

# Assessing Community Need for a Saginaw Bay Harmful Algal Bloom Forecast

(A case study for stakeholder engagement in research)

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# Stakeholder Engagement

## Who is a stakeholder?

- Anyone with an interest in utilizing research products/outcomes for decision-making

## What is stakeholder engagement in research?

- Researchers and stakeholders both produce and consume knowledge
- Outreach is not engagement (although both are valuable!)

## Why is stakeholder engagement important?

- Promotes usability of research products to ensure public safety (Morrow et al, 2015)

**Cooperative Institute for Great Lakes Research**  
CIGLR  
Great Lakes Science & Research

### STAKEHOLDER OPPORTUNITIES

**Who are our stakeholders?**  
Anyone who makes decisions based on conditions of the Great Lakes, including public utilities, commercial and recreational users, shipping, and other water-based industry.

**Why participate as a stakeholder?**  
Help our research team create products that meet your Great Lakes information needs.

**How you can help:**

- Survey**  
Share your thoughts on Great Lakes information needs and our research products.
- Interview**  
Participate in an interview to evaluate the usefulness of a product or share your thoughts on Great Lakes conditions.
- Focus Group**  
Participate in a 1-2 hour small group interview with people who share a common Great Lakes experience.
- Workshop**  
An opportunity for diverse groups to interact and discuss topics of Great Lakes conditions.
- Co-design**  
Work directly with researchers to advise on products that meet Great Lakes information needs.

**To participate, contact:**  
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# Project Goals for Stakeholder Engagement

1. Document specific community needs for our research BEFORE investing resources and energy into a new project
2. Identify specific questions/concerns held by stakeholders that our proposed research could help answer
3. Foster community support and awareness of our research, while working hand-in-hand with stakeholders to develop a communication strategy for introducing our research to the community

# Background: The Water Quality Issue

- Harmful Algal Blooms occur in Saginaw Bay

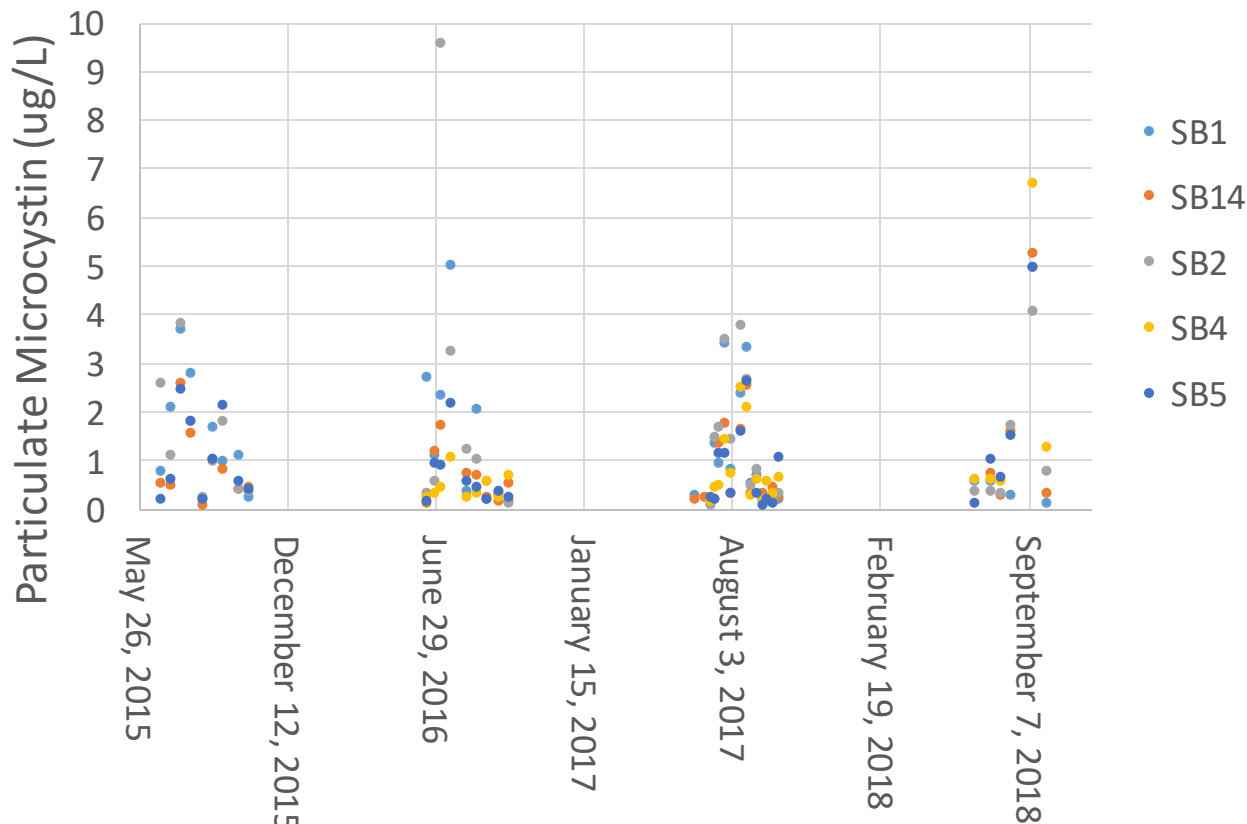


Known HAB locations in the Great Lakes

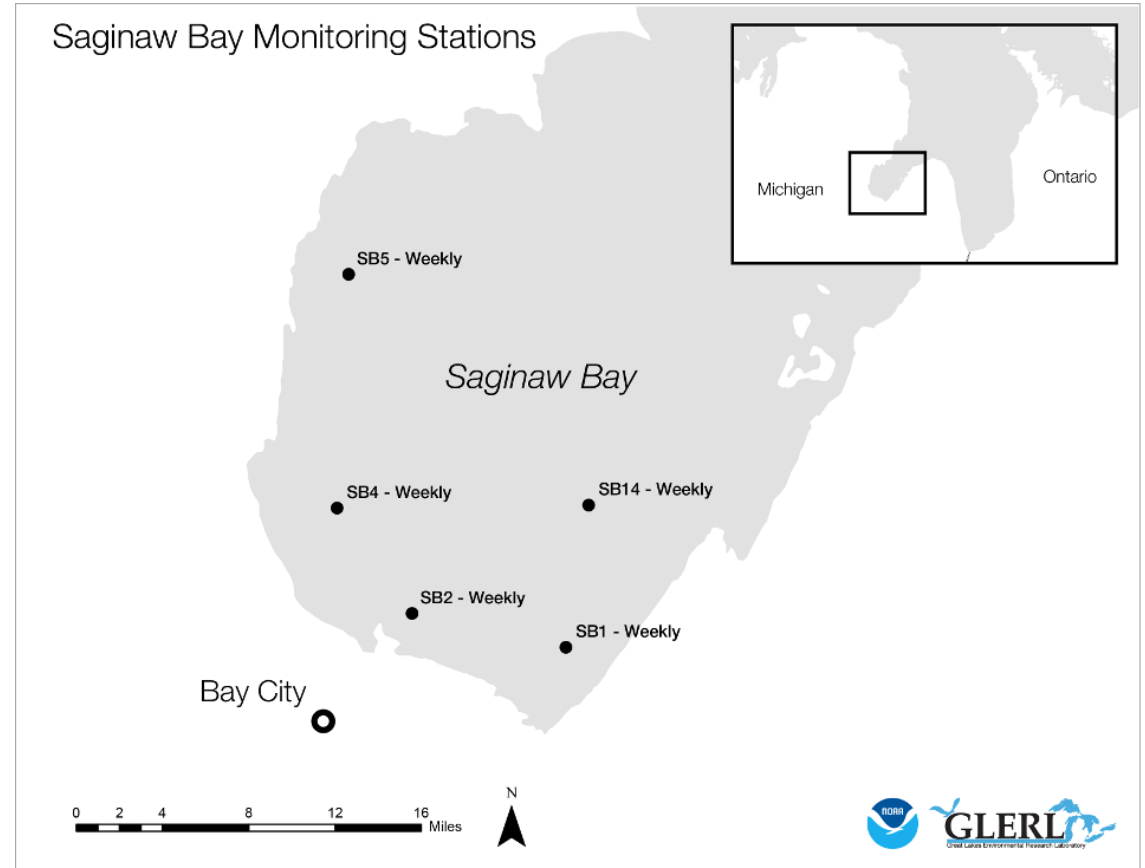
# Background: The Research Questions

- Can we develop a useful forecast for HABs in Saginaw Bay?
- Do HABs behave differently in Saginaw Bay than in Western Lake Erie?

Microcystin Field Monitoring Data  
2015-2018



Saginaw Bay Monitoring Stations



## WHO Microcystin Guidelines

Drinking water  
**1 ug/L**

Sensitive populations  
**2 – 4 ug/L**

Avoid body contact  
**20 ug/L**

# Background: The Stakeholder Questions

- Would a Saginaw Bay HAB forecast be useful for stakeholders?
- How might the information needs of Saginaw Bay stakeholders be different from Lake Erie stakeholders? (Gill et al., 2018)
- Will their perceptions and concerns about HABs be different?



GLERI NOAA - Great Lakes Environmental Research Laboratory

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### 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.

Latest reported microcystine concentrations

**Panel descriptions:**

**HAB Tracker forecast** - This panel displays the HAB Tracker 5-day forecast. The color scale indicates surface HAB concentrations in terms of cyanobacterial *Chlorophyll-a*.

**GLCFS forecast & 5-day wind speed forecast** - The [Great Lakes Coastal Forecasting System \(GLCFS\)](#) forecast uses observed winds from stations surrounding the lake, while the forecast uses the National Digital Forecast Database generated by the National Weather Service.

**Latest reported microcystine concentrations** - The HAB Tracker doesn't predict toxin concentrations, so the latest measurements are shown here to provide context. Microcystins are the toxic compounds most commonly associated with lake toxic algae. The symbol above indicates the depth at which samples were collected at each monitoring station. "Surface" is approximately 0.75 m deep in the water column. Control colors correspond with classifications identified by the [Ohio Environmental Protection Agency](#). Microcystine concentrations exceeding the Cleveland Metropolitan Health Authority are indicated in red. Note that the HAB Tracker uses a different color scale - the HAB Tracker does not indicate toxin concentrations.

**GLCFS forecast & 5-day wave height forecast** - The wave height forecast is produced by the [Great Lakes Coastal Forecasting System \(GLCFS\)](#).

For more information on how the HAB Tracker works, who uses it, and what's next in research and operations, visit our [About the Lake Erie HAB Tracker](#) page. Note NOAA also provides an operational lake weekly HAB forecast and publishes it in the [Lake Erie HAB Bulletin](#).

Please view the laboratory's [Equipment and Intellectual Property](#) page. If you would like to provide feedback on the HAB Tracker, access the [user survey](#) developed by the Cooperative Institute for Great Lakes Research (CI2G-R) (This is not a NOAA survey).

**Latest satellite-derived data used by the HAB Tracker**

Sensors attached to satellites gather data, which is processed into the cyanobacterial index, an indicator of the abundance, or biomass, of the cyanobacteria associated with HABs. Processed satellite imagery is provided by the [NOAA HAB Operational Forecasting System](#). The cyanobacterial index scale is converted to a cyanobacterial chlorophyll index for use in the HAB Tracker, a satellite indicator of cyanobacterial abundance.

# Methods: Survey

## Why conduct a survey?

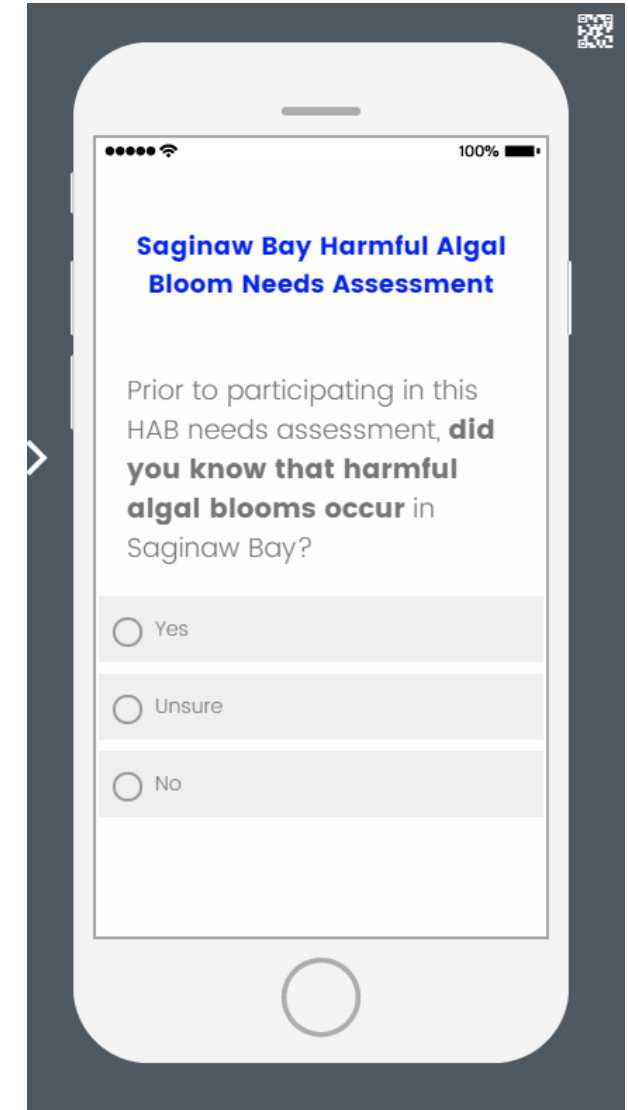
- Capture initial information to inform design of workshop
- Gather feedback from a greater number of people/allow more to participate

## Methods

- Qualtrics online survey distributed via email listservs and social media
- 14 Questions: 6 multiple choice, 1 rank question, 2 open-ended, 5 demographic
- 79 Total Respondents, 85% Completed the Survey

## Constraints

- Not a representative sample, Exceptionally engaged citizens?
- Target audience not clearly specified, population size unknown





# Results: Saginaw Bay HAB Forecast Survey

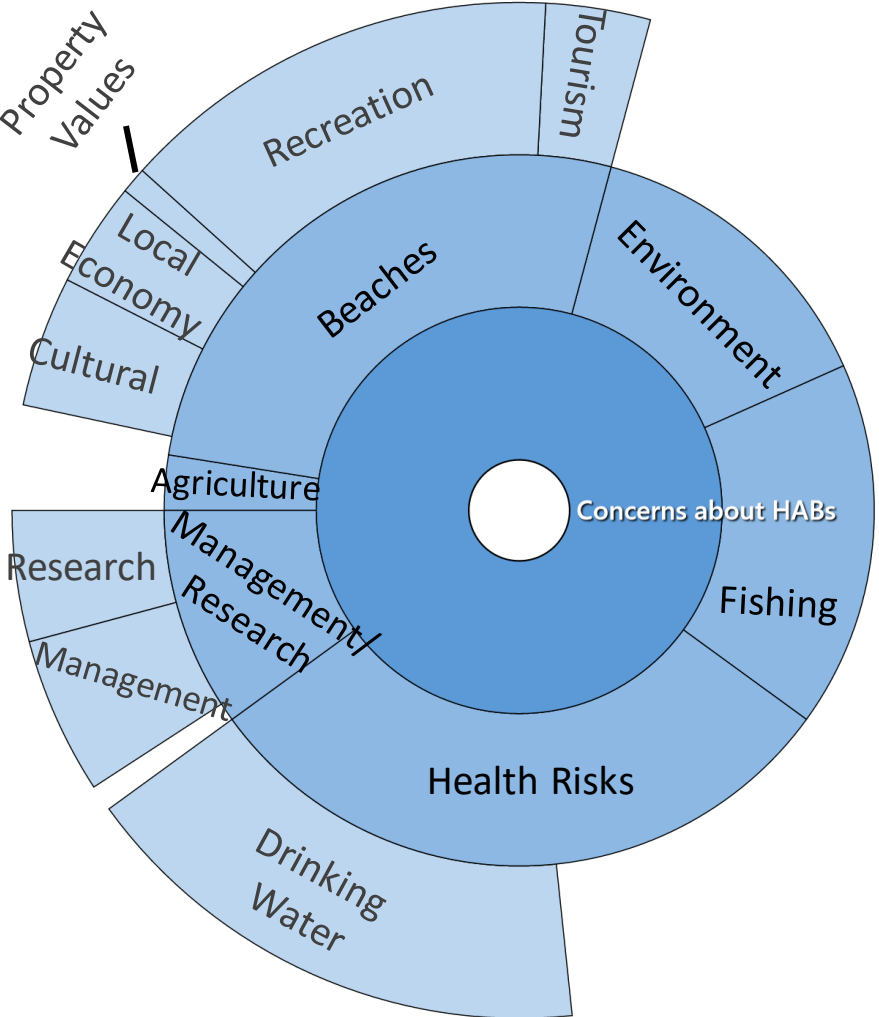
## What do stakeholders in Saginaw Bay think about HABs?

- Most respondents reported that they felt knowledgeable about HABs (77%, n=78)
- Most respondents knew that HABs occur in Saginaw Bay (71%, n=70)
- Most respondents are concerned about HABs in Saginaw Bay (87%, n=76)
- Most respondents said they would use the HAB Forecast (71%, n=70); those who wouldn't believed HABs don't greatly affect the Bay

**Some awareness of Saginaw Bay HABs by stakeholders,  
but the problem isn't clear or broadly acknowledged.**

# Results: Open Response Question

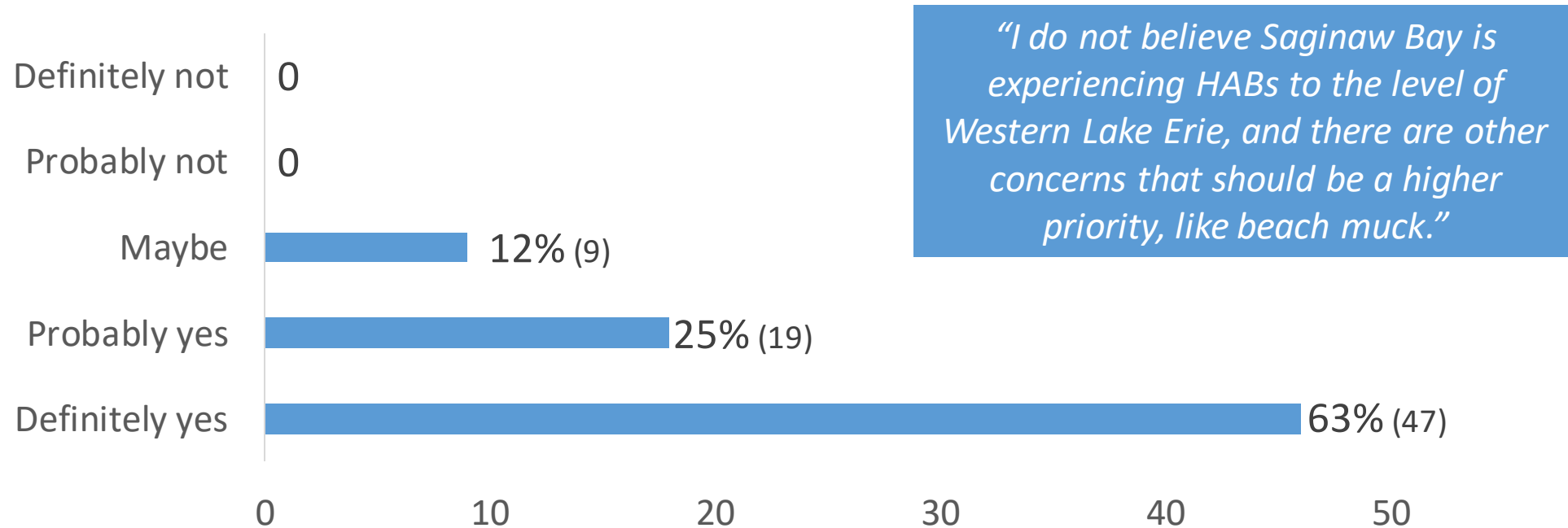
What concerns do you have about HABs in Saginaw Bay?



Code	Count	%
Beaches	32	<b>29%</b>
Health Risks	26	<b>24%</b>
Drinking Water	20	
Fishing	20	<b>18%</b>
Environment	17	<b>15%</b>
Management/Research	12	<b>11%</b>
Research	5	
Management	6	
Agriculture	3	<b>3%</b>
<b>Total</b>	<b>110</b>	<b>100%</b>

These are issues to explore further during the workshop discussion.

# Results: Do you think researchers should prioritize the study of HABs in Saginaw Bay?

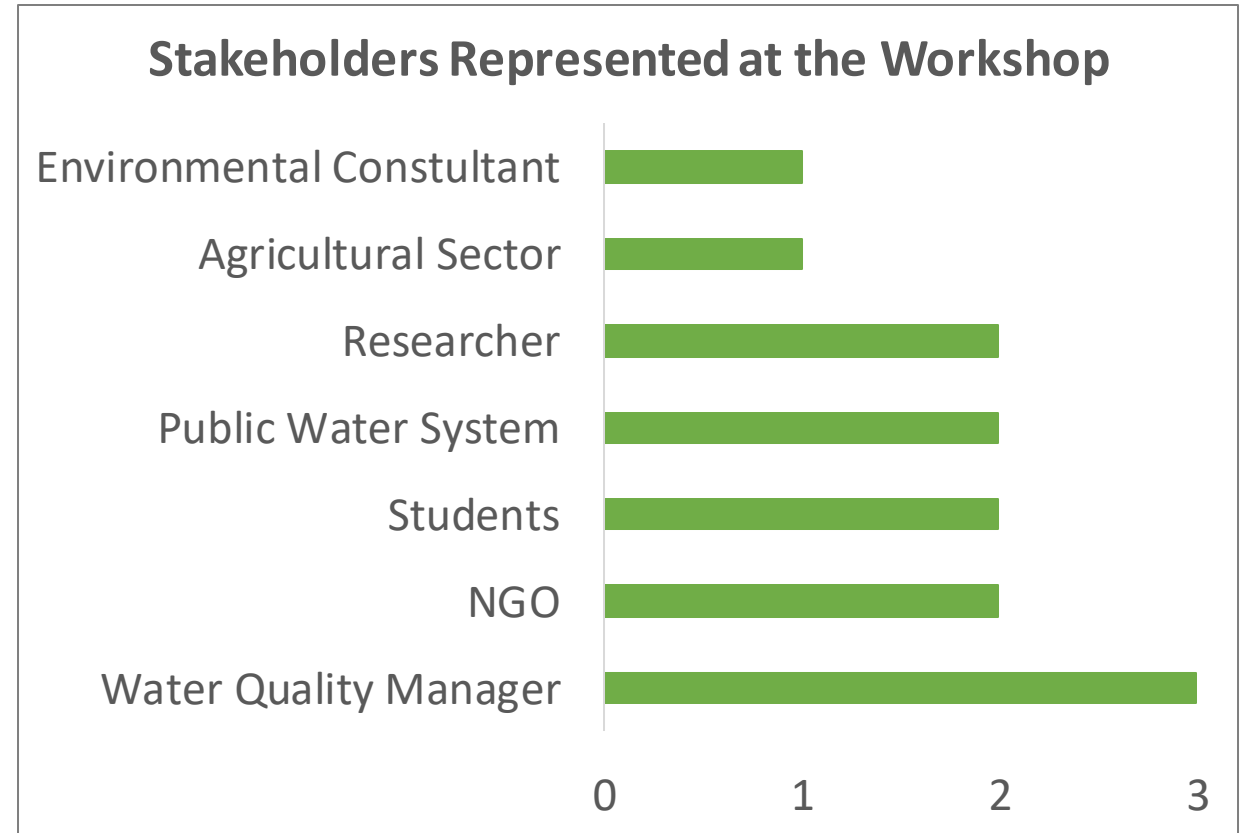


**Most respondents support Saginaw Bay HABs research to protect ecosystem services**

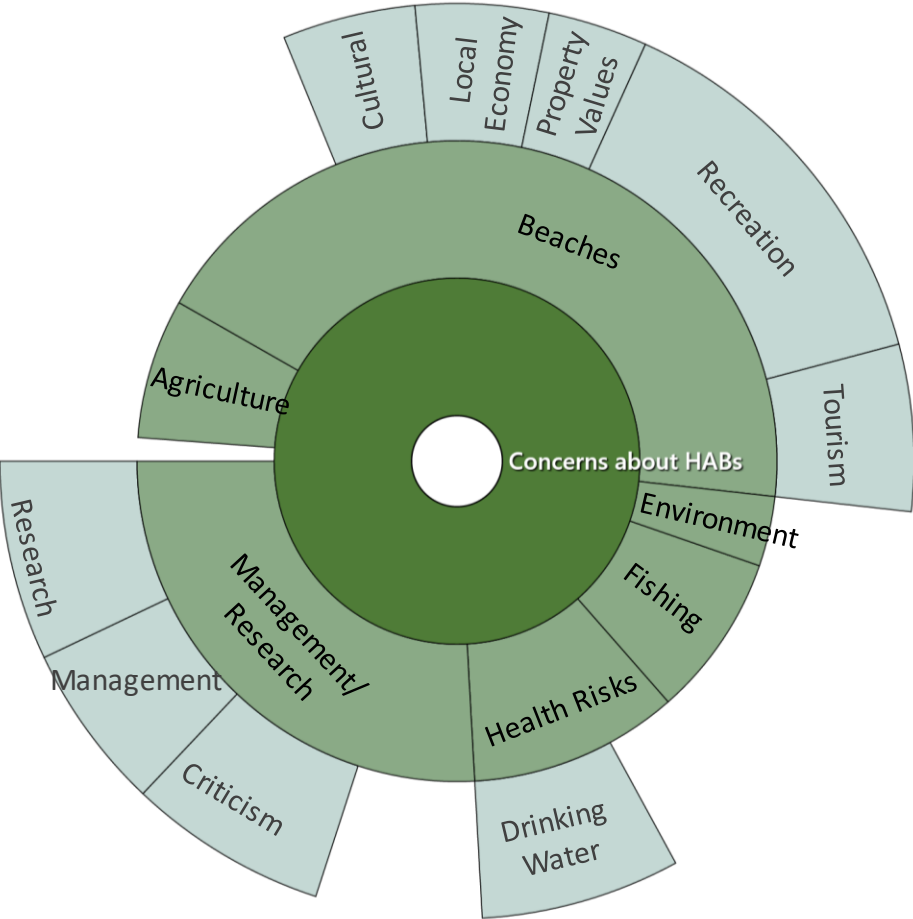
**Those who don't, want researchers to focus on other water quality issues that they think are more damaging to the Bay**

# Methods: Workshop

- 2 hr long workshop in Frankenmuth, MI
- Facilitated discussions led by semi-structured responsive interview guide
- Presentations of Saginaw Bay HAB research by NOAA GLERL Scientists
- **13** stakeholder participants recruited via email, identified through networking with key stakeholder contacts



# Results: Potential impacts of HABs on Saginaw Bay and surrounding communities



Code	Count	%
Beaches	37	44%
Management/Research	22	26%
Research	6	
Management	5	
Criticism	6	
Health Risks	9	11%
Drinking Water	6	
Fishing	7	8%
Agriculture	6	7%
Environment	3	4%
Total	84	100%

Drinking water concerns aren't as great; fewer plants draw water from Bay

Saginaw Bay has experienced bad publicity for “muck”; reluctance to add a new water quality concern because of anticipated impact on recreation/tourism/culture.

# Results: Concerns about the Potential Impacts of HABs

## Beaches

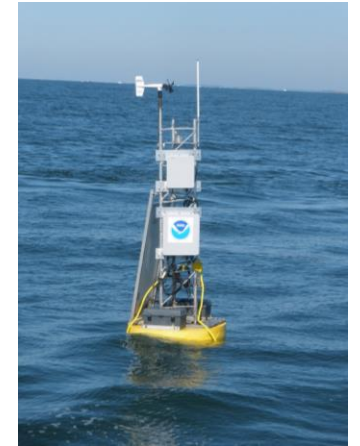
- *Tourists may choose to recreate elsewhere, impacting local economy*
- *Shoreline property values may decline*
- *Activities requiring full-body contact with water may decline: swimming, water skiing, jet skiing*
- *Cultural connection to the water may be tarnished*



# Results: Concerns about the Potential Impacts of HABs

## Management/Research

- *Trust in water quality managers may erode due to decline in water quality*
- *Poor communication on the state of HABs may create undue concern*
- *More research is needed before effective management solutions can be recommended. Many information gaps to fill*
- *Confusion over when blooms may be toxic or not will result in public fear and an aversion to Saginaw Bay*



# Results: Concerns about the Potential Impacts of HABs

## Health Risks

- *Tourists and locals will be at risk when they recreate during the blooms*
- *Although health risks may be moderate, public concern may become overinflated*
- *Information about potential health risks associated with the bloom will be exaggerated and citizens will over react*
- *Confusion regarding short term and long term impacts of exposure to HABs and resulting health impacts will create fear and an aversion to the Bay*





# Results: Concerns about the Potential Impacts of HABs

## Drinking Water

- *Drinking water plants in the Saginaw Bay region may have their water compromised by toxins*
- *Public Water Systems may be unprepared to effectively treat HABs in drinking water*
- *People who drink water sourced from Lake Huron may have their health compromised*
- *Some regions of the Bay may be disproportionately impacted than others depending on the location of the blooms and community preparedness*



# Results: Concerns about the Potential Impacts of HABs

## Fishing

- *Fishing is key to community culture*
- *Decline in fishing affects local economy: marinas, charter fishermen, sportsmen's shops, etc.*
- *HABs will negatively impact the Saginaw Bay Fishery*
- *Toxins will accumulate in fish making them unsafe to eat*



Credit: Captain Ed, West Coast Sportfishing

# Results: Concerns about the Potential Impacts of HABs

## Environment

- *The affect it will have on our water and the organisms that live in and around it.*

## Agriculture

- *Crops irrigated with water from Lake Erie during bloom season may become contaminated with toxins*
- *HABs in Saginaw Bay may further erode trust in local farmers and managers despite progress in nutrient management*
- *Additional pressure will be put on farmers to regulate their nutrient management*



# Outcome 1: Document specific community needs for research

## Potential Users and Uses for the Forecast

- Beach Goers: *where and when to recreate*
- Fishing Community: *where and when to fish*
- Public Water Systems: *whether to prepare to adjust water treatment*
- Agriculture: *whether to irrigate crops with Lake Erie water*
- Tourists: *whether to visit Saginaw Bay during a particular weekend*
- Beach Managers: *when to schedule beach maintenance at parks*
- Community Groups/Municipalities: *when to plan community activities that involve water recreation*
- Researchers/Natural Resource Managers: *when to monitor HABs*
- NGOs: *Inform watershed management plans*

## Outcome 2: Identify specific questions research can address

*“Which communities and drinking water plants will be affected by the blooms?”*

*“Which areas of the Saginaw Bay are predominantly impacted by the blooms?”*

*“How much do different sectors contribute phosphorus to Saginaw Bay? Agriculture, urban runoff, golf courses?”*

*“Is the Saginaw River the primary driver of the blooms?”*

# Outcome 3: Foster community support & collaborative development

## Stakeholder Usability Recommendations

1. Limit initial public release of forecast (research results sensitive to misinterpretation)
  - Emphasize that the forecast promotes continued use and access to clear water
  - Can the HAB Forecast be presented as a way to track improvement of water quality on Saginaw Bay?
2. Effective messaging of results
  - Interpret for general audiences
  - Don't overwhelm with too much detail
  - Define HABs and how they differ from other water quality problems
  - Provide guidance on how to interpret forecast for public health risk\*

# Outcome 3: Foster community support & collaborative development

## Stakeholder Usability Recommendations (cont.)

### 3. Desired information

- Explain any uncertainty in the data and measures of accuracy
- Provide concurrent water quality parameters: water temp, winds, currents
  - Create a centralized source of Saginaw Bay Water Quality data
- Forecast for high-use areas: water intakes, popular beaches, fishing areas, river mouths
- Integrate forecast data visualizations with google maps

### 4. Access & Timing

- Access via website or emailed bulletin
- PWS need 3 days advance notice for forecast, most prefer 24 hr notice

# Conclusions

## **Stakeholder engagement improved our research by...**

- Allowing us to identify specific stakeholder information needs
- Identifying specific stakeholder questions that future research can address
- Alerting us to sensitive community issues that should be considered during communication efforts

## **How can researchers engage stakeholders in their science?**

- A continuum of engagement based on available resources and information needs (co-design, needs assessment, product evaluation)





Questions?

Thank you!

