The Great Lakes
HABs Collaboratory: building a boundary space for scientists and managers

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Great Lakes Commission
ASLO Winter Meeting 2019
Theory of Change: Need for a HABs Boundary Organization

• Eutrophication is a serious problem globally and in selected regions of the Great Lakes.

• Harmful algal blooms (HABs) are most prominent in three major bays: Green Bay; Saginaw Bay; and Western Lake Erie Basin.
Validating Need for A HABs Collaboratory

- 58 interviews
  - 47 researchers and 11 practitioners
  - 34 from universities, 3 from private sector, 21 from 5 different agencies
Collective Impact Model

- A technique used to address large-scale problems
  - Encourages cross-sector collaboration
- Stakeholders agree on a common agenda and shared measures
Collective Impact Model Applied to HABs Collaboratory

Great Lakes Commission: Backbone Organization & Management Liaison

USGS: Science Liaison

Resource Managers

HABs Collaboratory

Scientists & Researchers

Linking Science and Management to Reduce Harmful Algal Blooms
What is A “Boundary Organization”?

In the Literature

• Guston, 2001
  – use of boundary objects/standardized packages
  – expertise from policy and science along with professionals that mediate those sides
  – accountability to both science and policy

• Gustafsson et al., 2018
  – authority is negotiated and gained through stakeholder engagement
  – trust that the process of engagement is fair
  – boundary objects that are Credible, Relevant and Legitimate (CRELE).

My Contribution to the Concept

• Pebbles, 2019 (forthcoming)
  – includes Gustafsson et al. characteristics, but further adapted
  – trusted and well facilitated processes are used to engage policy makers and policy practitioners
  – identify policy-relevant research priorities

Science → Policy
Policy → Science
Initial Priorities/Unmet Needs

• **Triggers**: What triggers and/or controls toxicity?

• **Nutrients**: What is the effect of timing and pulses of nutrient input on extent and duration of HABs?

• **Toxicity**: What (environmental and biological) factors determine whether a bloom is toxic and how toxic it is? (N, micronutrients, genetics, microbial community)
Membership

- Multidisciplinary group, 250+
- Over half actively conducting HABs research

2015
- Universities: 59%
- Private sector: 5%
- Agencies: 36%
- ~75 members

2018
- Universities: 46%
- Agencies: 43%
- Other: 11%
- 250+ members
Applying Collective Impact

Steering Committee

- **Silvia Newell, Wright State University**
- **Michelle Selzer, Michigan Office of the Great Lakes**
- Eric Anderson, NOAA-GLERL
- Raj Bejankiwar, International Joint Commission
- Jan Ciborowski, University of Windsor
- Timothy Davis, Bowling Green State University
- Mary Anne Evans, U.S. Geological Survey
- Donna Hill, U.S. EPA
- Gina LaLiberte, Wisconsin Department of Natural Resources
- Todd Miller, University of Wisconsin-Milwaukee
- Dale Robertson, U.S. Geological Survey
- Brannon Walsh, U.S. EPA

Webinars

- Current and Emerging HABs-related Technology in the Great Lakes
- 2016 and 2017 Field Season
- 2017 Modelling Webinar
- HABs Collaboratory and Invasive Mussels Collaborative Joint Webinar
- 2016 State of the Science Webinar Series
  - Data and modeling
  - Sources and movements
  - HABs and safe drinking water
  - Detection, composition and effects
  - Public health
  - Monitoring and forecasting
  - Sources and toxicity
  - Educate & engage
It Takes Two to Tango: When and Where Dual Nutrient (N & P) Reductions Are Needed to Protect Lakes and Downstream Ecosystems
Paerl et. al 2016

Publications

- Nitrogen role in HAB biomass and toxicity
- What are the different forms of nitrogen and why is this important?
- How does nitrogen enter the Great Lakes?
- Future directions for nitrogen research
- Strategies to reduce nitrogen loading

HABs Collaboratory Fact Sheet linking to management
Publications

**Phosphorus (P) and HABs: Sources of P from the Maumee River**

- **Agricultural Fertilizers**: The largest source of P into the Lake comes from chemical agricultural fertilizers, which are approximately 4/5 of the total agricultural P applied to fields.
- **Manure from CAFOs and Large Farms**:
  - Urban Sources: Treated wastewater, septic systems, lawns, golf courses, pet waste, stormwater account for, at most, 15% of the P loading to Lake Erie.

**Why P?**
- P has been shown to be the key driver of HABs and hypoxia because P is the limiting nutrient that maintains enough nitrogen in the system to maintain growth.

**Does P timing matter?**
- The season that P enters the lake is critical for ecosystem processes. The algae that form HABs prefer warmer temperatures, therefore the P entering during the spring (which typically has more rain and is when fertilizer is applied to farm fields) drives the HABs.

**What about other P sources?**
- Internal loading in the lake is suspected to occur in algae and plants. It is believed to be a small source of P, with the impacts gaining in importance.
- The Detroit and Maumee Rivers provide almost equal annual average loads of P into Lake Erie. However, the concentration of P from the Detroit River is much lower than the Maumee River. The concentrations from the Detroit River are not high enough to stimulate HABs but they contribute hypoxia.
A Collaborative Approach: Linking science and management to reduce harmful algal blooms

Expanding the Impact

• Annex 4
  – HABs Collaboratory RFP will provide small grants to support science needs identified by the Adaptive Management Task Team

• CSMI 2019 Lake Erie
  – Exploring how to best support CSMI researchers and showcase this work (e.g., interactive maps)

• ErieStat
  Using HABs science to support tracking progress toward P reduction goals for Lake Erie
Keeping in Touch

Website: https://www.glc.org/work/habs-collaboratory

Join the List-Serv: habscollaboratory+subscribe@great-lakes.net

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