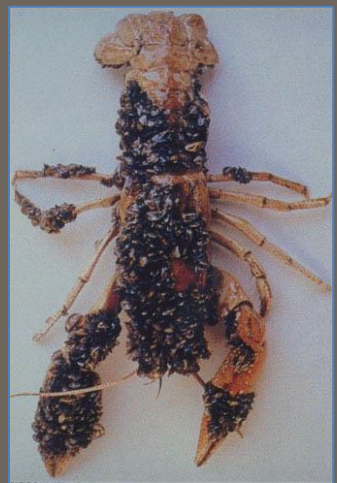




Invasive Mussel Collaborative

Samantha Tank
Great Lakes Commission
2 June 2022
Great Lakes Panel





Effects of biocontrol application

A colony of zebra mussels attached to a native mussel. The native mussel survives the application of biocontrol; the zebra mussels do not.



Convene researchers,
managers and stakeholders

Identify goals, needs and
uncertainties

Develop common
understanding and agenda

New Opportunity (2014)

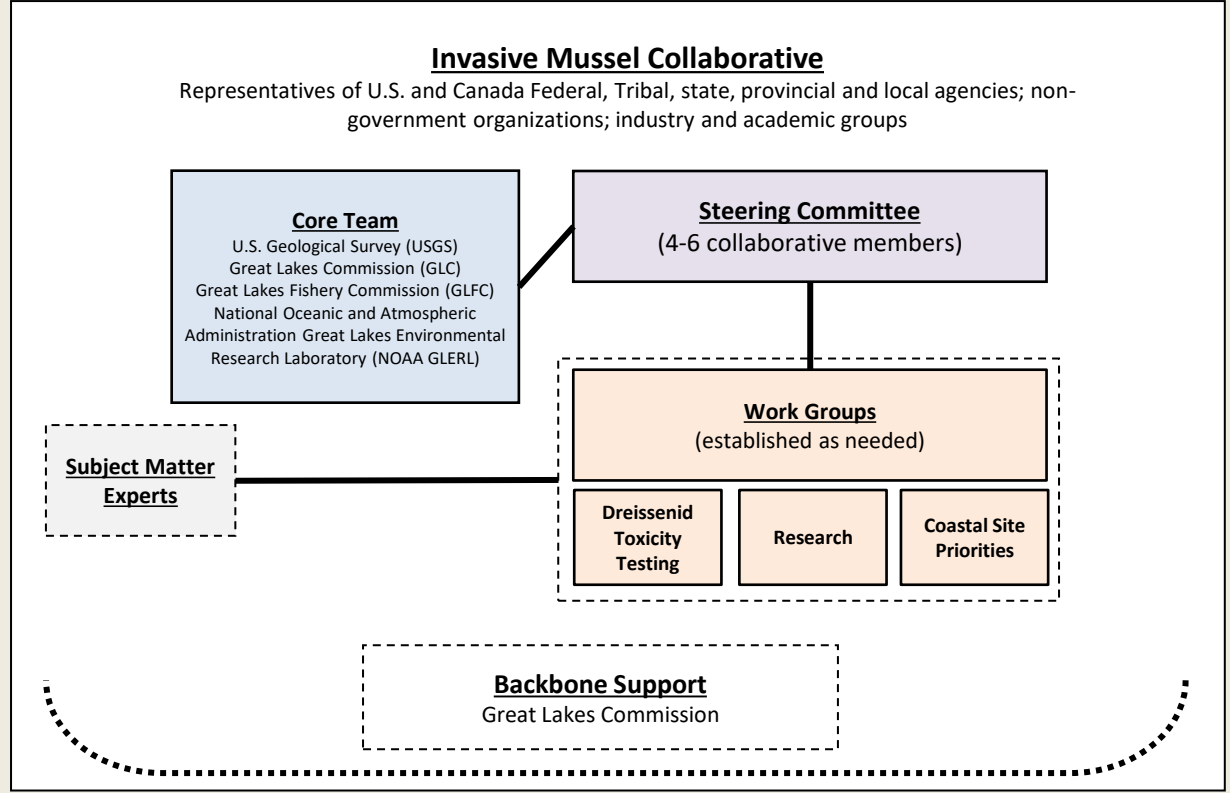
Limited options for response, containment
or eradication in open waters

New potential for management:
Zequanox^{®1} → trial applications

Ongoing investments to develop
other technologies



Stakeholder Community



Common Agenda

Mission

- Advance scientifically sound technology for invasive dreissenid mussel control to produce measurable ecological and economic benefits.

Goal

- Develop and guide the implementation of a long-term adaptive strategy that establishes and prioritizes an agenda for developing effective dreissenid mussel control methods that can be applied at a variety of spatial scales and environments to suppress or eradicate dreissenid mussels and support the restoration of biodiversity, and ecosystem functions and services

Strategy to Advance Management of Invasive Zebra and Quagga Mussels (2018)



Strategy Management Goals

- Respond to new detections of ZQM to slow spread and/or protect assets
- **Protect and restore critical habitats with broad ecological value, focusing on Great Lakes coastal areas**
- Protect/restore native unionid mussel populations and habitat
- **Restore balanced productivity in impacted lake systems**
- Restore socioeconomic benefits in impacted systems





Accomplishments

Dreissenid Mussel Control Demonstration Project





Dreissenid Mussel Control Demonstration Project

Project site: Good Harbor Bay/Reef near Sleeping Bear Dunes National Lakeshore and Leland, MI

Implementation in August 2019

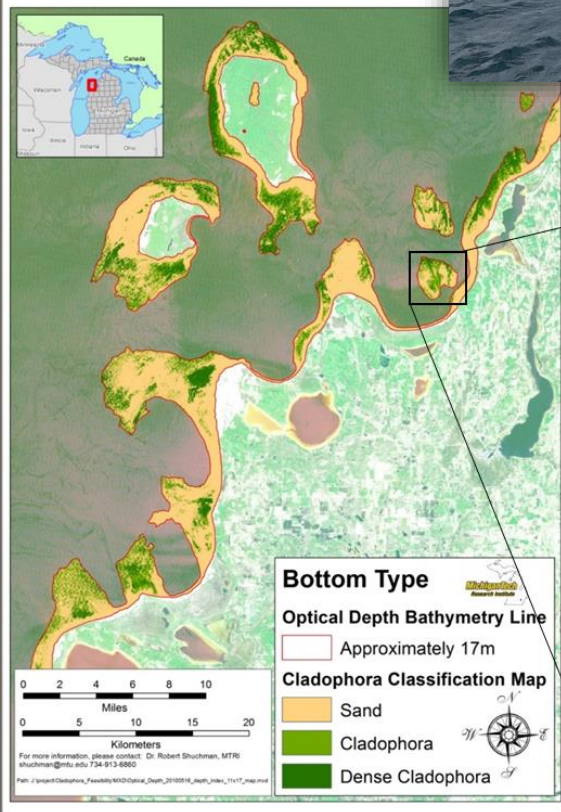
- 300 m² area of the reef
- waters 8-10 meters deep
- 3 days of treatment over ~1 week period

Large project team lead by GLC and LimnoTech

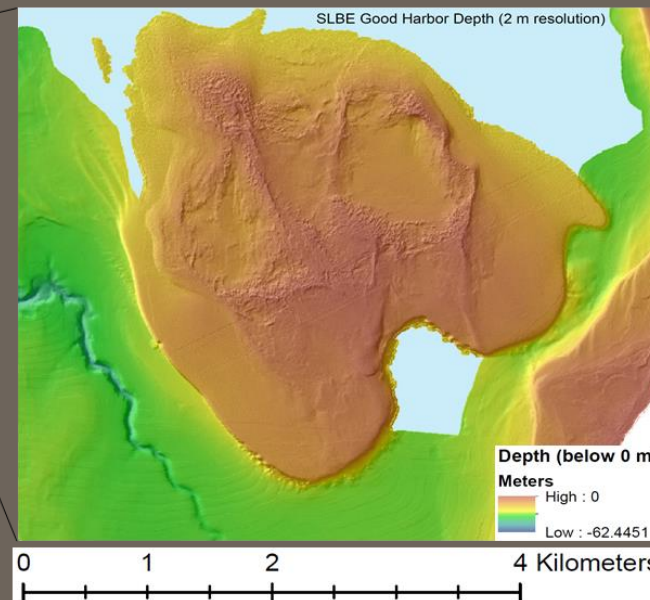
- UCC, GLEC, UWM, UM, NPS, MDNR, MBI
- IMC Members (GLFC, USGS, NOAA, TNC, MI EGLE, GTBB)



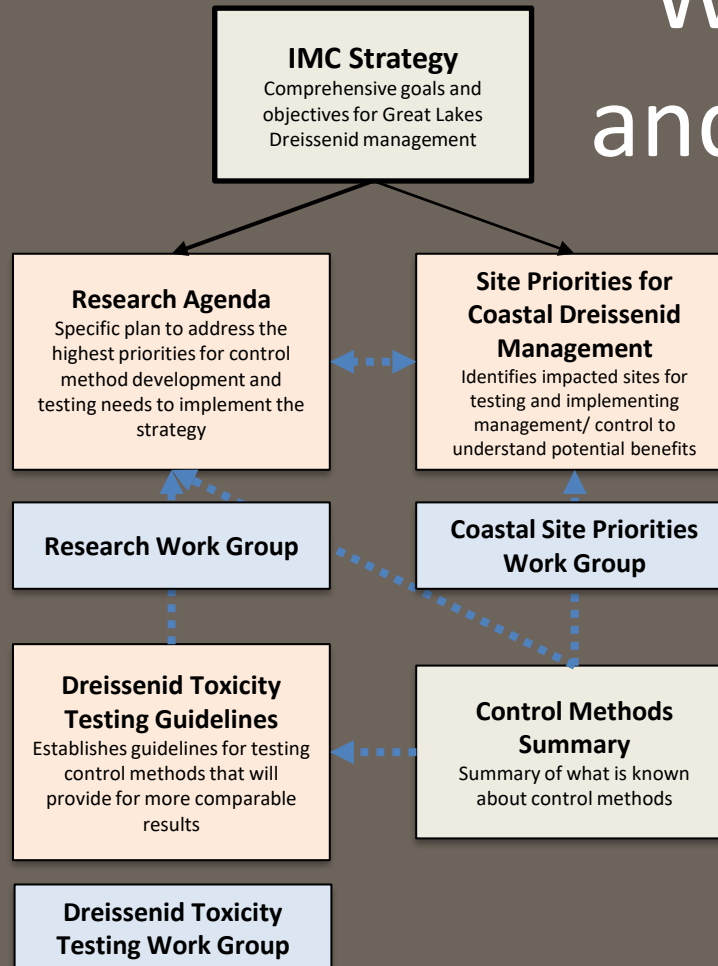
Submerged Aquatic Vegetation Extent Derived from May 16, 2010 Landsat 5 Satellite Imagery



Good Harbor Reef Study Area



Work Groups and Outcomes



Last Updated: April 29, 2020

This diagram depicts relationships between documents produced by the IMC and its work groups. These products may be updated periodically based on new research and knowledge, and/or evolving priorities. Updates made to one document may necessitate updates to another document, and all of those sub-relationships may not be reflected in this diagram.

Research Work Group



The screenshot shows the 'Dreissena Project Coordination Mapper' interface. At the top left is the Invasive Mussel Collaborative logo. The main title is 'Dreissena Project Coordination Mapper'. On the right, there is a 'How to Use' button. Below the title, there are two tabs: 'Research Projects' (selected) and 'Applied Control Projects'. A search bar is present above the project list. The map on the left shows North America with orange dots representing research projects and blue dots representing applied control projects. A legend at the bottom left of the map identifies these dots. At the bottom of the map area, there are two buttons: '+ Research Project' and '+ Applied Control Project'. The project list on the right includes:

- Watershed Council**: Furthering Restoration Via A New Approach To Invasive Mussel Control (Details →)
- NCCOS**: NOAA Great Lakes Mussel Watch Program (Details →)
- Wisconsin Department of Natural Resources**: Wisconsin Department of Natural Resources Boat, Gear, and Equipment Decontamination (Details →)
- Utah DNR**: Utah "STD" of the Sea Outreach Program (Details →)
- Northwest Power and Conservation Council**: Estimating Economic Impact of Invasive Mussel Establishment in the Northwestern (Details →)
- Minnesota Department of Natural Resources**: Field Prevention Protocols in Minnesota (Details →)

Toxicity Testing Work Group

- Best practices document
- Review of lessons learned from open water treatments
- Dreissena laboratory toxicity and open water control test methods table

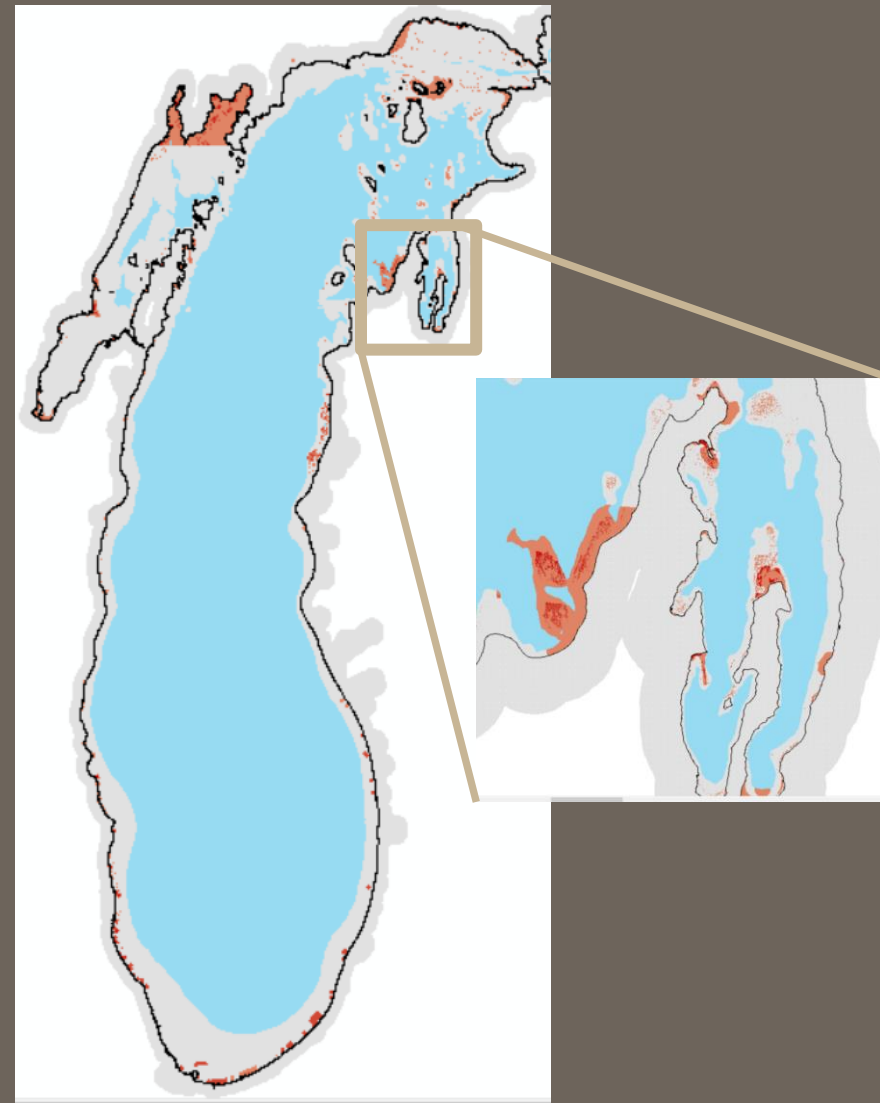


Show 10 entries Search:

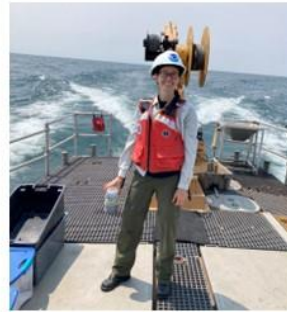
Authors	Date	Title	Life stage	Test chemical	Response measure	Nontarget species	Journal
Barbour, Matthew T.; Wise, J.K.; Luoma, J.A.	2018	A Bioassay Assessment of a Zebra Mussel (Dreissena polymorpha) Eradication Treatment	Adult	Copper (EarthTec QZ)	Mortality	NA	Report
Bouskill, Nicolas; Handy, Richard D.; Ford, Tim E.; Galloway, Tamara S.	2006	Differentiating copper and arsenic toxicity using biochemical biomarkers in Asellus aquaticus and Dreissena polymorpha	Adult	Copper (CuCl ₂), Arsenic (NaAsO ₂)	biomarkers (sodium/potassium ATPase activity, MT level, Total lipid peroxidation)	NA	Ecotoxicology and Environmental Safety
Clayton, Maureen E.; Steinmann, Roland; Fent, Karl	2000	Different expression patterns of heat shock proteins hsp 60 and hsp 70 in zebra mussels	Adult	Copper (CuSO ₄), tributyltin	biomarkers (heat shock protein analysis)	NA	Aquatic Toxicology

Coastal Site Priorities Work Group

- Geospatial platform
 - Great Lakes Aquatic Habitat Framework (GLAHF)
 - Zones defined
 - Hierarchical nested grids (30m, 1800m, 9000m)
- Scope
 - Basinwide
 - Constrained to coastal terrestrial, coastal margin, and nearshore
 - Recognized operational constraints
- Resolution
 - GLAHF 30m initially
 - Utilized 90m, 1800m and 9000m resolution



Learn more about work group accomplishments next Monday, June 6 from 1:00 – 2:30 p.m. Eastern!



IMC Research Work Group
Ashley Elgin, NOAA²

The IMC Research Work Group is tasked with coordinating and prioritizing research to maximize and advance dreissenid control outcomes. We recently developed a project inventory to collate information on dreissenid mussel-related projects across organizations and regions. We also worked with managers and researchers to rank dreissenid mussel research priorities, the results of which can help inform future research efforts.



Toxicity Testing Work Group
Diane Waller, USGS¹

The IMC Toxicity Testing Work Group is tasked with developing a framework for dreissenid testing which will provide guidance for researchers on testing and reporting methods and inform managers and regulatory agencies on how toxicity data on molluscicides have been generated. We developed a database of dreissenid toxicity studies, both laboratory and open water studies, that will be accessible on the IMC website. We also drafted a guidance document on "best practices" for toxicity testing based on published standard methods, a literature review, and recommendations from an expert panel.



The IMC's Coastal Site Priorities Working Group: Tools for Identifying Priority Sites for Experimental Mussel Control in the Great Lakes
Jeff Tyson, GLFC³

The presentation will cover the process that the Coastal Site Priorities Working Group used to identify appropriate sites to implement experimental invasive mussel control. Additionally, the presentation will cover the tools developed for customizing experimental invasive mussel site priority development based upon agency or researcher specified priorities.



Engagement

Website

invasivemusselcollaborative.net

Email list

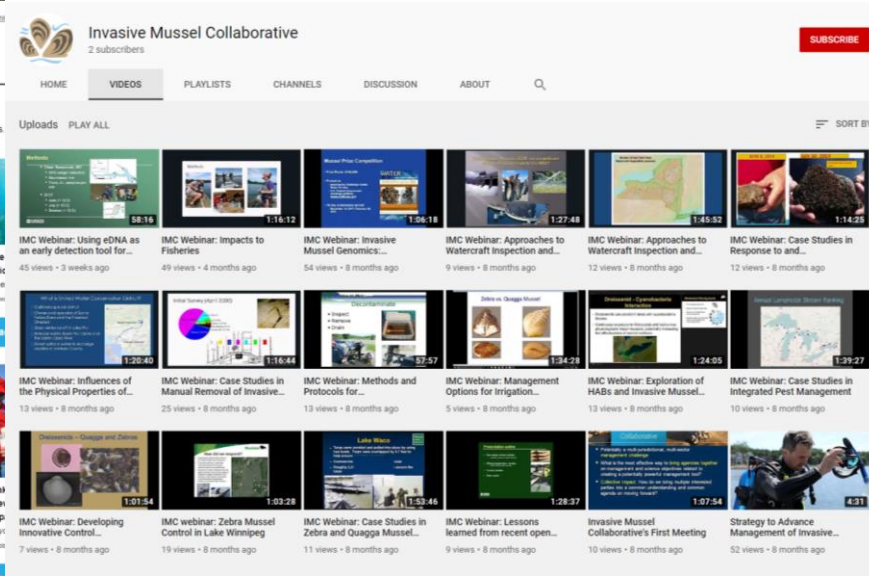
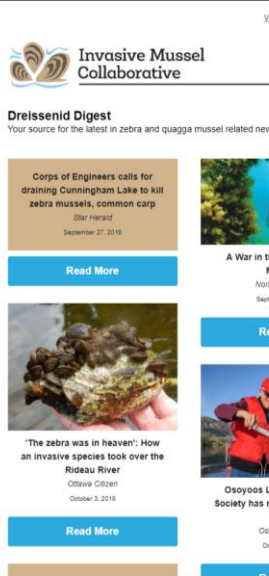
invasivemussels@great-lakes.net

Dreissenid Digest

Quarterly newsletter

Webinar Series

Recorded and archived



Dreissenid Mussel Control – Future Opportunities?



IMC
Work
Groups

- Strong interest in coastal restoration
- Research priorities to advance control tech development

IJC DOP
Report

- Integrating water quality and fishery management
- Understand role of mussels

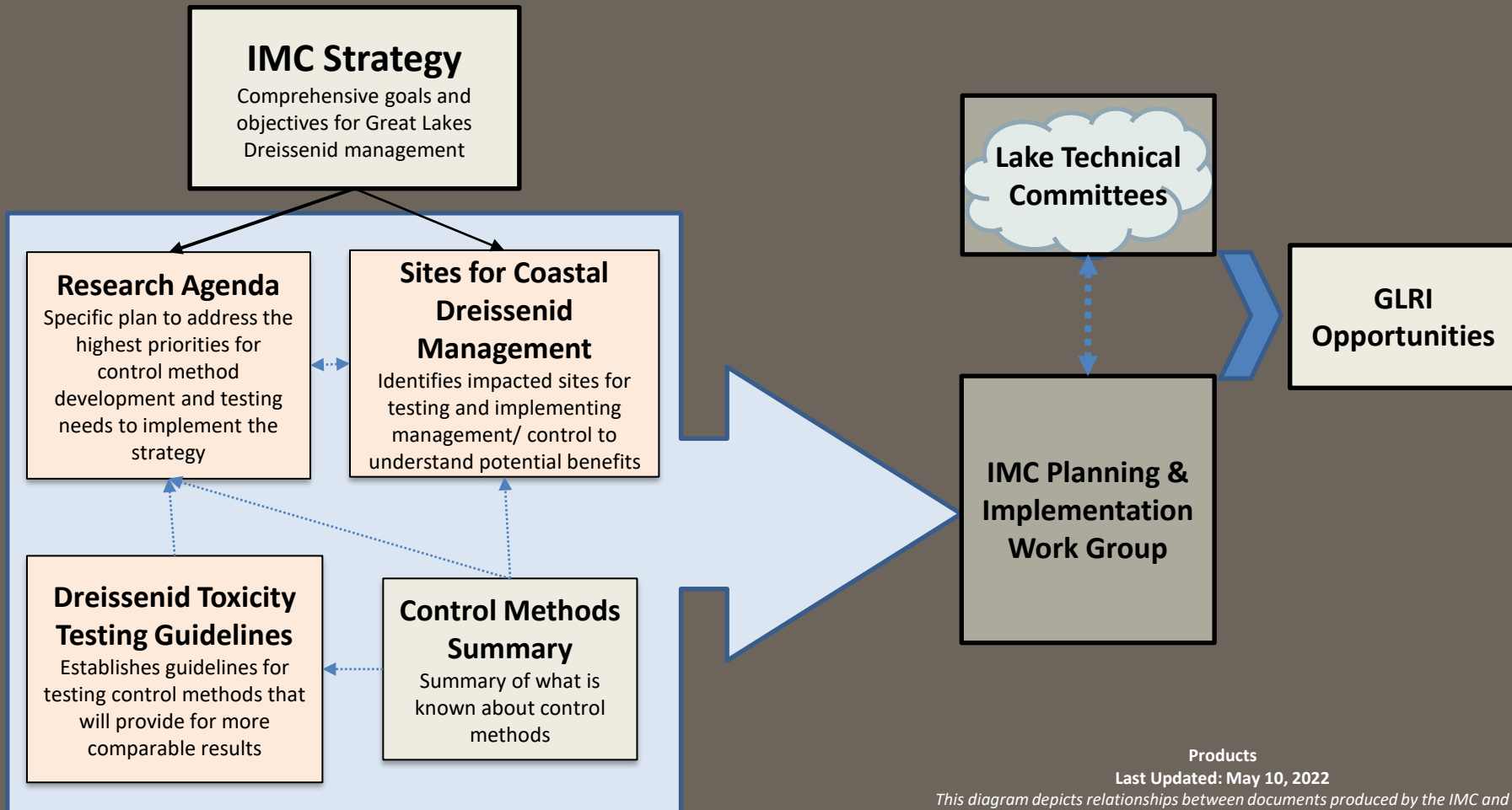
GLRI
Funding

- Applied research to develop and pilot control technologies



Looking Ahead

Invasive Mussel Collaborative
Advancing scientifically sound technology for invasive dreissenid mussel control to produce measurable ecologic and economic benefits.



Products

Last Updated: May 10, 2022

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Invasive Mussel Collaborative

Thank you!
mussels@glc.org