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)

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

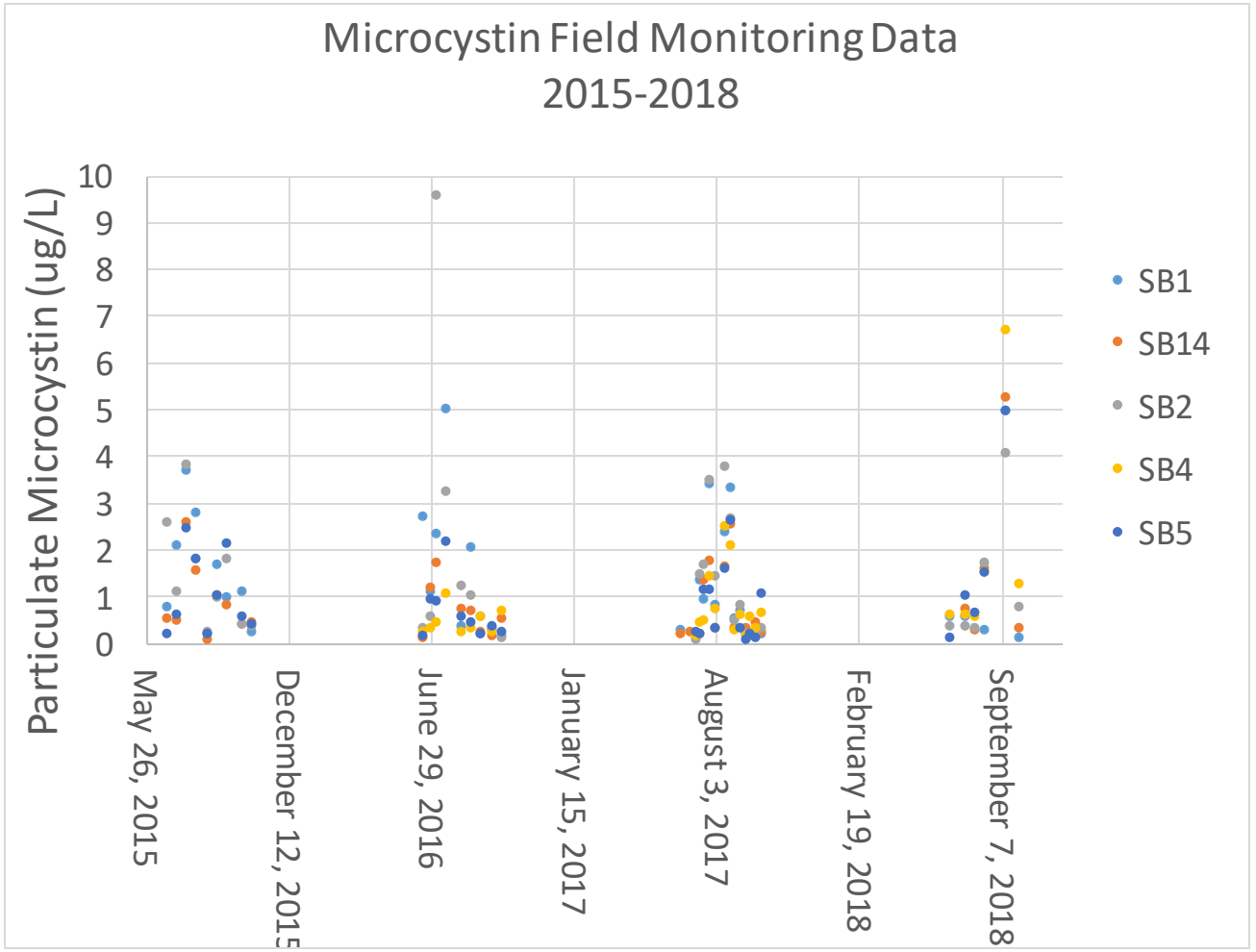
Background: The Water Quality Issue

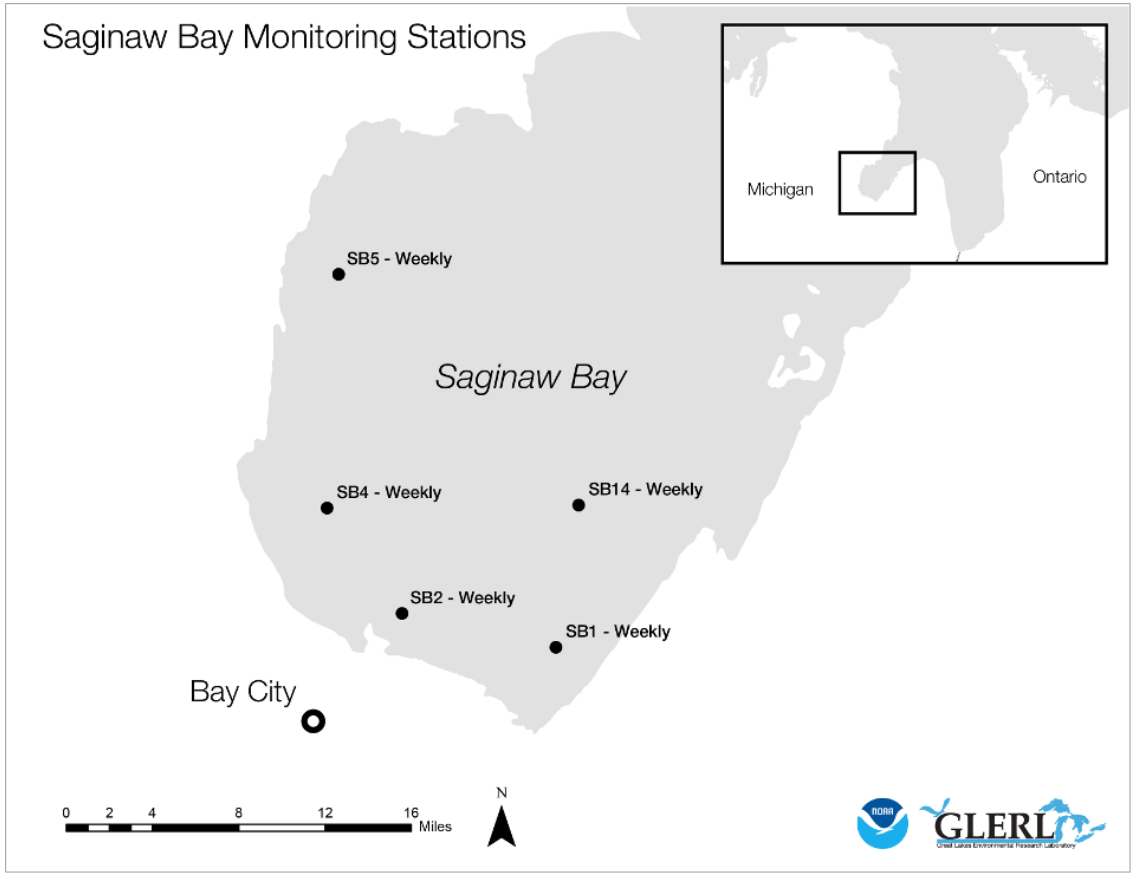
- Harmful Algal Blooms occur in Saginaw Bay

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?



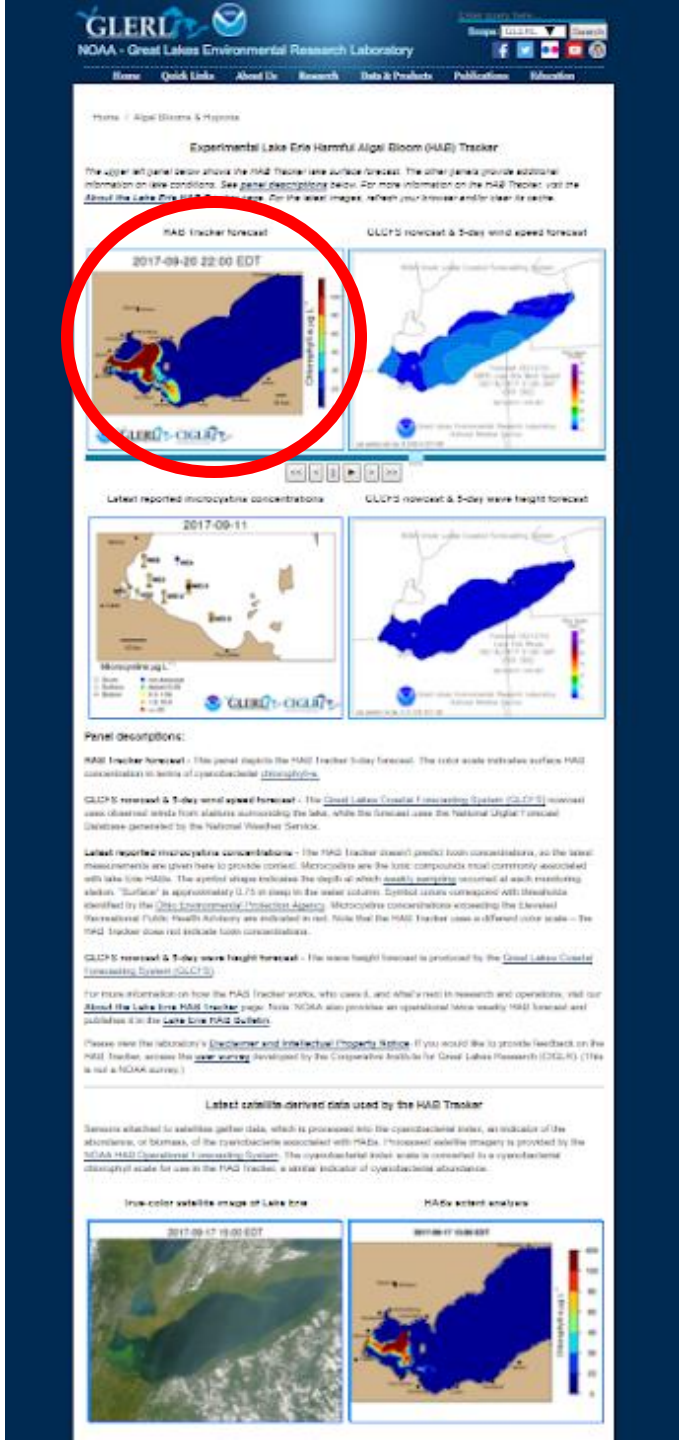


WHO Microcystin Guidelines

Drinking water	Sensitive populations	Avoid body contact
1ug/L	**2 – 4 ug/L**	**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?



Methods: Survey

Why conduct a survey?

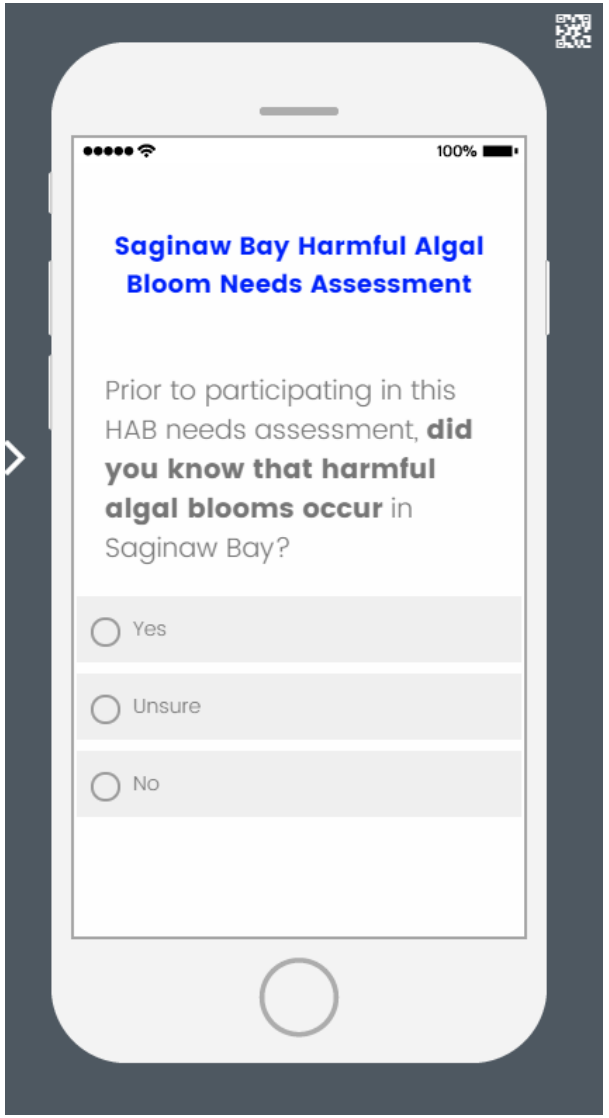
- Capture initial information to inform design of workshop
- Gather feedback from a greater number of people/allow more to participate

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

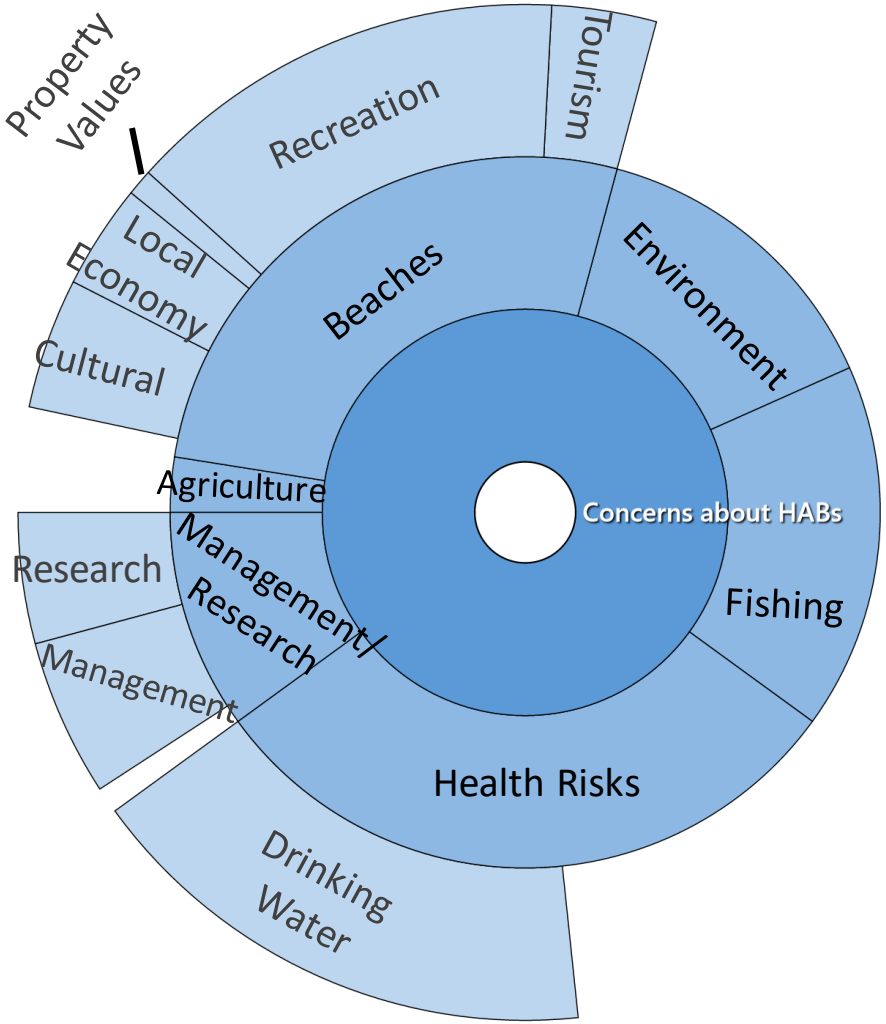
What do stakeholders in Saginaw Bay think about HABs?

- 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

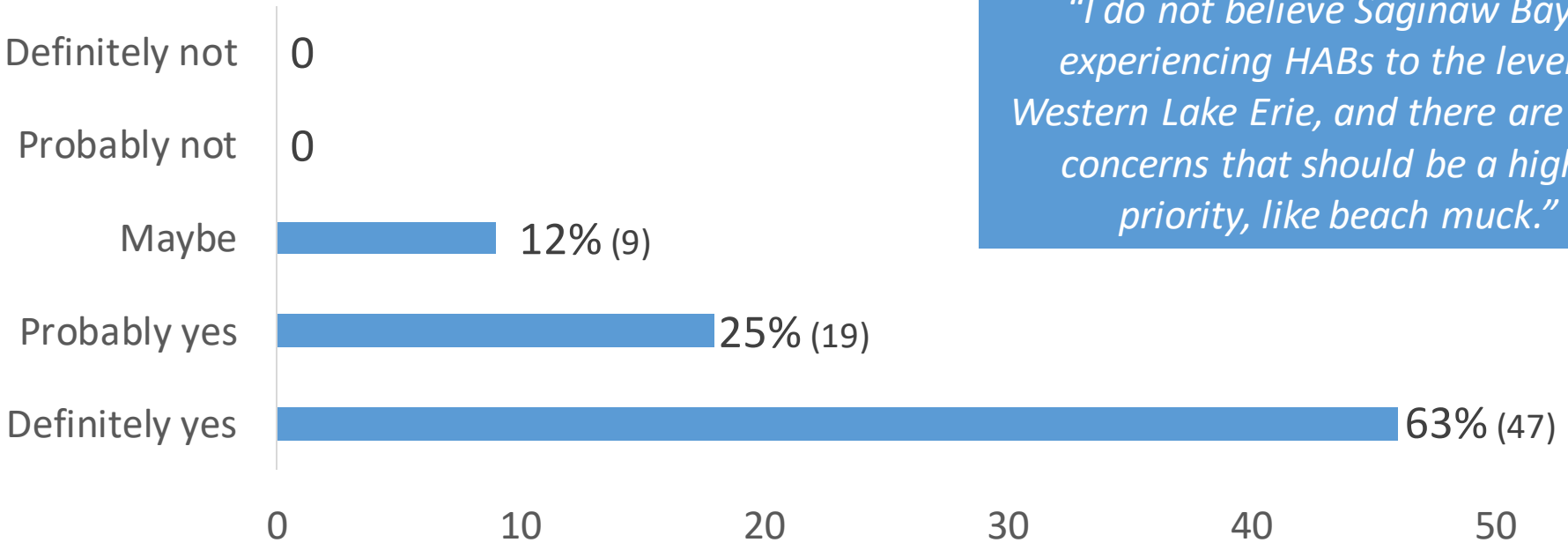
What concerns do you have about HABs in Saginaw Bay?



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

These are issues to explore further during the workshop discussion.

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



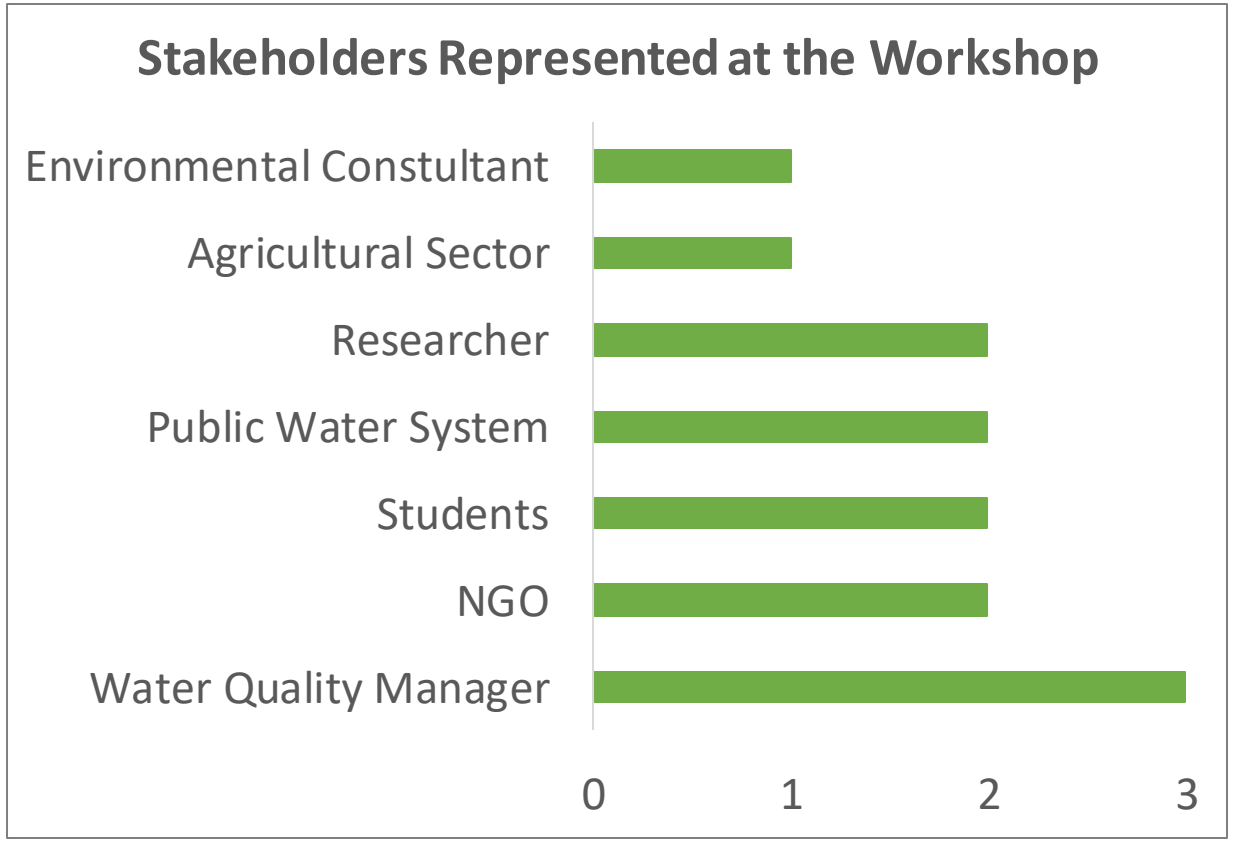
"I do not believe Saginaw Bay is experiencing HABs to the level of Western Lake Erie, and there are other concerns that should be a higher priority, like beach muck."

Most respondents support Saginaw Bay HABs research to protect ecosystem services

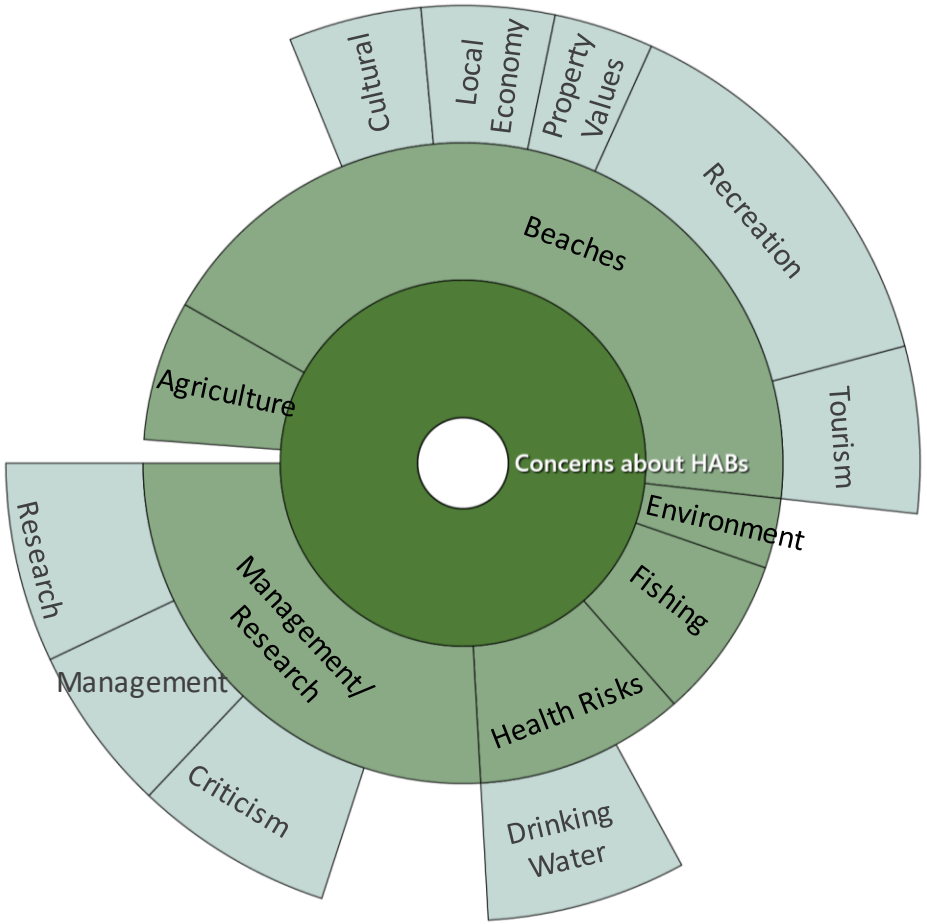
Those who don't, want researchers to focus on other water quality issues that they think are more damaging to the Bay

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

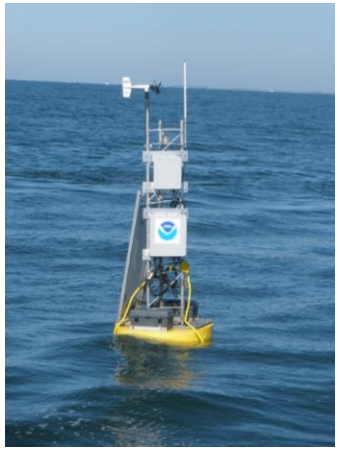
- *Tourists may choose to recreate elsewhere, impacting local economy*
- *Shoreline property values may decline*
- *Activities requiring full-body contact with water may decline: swimming, water skiing, jet skiing*
- *Cultural connection to the water may be tarnished*

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*


Credit: David Marvin



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*


Credit: Getty Images

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)

Thank you!

Questions?