



GRAHAM  
SUSTAINABILITY INSTITUTE  
UNIVERSITY OF MICHIGAN

# Great Lakes Water Levels Integrated Assessment

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University of Michigan Graham Sustainability Institute

September 15, 2015  
Muskegon, Michigan

# Presentation Overview

- Graham Sustainability Institute
- Integrated Assessment
- Water Levels Integrated Assessment
  - Process
  - Shoreline property owner survey
  - Outreach materials
  - Planning grants
  - Next steps

# Graham Sustainability Institute

## Centers & Programs

- Education
  - *Undergrad, MS, PhD, Postdoc*
- Integrated Assessment
  - *“Wicked Problems”*
- Water
  - *Great Lakes & Estuaries*
- Climate
  - *Adaptation Planning, Literacy & Decision support*
- Campus Behavior
  - *Cultural Indicators, Planet Blue Ambassadors*

## Common Principles

- Scientifically rigorous
- Interdisciplinary
- Engaged with practice
- Collaborative

# Integrated Assessment

## An Assessment...

- Or a review and analysis of research and data related to a specific issue.

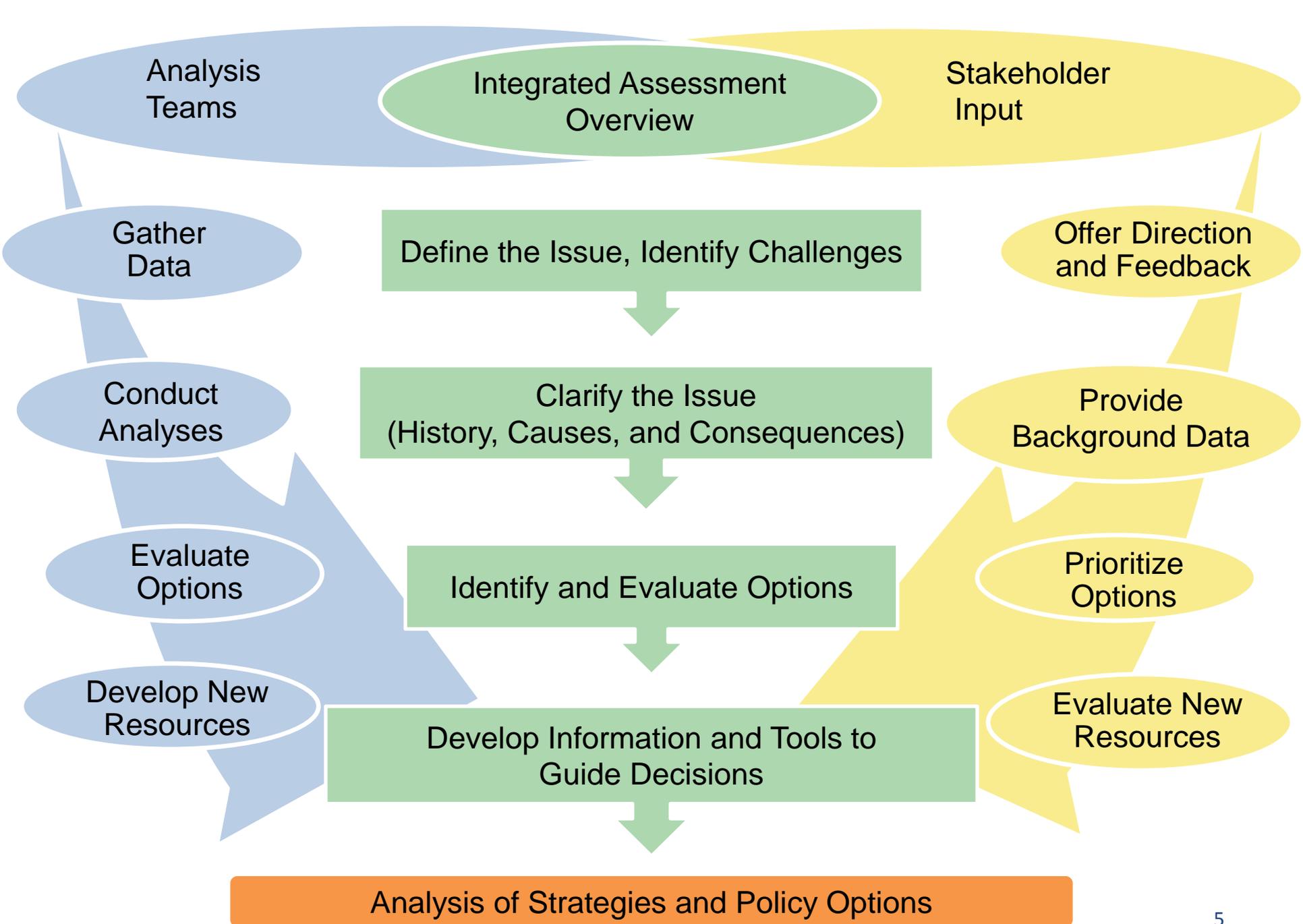
## That Integrates...

- Policy or management context
- Diverse stakeholder perspectives
- Several disciplines
- An analysis of causes and possible solutions

## In order to....

- Build consensus
- Inform decisions





# Presentation Overview

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- **Water Levels Integrated Assessment**
  - **Process**
  - Shoreline property owner survey
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# Water Levels Integrated Assessment

- **Scoping & development**
  - Stakeholder mapping
  - Shoreline property owners survey
  - Development of an advisory committee

MDEQ, Office of the Great Lakes	U.S. Army Corps of Engineers	Ducks Unlimited	Wisconsin Harbor Towns Association
ODNR, Office of Coastal Management	Environment Canada	The Nature Conservancy	W. Michigan Shoreline Regional Dev. Comm.
Conservation Ontario	Ohio Lake Erie Commission	Georgian Bay Forever	Save our Shoreline
International Joint Commission	Wisconsin & Michigan Sea Grant	Council of Great Lakes Industries	Great Lakes Coalition

# Water Levels Integrated Assessment

- **Purpose**

- To help equip the region with a robust set of water level adaptive strategies that protect the ecological integrity, economic stability, and cultural values of the region

- **Focus**

- Lakes Michigan-Huron & Erie
- Identifying & evaluating adaptive management other options (not lake level control structures)

# Water Levels Integrated Assessment

- **Guiding Question**

*What environmentally, socially, politically, and economically feasible policy options and management actions can people, businesses, and governments implement in order to adapt to current and future variability in Great Lakes water levels?*

- **Key Impact Areas**

- Infrastructure
- Water Quality
- Recreation & Tourism
- Shoreline economies
- Nearshore & shoreland habitat

# Water Levels Integrated Assessment

- **Interdisciplinary**

Environmental	Social	Political	Economic
<ul style="list-style-type: none"><li>• Climate change</li><li>• Hydroclimate processes/ modeling</li><li>• Shoreline stability</li><li>• Slope erosion</li><li>• Ecosystem dynamics</li><li>• Habitat</li></ul>	<ul style="list-style-type: none"><li>• Effects of shoreline management activities on neighboring properties</li><li>• Distribution of costs and benefits of water level impacts and shoreline management activities</li><li>• Changes to the culture/feel of a community</li><li>• Education/communication and outreach/engagement</li><li>• Resiliency planning</li></ul>	<ul style="list-style-type: none"><li>• Shoreline or floodplain building and zoning regulations</li><li>• Shoreline or floodplain planning</li><li>• Land conservation</li><li>• Decision tools</li></ul>	<ul style="list-style-type: none"><li>• Property values</li><li>• Property damage</li><li>• Decreased business revenue</li><li>• Increased operating expenses</li><li>• Incentives</li><li>• Financial planning and budgets</li></ul>

# Water Levels Integrated Assessment

- **Place-based**
  - Evaluate specific, integrated, and feasible options
  - Engage local stakeholders
  - Build the local ownership
- **Regionally-minded**
  - Identify opportunities for the wide variety of shorelines and issues throughout Lakes Michigan-Huron and Erie basins

# Water Levels Integrated Assessment

## Planning Grants

- March – August 2015: Planning grant teams explore **feasibility** of an IA in a specific location & prepare summary reports

## IA Phase 1

- November 2015 – April 2016: 4+ IA analysis teams each provide an interdisciplinary overview synthesis and report of **status, trends, causes, and consequences**

## IA Phase 2

- May 2016 – October 2016: With stakeholder input, each analysis team develops a report **analyzing viable policies and adaptive actions**

## IA Phase 3

- November 2016 – April 2017: Analysis teams work together with Graham personnel to develop a final **comprehensive IA report** of select options

Local

Regional

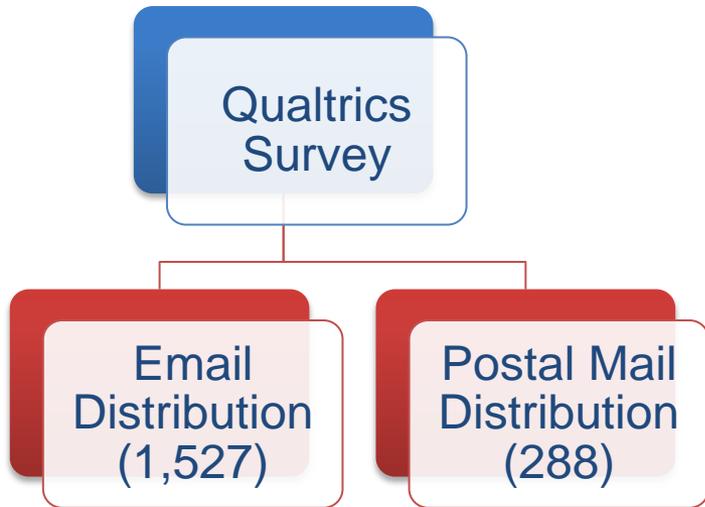
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# Shoreline Property Owners Survey

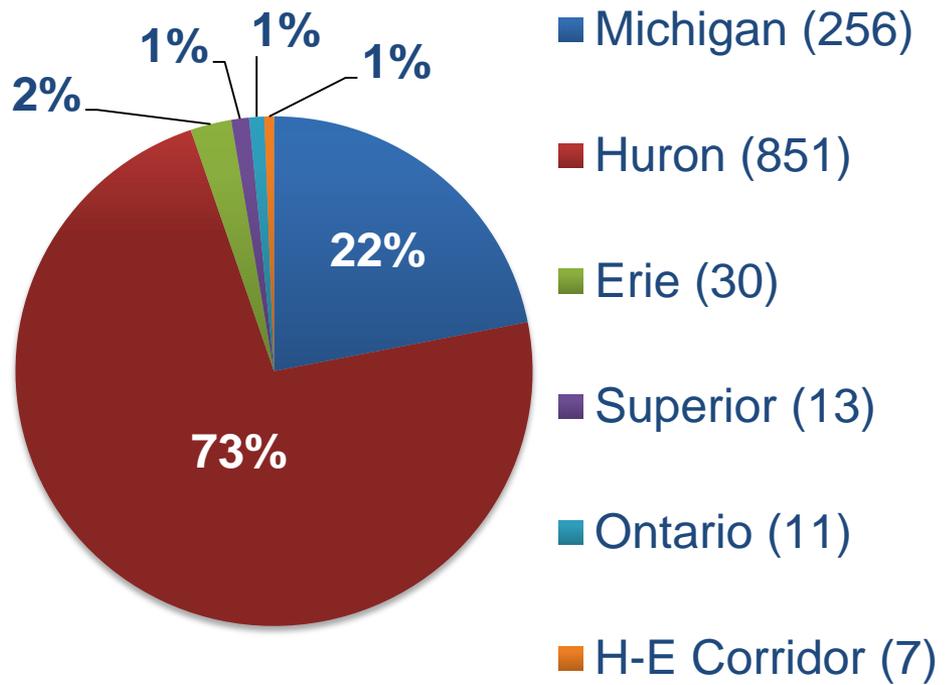
- **Rachel Jacobson** (MS/MPP, currently at NOAA PPI)
- **Goals:**
  - Inform the direction & scope of the IA
  - Collect data on perceptions of water level change
- **These data shed light on:**
  - 1) The level of **concern** about water level change
  - 2) How water level change and extreme water levels **impact** property owners and managers
  - 3) What people **believe** about water level change
  - 4) How to best reach people with **information**

# Shoreline Property Owners Survey



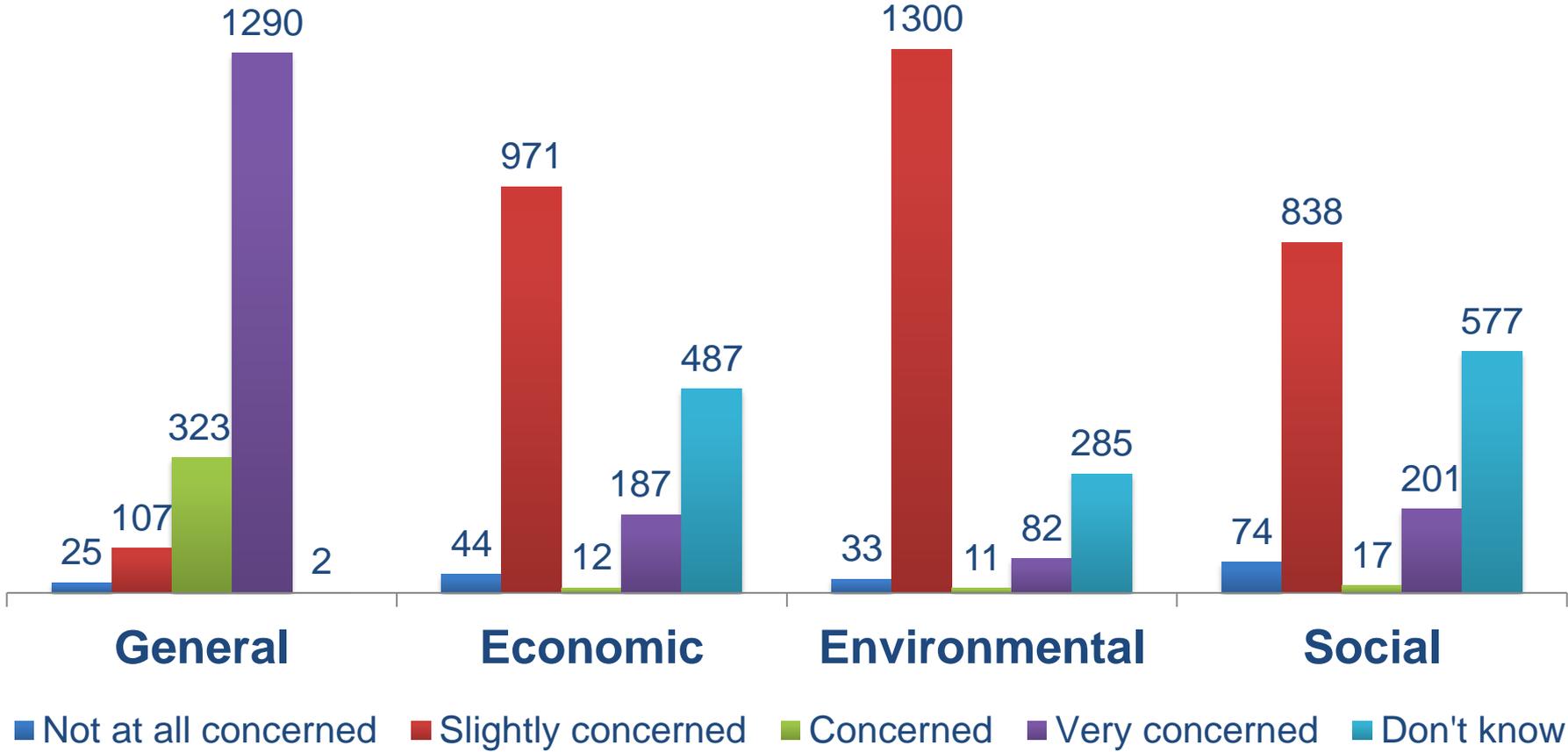
**1,815 Responses**  
**70% Property owners**  
**90% Residential**

## Owners/managers by property location



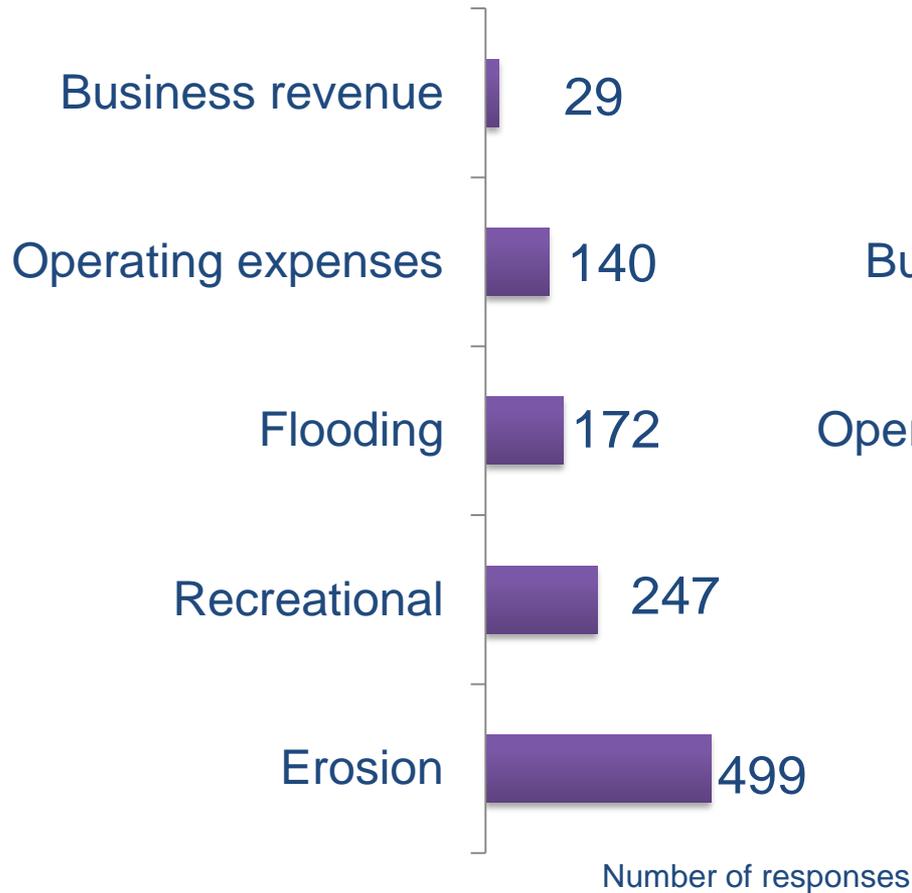
# Results: Concern

## Level of Concern

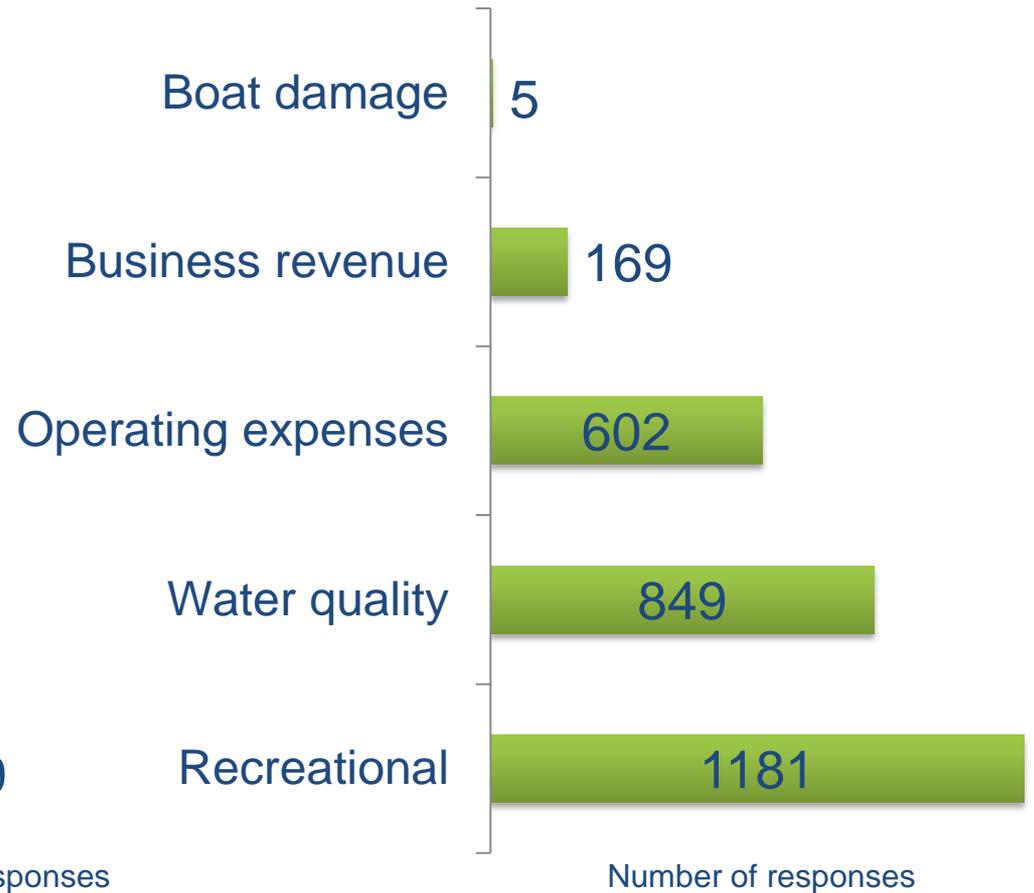


# Results: Impacts

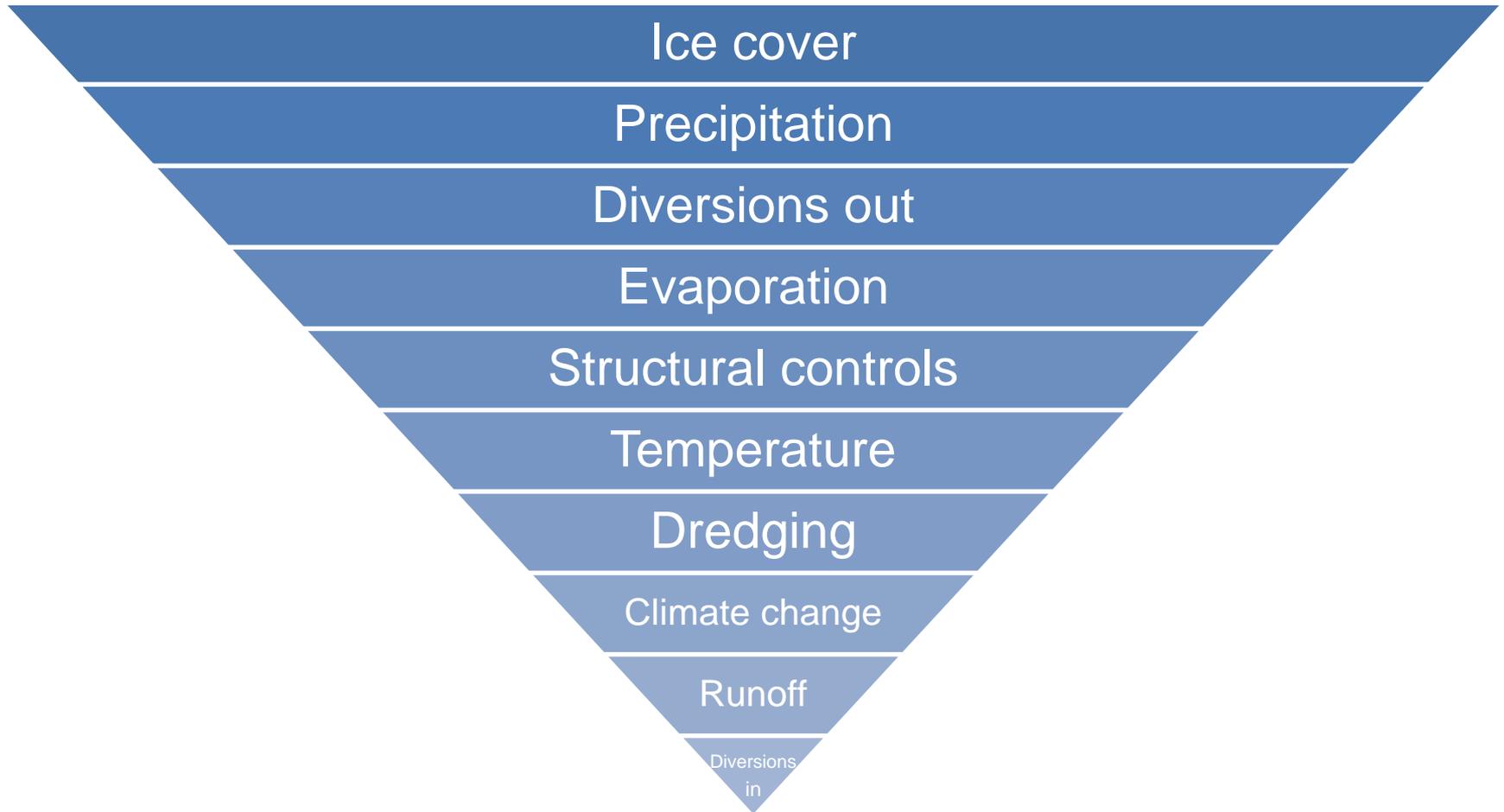
## High Water Level Impacts



## Low Water Level Impacts



# Results: Beliefs



# Results: Information

- **Common Knowledge Gaps**

- Causes (1188)
- Future levels (1069)
- Adaptation to low levels (887)

- **Common Barriers to Knowledge**

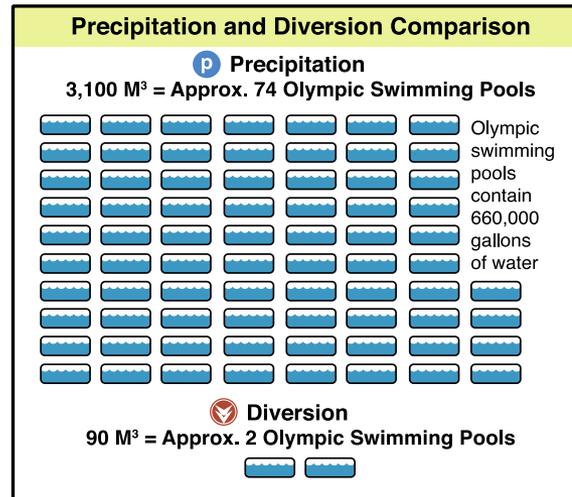
- Difficulty finding (1767)
- Not looking (1480)

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# Outreach: Water Budget & Fluctuations

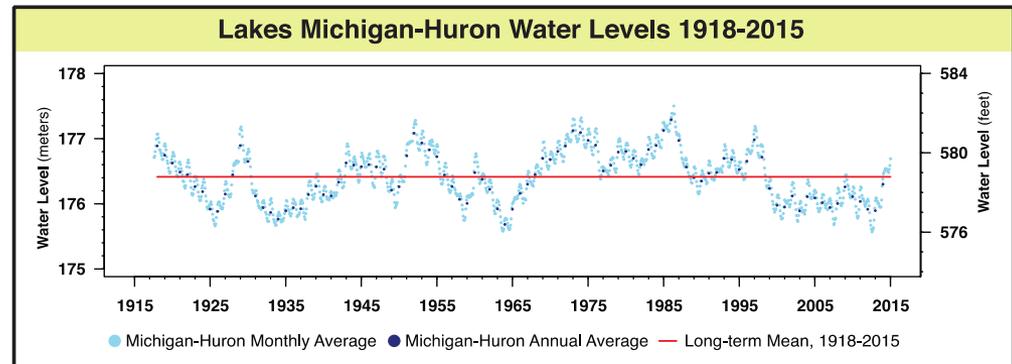
- Elizabeth LaPorte



This graphic shows the amount of precipitation compared to the amount of diversion in Lake Michigan-Huron, per minute. Developed by the Graham Institute.

**e = evaporation**  
**p = precipitation**  
**r = runoff**

Figure revised from original, used with permission from Sea Grant.



Data from GLERL

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# Planning Grants

- **Purpose**
  - Identify appropriate locations, interested partners, existing data to determine feasibility of an IA



# Planning Grants

- **Land-use regulation and infrastructure policy**  
*Richard Norton , University of Michigan (PI); Guy Meadow, Michigan Technological University*



# Planning Grants

- **Stakeholder perceptions**

*Hans VanSumeren (PI) and Constanza Hazelwood, Northwestern Michigan College*



# Planning Grants

- **Threatened and endangered species habitat**

*Dennis Albert, Oregon State University (PI); Paul Drevnick, University of Michigan*



# Planning Grants

- **Tribal fisheries**

*Frank Marsik (PI) and Richard Rood, University of Michigan; Kyle Whyte, Michigan State University*



# Planning Grants

- **Coastal bluffs & shoreline planning**

*David Hart (PI), Jane Harrison, and Adam Mednick, Wisconsin Sea Grant; Bruce Bessert, Concordia University; John Janssen and Jenny Kehl, University of Wisconsin-Milwaukee; Jim LaGro, David Mickelson, Brian Ohm, and Chin Wu, University of Wisconsin-Madison*



# Planning Grants

- **Coastal bluffs & shoreline planning**

*George Arhonditsis (PI) and Vincent Cheng, University of Toronto at Scarborough; Lynne Peterson, Consultant; Agnes Richards, Environment Canada*



# Planning Grants

- **Visualization & scenario planning**

*Adam Fenech, University of Prince Edward Island; Daniel Scott, University of Waterloo; Colin Dobel, Ontario Water Center*



# Next Steps

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For more information:

[graham.umich.edu/knowledge/ia/water-levels](https://graham.umich.edu/knowledge/ia/water-levels)

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