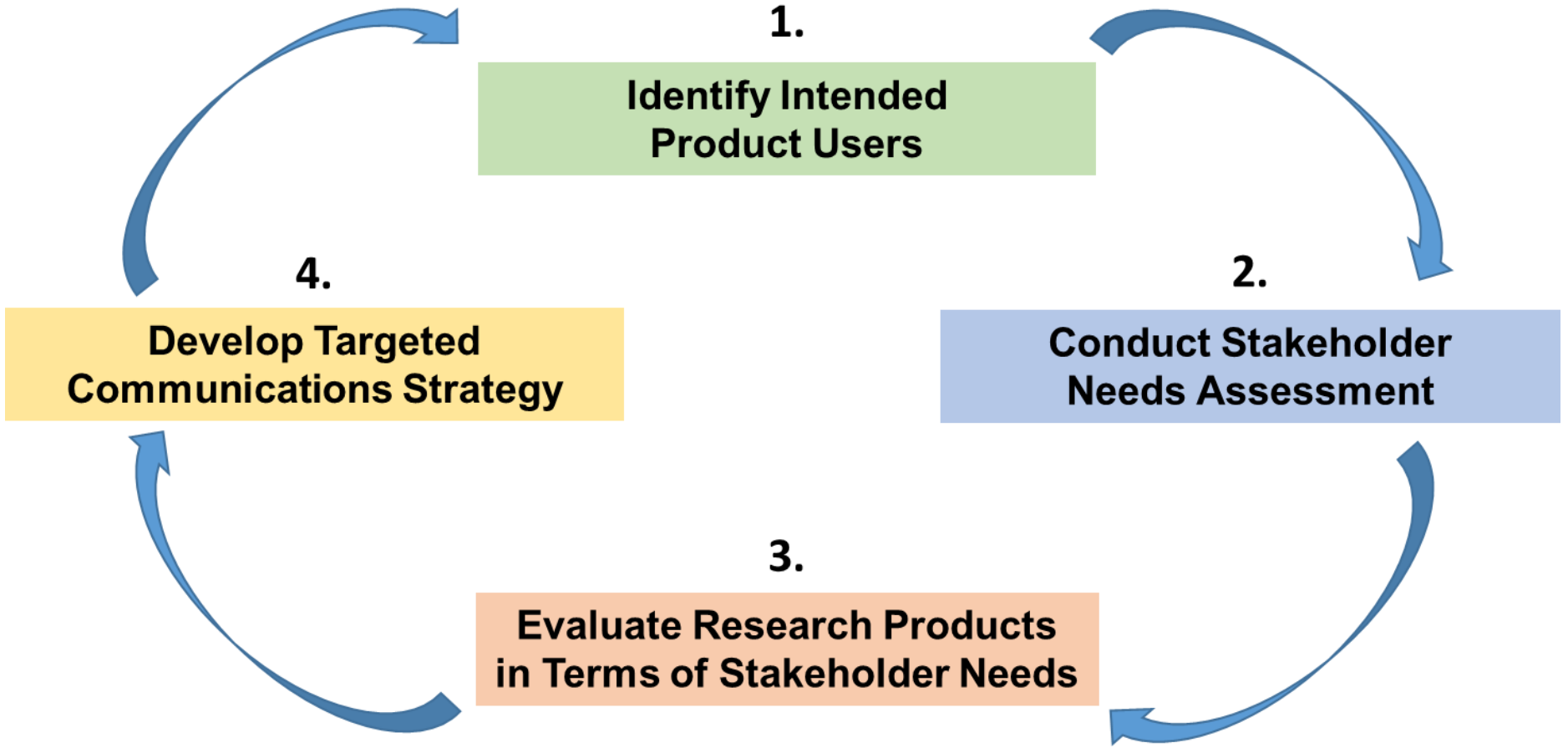
What worked?

- 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

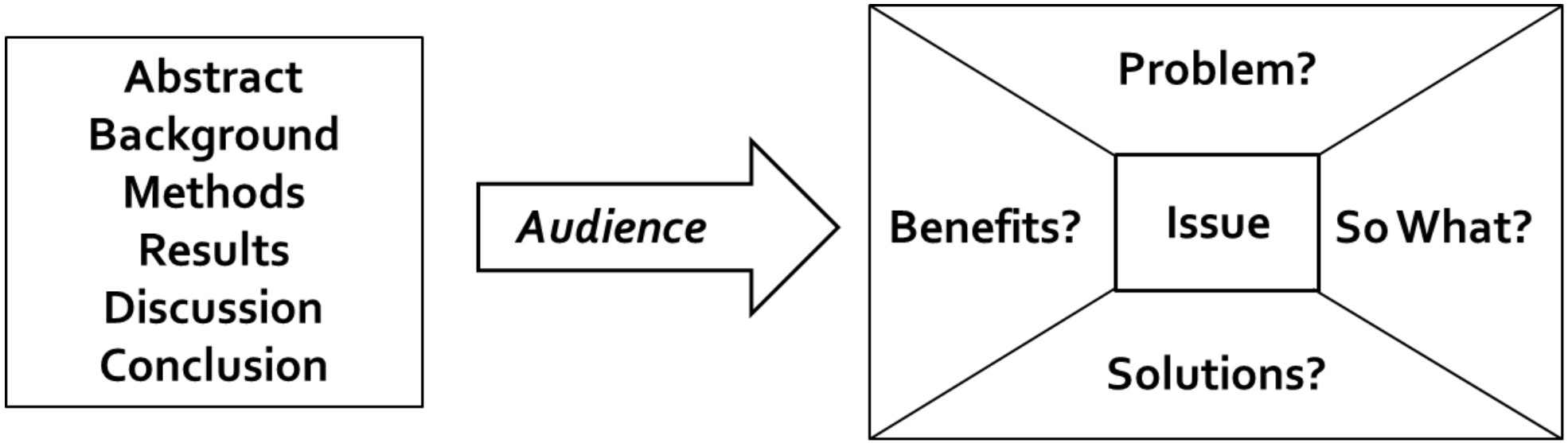
Guidelines for Prioritizing Intended Product Users

- 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

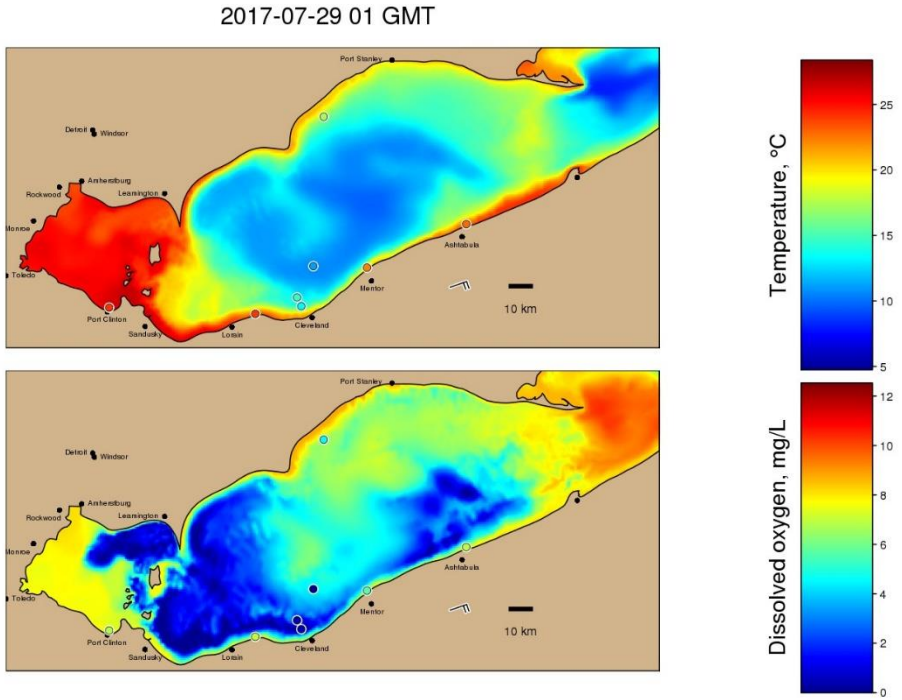
- Create shared language for project participants
- Incorporate story-telling

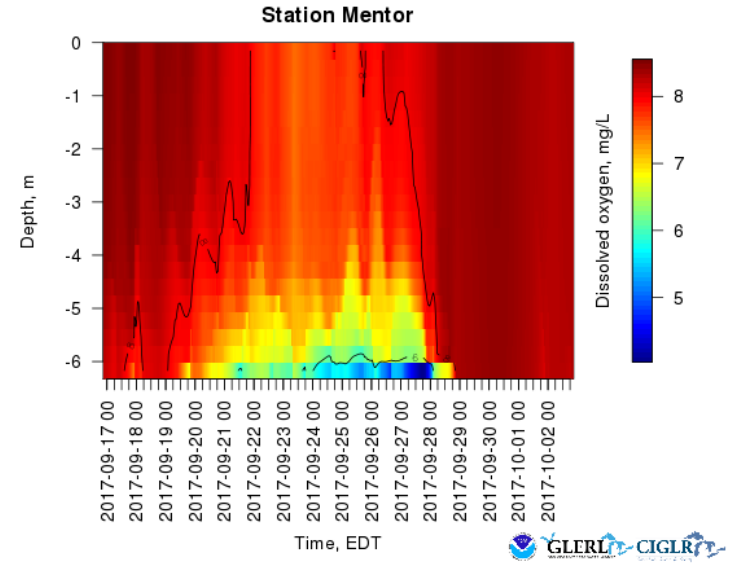


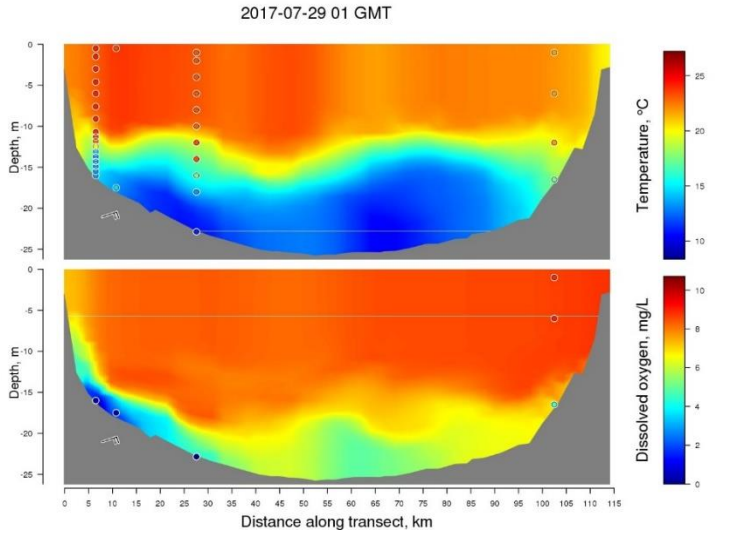
New Project: Experimental Lake Erie Hypoxia Forecast

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

www.glerl.noaa.gov







Step 1) Identify intended product users

Public Water Systems

Guidelines for Prioritizing Intended Product Users

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- ✓ 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

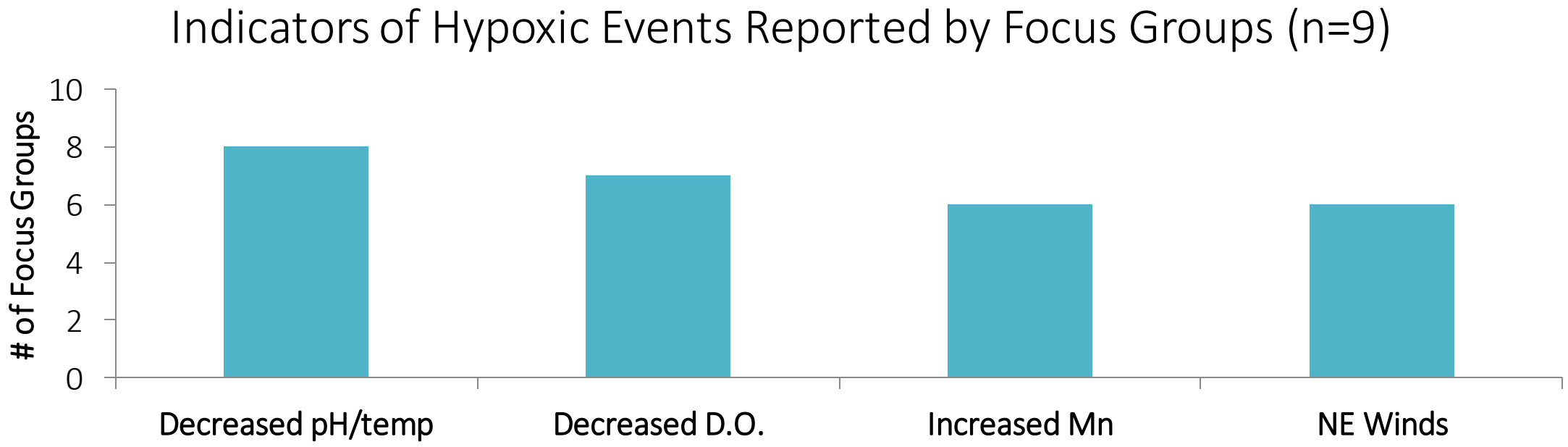
32 Participants

>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



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."

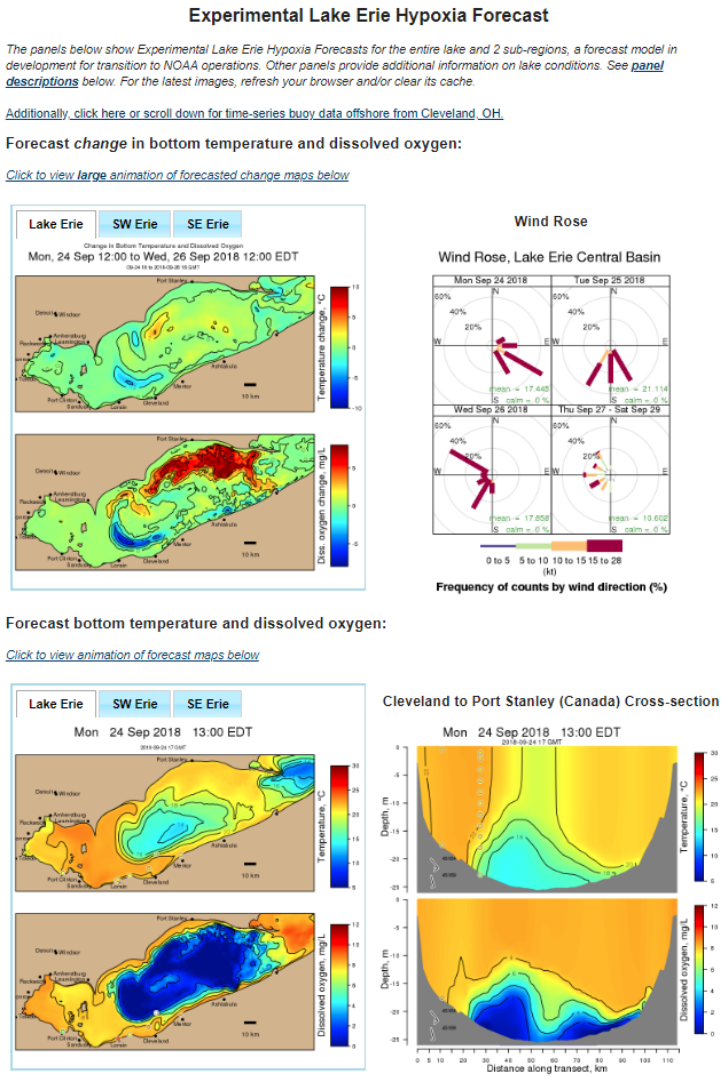
- Allows for preparation

  "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



Evaluating Project Success

Measures of Success

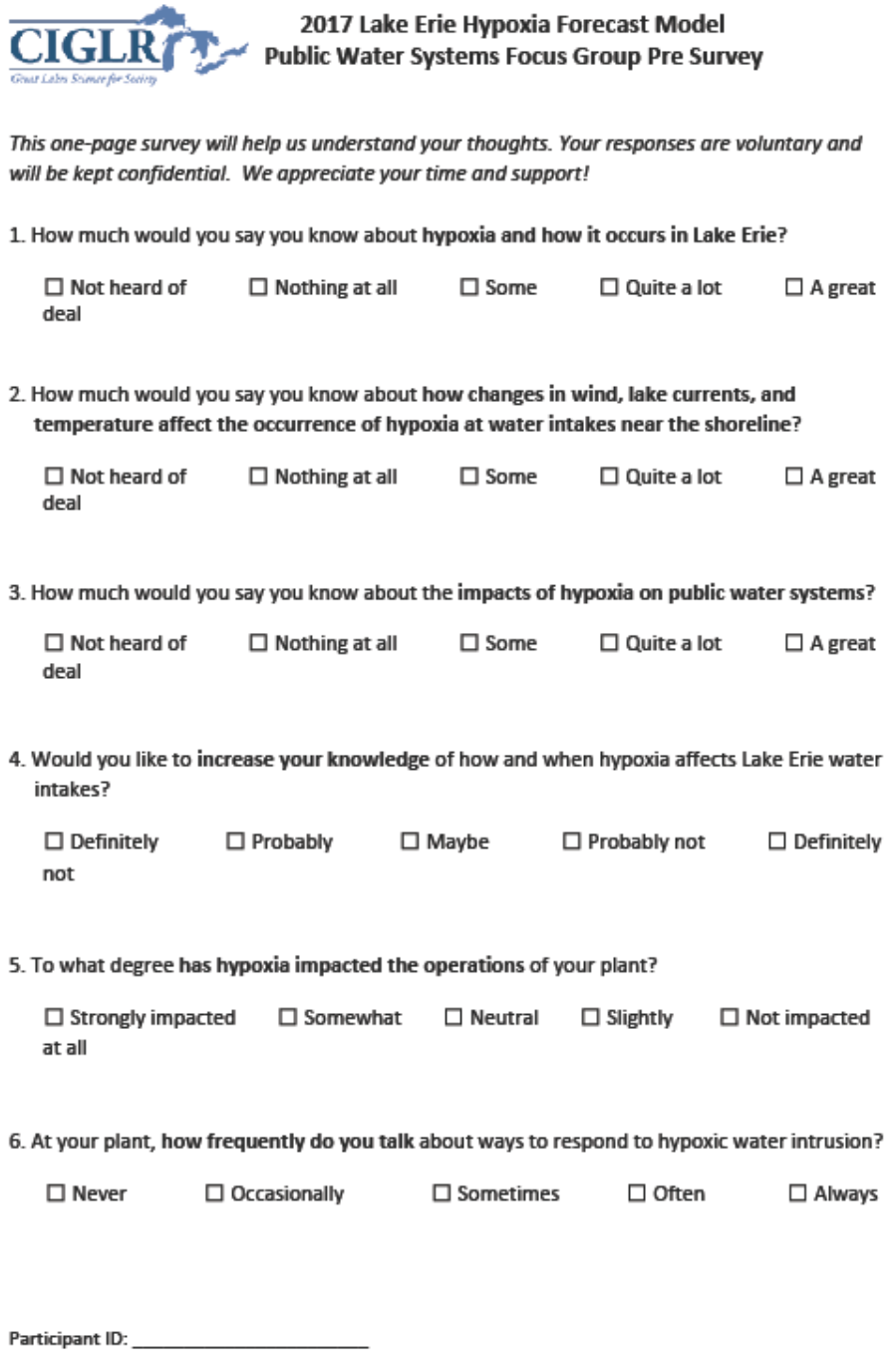
- Increased knowledge
- Better prepared for hypoxic events
- Favorable review of the hypoxia forecast
- Favorable review of study participation

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)



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2017 Lake Erie Hypoxia Forecast Model
Public Water Systems Focus Group Pre Survey

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

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

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

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

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

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:

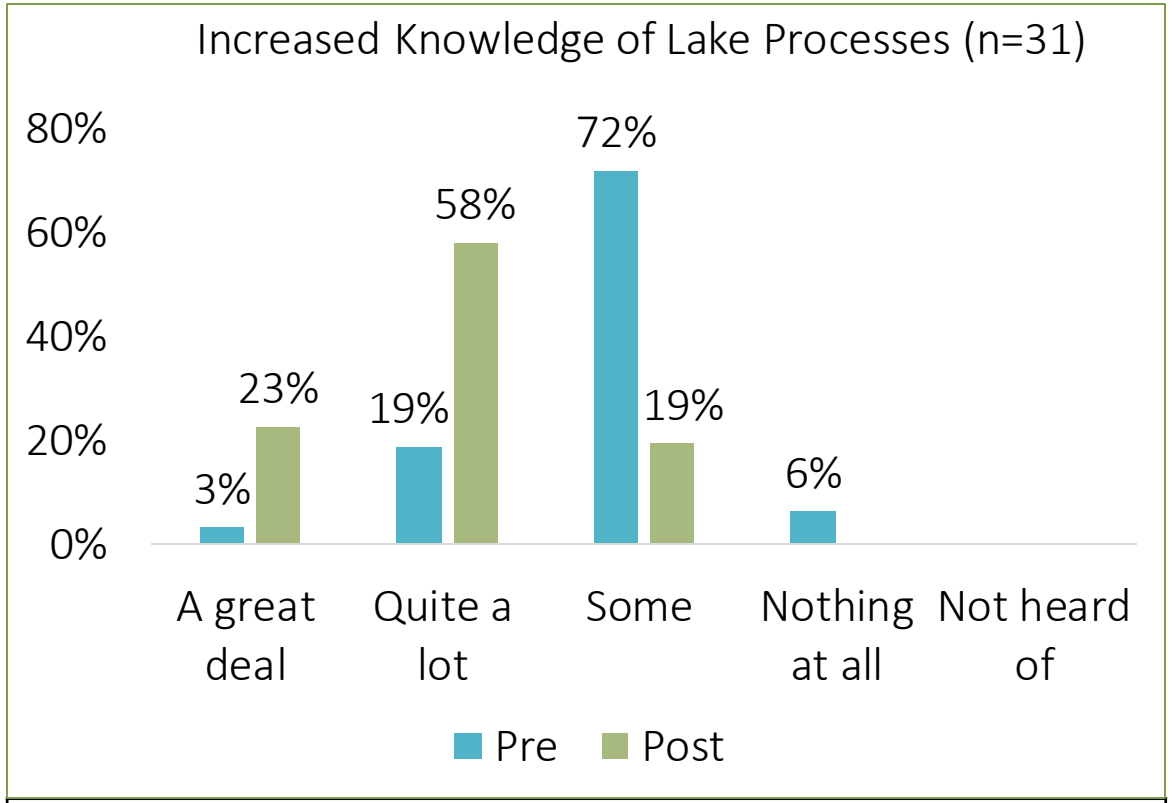
- Most participants said they knew “some” about Lake Erie’s physical processes (72%).
- Only 22% said they knew a lot

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).



Paired Sample T-Test					
Mean diff.	Std. dev.	Std. error	t	df	Sig. (1-tailed)
0.8387	0.6878	0.1235	6.7890	30	0.000

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!

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