

Great Waters Research Collaborative Update

14 NOVEMBER 2019 – GREAT LAKES PANEL ON AQUATIC NUISANCE SPECIES MEETING

KELSEY PRIHODA – PROGRAM MANAGER



LSRI

Lake Superior
Research Institute

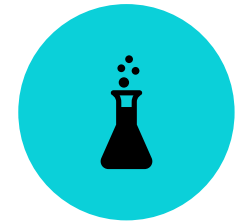
Est. 1967



APPLIED
ENVIRONMENTAL
RESEARCH CENTER AT
UNIVERSITY OF
WISCONSIN-SUPERIOR



21 STAFF
10 – 15
UNDERGRADUATE
STUDENTS



ANALYTICAL
CHEMISTRY
AQUATIC INVASIVE
SPECIES ECOLOGY
AQUATIC TOXICOLOGY
MACROINVERTEBRATE
AND ZOOPLANKTON
TAXONOMY
HABITAT RESTORATION
MICROBIOLOGY
QUALITY ASSURANCE



Natural Resources Research Institute

UNIVERSITY OF MINNESOTA DULUTH
Driven to Discover™



QUALITY DATA WITH A FRESHWATER
PERSPECTIVE



LAKE SUPERIOR
RESEARCH
INSTITUTE
PROGRAM, EST.
2017



MARITIME-RELATED
ENVIRONMENTAL
RESEARCH SERVICES

MANY YEARS OF
EXPERIENCE
WORKING
TOGETHER IN
SUPPORT OF GREAT
SHIPS INITIATIVE



BALLAST WATER
TREATMENT AND
COMPLIANCE
MONITORING
TECHNOLOGY
TESTING

GREAT LAKES
COMMERCIAL PORT
MONITORING

BALLAST WATER
SAMPLING AND
ANALYSIS METHOD
DEVELOPMENT

EDUCATION AND
OUTREACH

GWRC Advisory Committee

Provide advice and recommendations to GWRC Program Manager and staff on:

- Mission
- Direction
- Research priorities

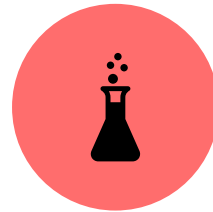
Current Membership = 21

How does the Advisory Committee help?

- Research/data needs for the Great Lakes region
- Inform project design/direction
- Marketing
- Give project data utility
- Provide information on other projects throughout the Great Lakes region
 - Ensure research within the Great Lakes region is complementary rather than duplicative



Technology Testing



LABORATORY SCALE

TREATMENT
TECHNOLOGY
PROTOTYPES

RESEARCH AND
DEVELOPMENT
QUESTIONS



LAND-BASED SCALE

LARGE-SCALE,
CONTROLLED
TREATMENT
TECHNOLOGY
TESTING

FRESHWATER
VALIDATION OF
TREATMENT
PROCESSES

FRESHWATER TYPE
APPROVAL TESTING



SHIPBOARD SCALE

TREATMENT
TECHNOLOGY
TESTING UNDER
NORMAL VESSEL
OPERATING
CONDITIONS

REAL-WORLD,
FRESHWATER
VALIDATION OF
TREATMENT
PROCESSES

TYPE APPROVAL
TESTING

GWRC Technology Testing Program



Great Waters Research Collaborative (GWRC)

2020 Request for Applications for Testing Services

The Great Waters Research Collaborative (GWRC), a major program of the University of Wisconsin-Superior's (UW-S) Lake Superior Research Institute (LSRI), offers testing and validation services to developers of novel technologies and methods. LSRI-GWRC specializes in testing ballast water treatment (BWT) technologies, as well as, tools/methods for ballast water sampling and analysis. Depending upon the technology and its stage of development, testing may be conducted at the laboratory, land-based, or shipboard scale. This Request for Applications (RFA) applies to technology testing to be conducted 01 January to 31 December 2020. In 2020, limited federal funding¹ is available to support LSRI-GWRC testing of meritorious technologies at the laboratory scale, or bench-scale, of testing.

INTRODUCTION

LSRI-GWRC is devoted to assessing the effectiveness of technologies for sustainable commercial and recreational use of the Great Waters of the world, especially green shipping. A major LSRI-GWRC focus area is testing and validation of these technologies, with the objective of providing support to accelerate the development of technologies having potential for preventing the introduction and controlling the spread of invasive species within the Laurentian Great Lakes. This 2020 RFA applies to unique and/or enhanced tools, technologies, and methods with justified potential for use within the Laurentian Great Lakes. This includes, but may not be limited to:

- BWT processes, such as, novel components, active substances, procedures, mechanisms, and activities that may be able to reduce or eliminate introductions of invasive species associated with commercial shipping via ballast water or hull fouling:

Solicit applications from interested developers of ballast water treatment and analysis technologies

Work with developers to design test plan to answer research and development questions

Funding available for testing technologies with demonstrated applicability to the Great Lakes

- US EPA Great Lakes Restoration Initiative
- US Department of Transportation – Maritime Administration

Goal of program is accelerated technology development

2019 Applicants (Laboratory-Based Testing Only)

Treatment Technologies:

- Kria Ionizer
- NanoBubble Ozone Technology
 - 3 horsepower version
 - 2.5 horsepower version
- LED-Activated Titanium Dioxide

Compliance Monitoring Devices:

- B-QUA Quick Ballast Monitoring Kit
- Ballast-Check 2



New Project!

Great Lakes Verification of Ballast Water Compliance Monitoring Devices

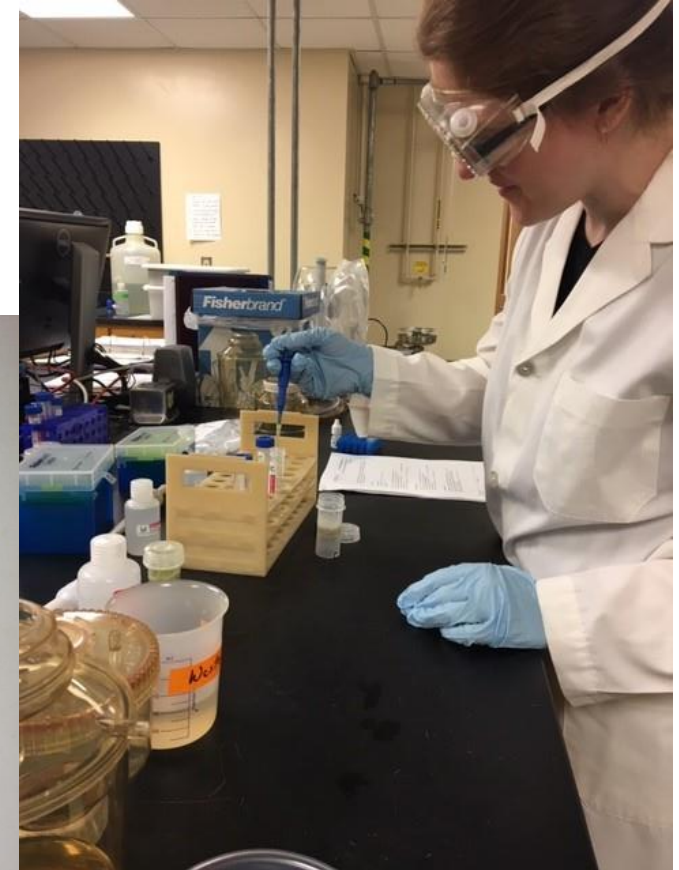
Funded by US Department of Transportation – Maritime Administration

- Maritime Environmental Technology Assistance Program

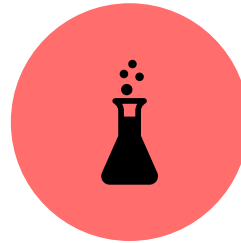
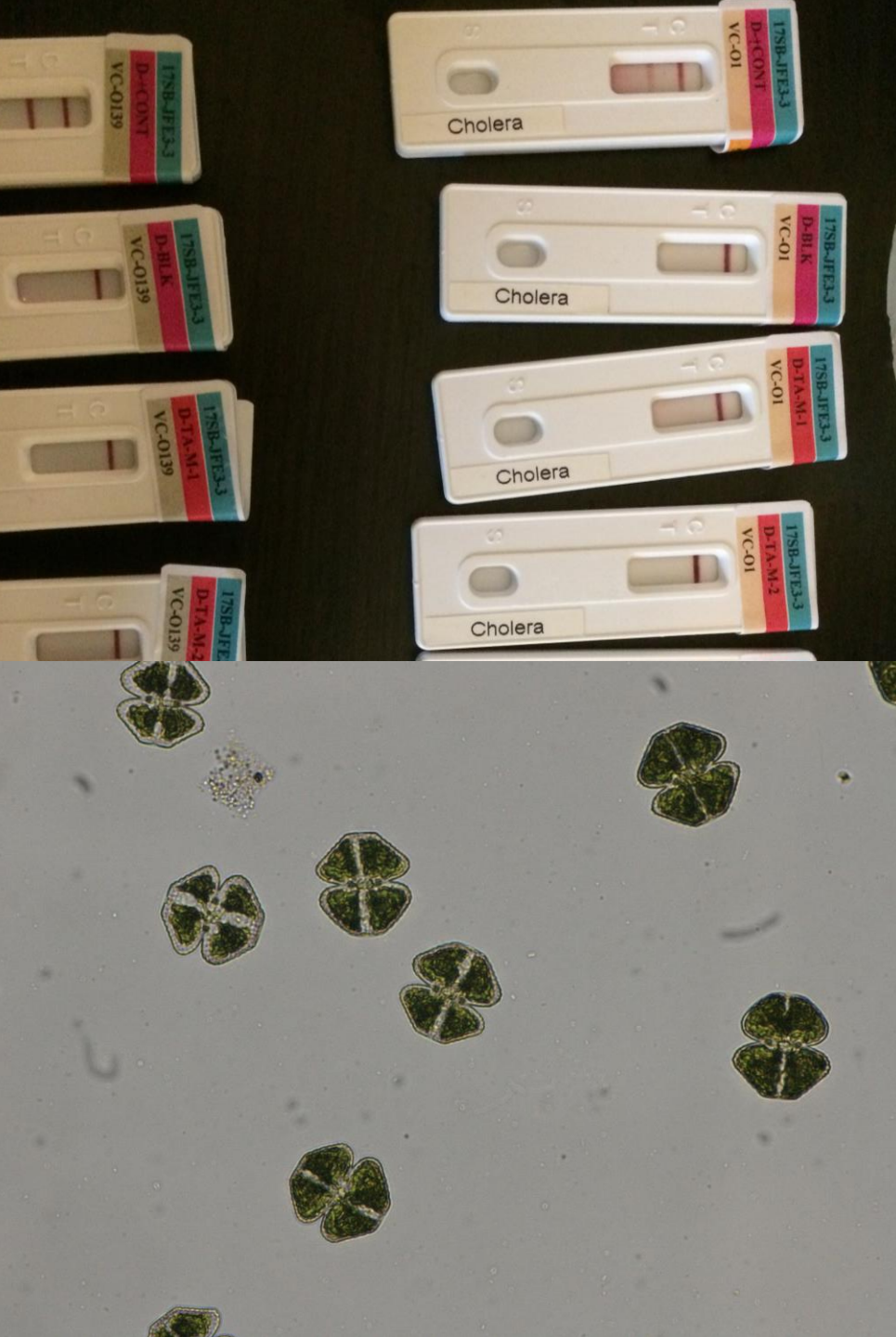
Verification method based upon proposed ISO method

Three phases of testing

- Laboratory-based using single species (cultured organisms)
- Field-based testing using ambient assemblages
- Field-based testing on treated water



Freshwater Testing and Evaluation Method Development



PROVIDE VERIFICATION
DATA TO SUPPORT
ALTERNATIVE/EMERGING
ANALYSIS METHODS



CONDUCT RESEARCH TO
SUPPORT GREAT LAKES
SPECIFIC BALLAST WATER
SAMPLING AND ANALYSIS
NEEDS

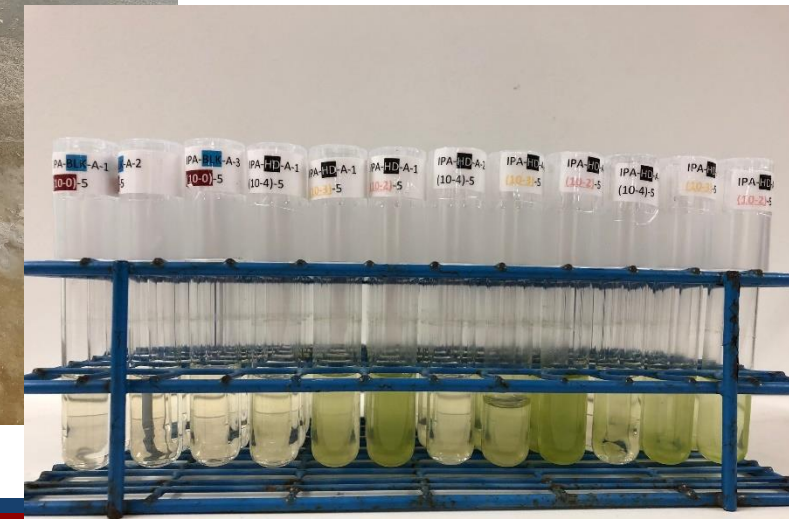
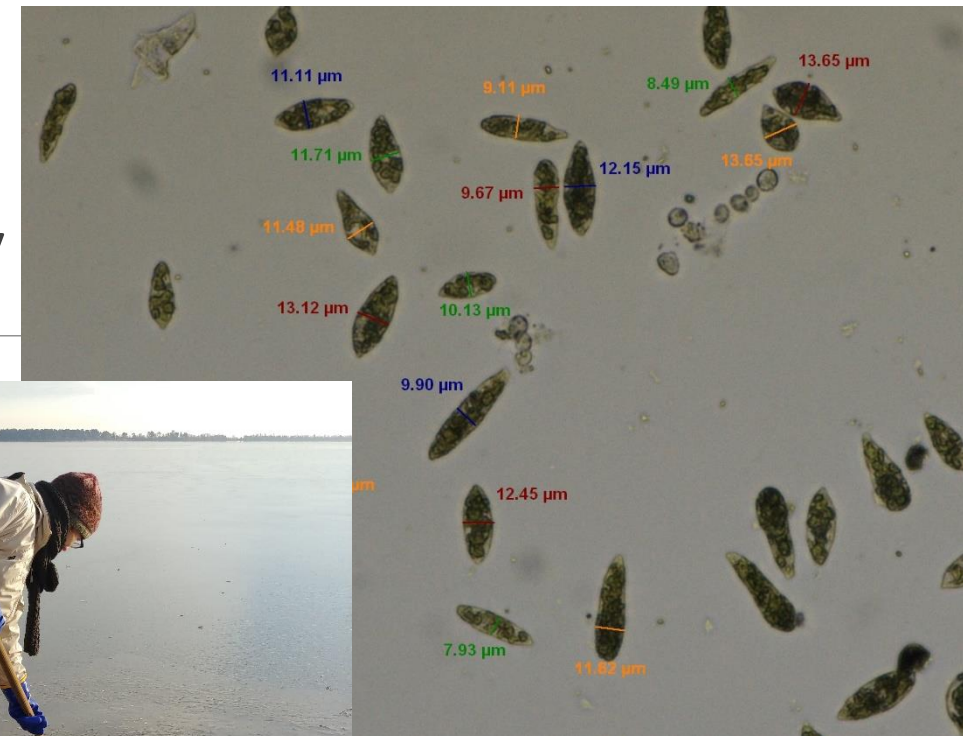


PROVIDE VERIFICATION
DATA TO SUPPORT
SHIPBOARD SAMPLE
COLLECTION AND
ANALYSIS METHODS

NRL MPN Validation Study

Freshwater validation of “Alternative Method” for determination of living protists in ballast water

- Timeline:
 - SEP – DEC 2018
 - Implementation in OCT – NOV 2018
 - LSRI
 - NRRI
- Initial precision and accuracy determination
- Three densities validated
 - High
 - Medium
 - Low
- Replicate samples analyzed in triplicate using Alternative Method and ETV Method



Ballast Water Management Alternatives for Lakers

Funded by US EPA GLRI via US Coast Guard Research and Development Center

- US DOT – MARAD

Goal to identify potential ballast water best management practices that Laker vessel operators could use to reduce risk of secondary spread

Data obtained through

- Literature
- Online survey
- Project stakeholder roundtable discussion



New Project!

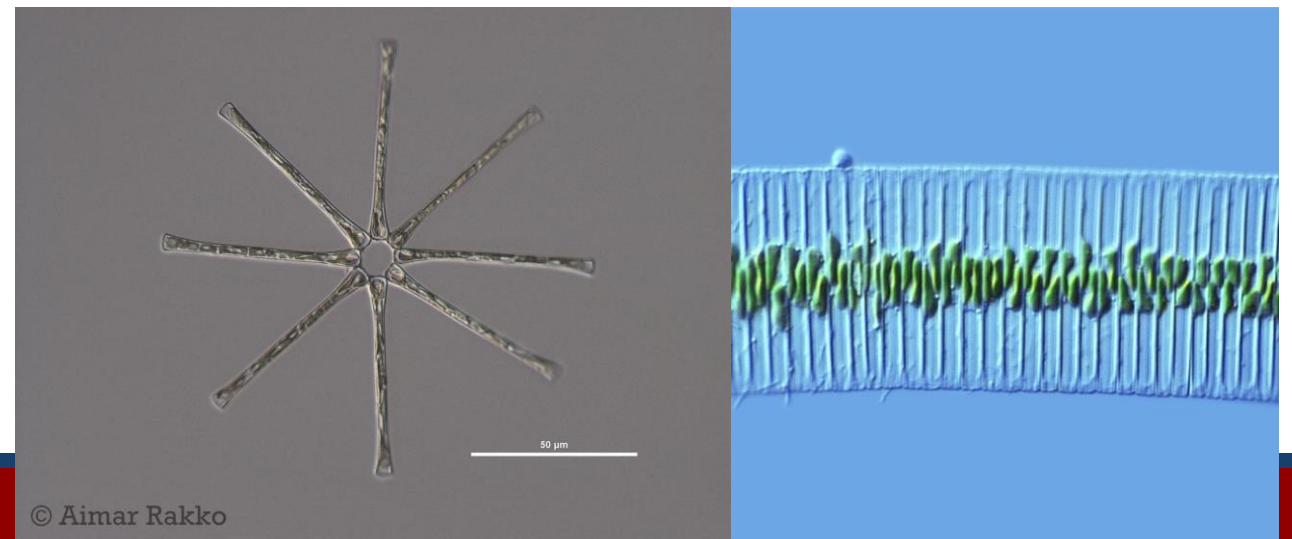
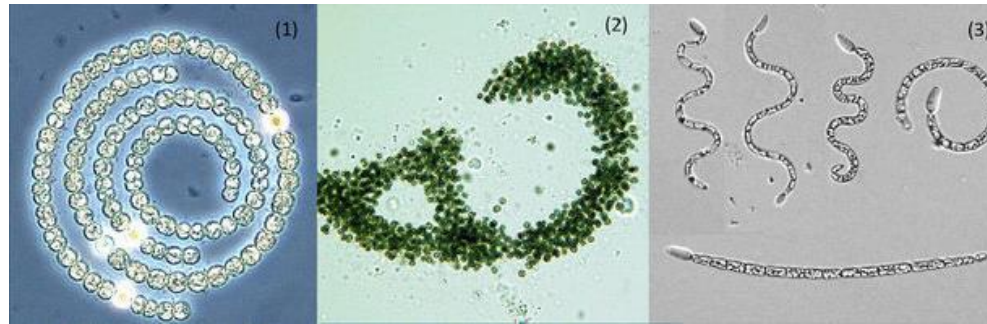
Examining Toxicological Response of Freshwater Organisms based on Size

Funded by US Department of Transportation – Maritime Administration

- Maritime Environmental Technology Assistance Program

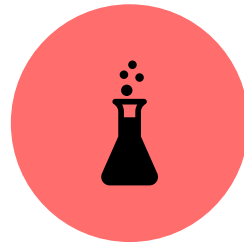
The Laurentian Great Lakes challenge:

- Large, multicellular entities
- Cells within entities <10 μm
- Can be abundant
- Examples:
 - Cyanobacteria – *Microcystis*, *Dolichospermum* (formerly *Anabaena*), *Aphanizomenon*, *Oscillatoria*
 - Green Algae – *Scenedesmus*, *Ankistrodesmus*
 - Diatoms – *Asterionella*, *Tabellaria*, *Fragilaria*, *Aulacoseira*
 - Chrysophytes – *Synura*, *Dinobryon*





Great Lakes Port Monitoring



CREATION OF PUBLICLY-
AVAILABLE GREAT LAKES
PORTS DATABASE



COMPARISON OF GREAT
LAKES PORT WATER
QUALITY WITH
REGULATED CHALLENGE
CONDITIONS



PROVIDE INFORMATION
TO AID DEVELOPMENT
OF TECHNOLOGIES WITH
GREAT LAKES
APPLICATION

New Project!

Exploring Options for Real-Time Monitoring within Great Lakes Ports

Funded by US Department of Transportation – Maritime Administration

- Maritime Environmental Technology Assistance Program

Determine whether environmental monitoring sensors exist that are accurate and capable of monitoring parameters of interest to commercial vessels

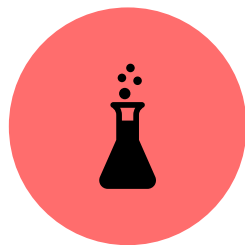
Pilot the use of identified sensors for “smart” (real-time) monitoring within a Great Lakes commercial port

Long-term goal is to establish a port-based monitoring network

- Feedback to vessels and ports



Education and Outreach



CONNECT WITH
TECHNOLOGY
DEVELOPERS



CONNECT WITH ELECTED
OFFICIALS AND FUNDING
AGENCIES



CONNECT WITH THE
PUBLIC



Ways to Connect with Great Waters Research Collaborative

Visit us online:
uwsuper.edu/gwrc

**Technical reports
available at
MINDS@UW!**

**Kelsey Prihoda
GWRC Manager
(715)394-8422**

kprihoda@uwsuper.edu



**Subscribe to our
newsletter!**

Technical Documents

[Tests of the Amglo Kemlite Bench-Scale Ballast Water Management](#)

[Great Lakes Ship Ballast Monitoring Project](#)

2020 Request for Applications

[GWRC Request for Applications](#)

[Great Waters Research Collaborative Application](#)

GWRC Newsletter

Subscribe to the GWRC mailing list:

Subscribe