

# Great Lakes Panel on Aquatic Nuisance Species Meeting Summary

November 13-14, 2019

National Oceanic and Atmospheric Administration  
Great Lakes Environmental Research Laboratory  
4840 S. State Rd. | Ann Arbor, Michigan 48108

---

Additional meeting information including a final agenda and presentations are available on the Great Lakes Panel website (<https://www.glc.org/work/qlpans/meetings>)

Wednesday, November 13, 2019

All times Eastern

## **Call to order, welcoming remarks, introductions, and agenda review**

*Sarah LeSage, Great Lakes Panel (GLP) Chair, Michigan Department of Environment, Great Lakes, and Energy (EGLE)*

- LeSage called the meeting to order
- GLP members and observers introduced themselves and a quorum was confirmed
- LeSage reviewed the agenda and there were no changes

## **GLP Business**

*Sarah LeSage, GLP Chair and Erika Jensen, GLP Coordinator*

- The May 2019 meeting summary, incorporating revisions previously provided by GLP members, was approved
- E. Jensen summarized progress on and the status of the May 2019 meeting action items

## **GLP Elections**

- Biennial GLP officer and at-large member elections are scheduled to occur in 2020
- The current vice chair is considered “chair-elect” and will become the new GLP chair
- Open positions include:
  - Vice Chair position
  - Research Coordination Committee Chair
  - Policy Coordination Committee Chair
  - Information/Education Committee Chair
  - Two at-large members
- The nominating committee (Bob Wakeman, John Navarro and Francine MacDonald) will identify potential candidates for each position and develop a slate of nominees
- Electronic ballots will be sent out in February and responses will be due in March
- Election results will be announced, and installment of new officers will occur, at the spring 2020 GLP meeting

## **Other old business**

### **Great Lakes AIS Landing Blitz Event**

- The first fully regional [Great Lakes AIS Landing Blitz](#) was held in 2019; the GLP member agencies and organization participated in the event and assisted with event promotion
- GLC staff are currently summarizing 2019 event results and creating an infographic for distribution

- GLP members were asked for input on continued involvement of the GLP in future AIS Landing Blitz events and GLP member organizations were encouraged to indicate their individual interest in participating in future events
- New ideas and opportunities for the 2020 event include:
  - Working with that National Marine Manufacturer's Association (NMMA) to produce a short documentary on the 2020 event
  - An electronic data collection component
  - An expanded communication strategy to improve coordination and marketing
  - An event evaluation component

### **U.S. Geological Survey (USGS) NAS Database Update**

- Over the last two years USGS staff have been working to incorporate a number of tools and additional features into the [Nonindigenous Aquatic Species \(NAS\) database](#) including:
  - A tracker for species spread that is associated with storm flooding, focused primarily on coastal storms
  - A pilot project to identify ecological and economic impacts of AIS, currently in the literature review phase
  - A tool that allows users to directly submit a .csv file of species sighting coordinates
  - Native range layers for fish, with plans to expand to other taxa
- USGS is also now considering incorporating eDNA in the NAS database
  - USGS will coordinate and host webinars for all six of the regional panels on incorporating eDNA into the USGS NAS database
  - The GLP webinar will be held in March 2020
- USGS has considered including survey effort data and there is infrastructure in place to report this data; the main barrier has been a lack of submitted survey data
- USGS would like to incorporate Canadian data with the permission and cooperation of the provinces and Canadian government
- GLP staff will work with USGS to plan an additional webinar to demonstrate recent updates and new features

### Plans for spring 2020 meeting

- Potential dates and locations for the 2020 meeting were reviewed
- Ontario is the proposed location, with New York or Minnesota as alternative locations
- No major concerns were voiced by GLP members about holding the meeting in Ontario
  - GLP members should email the GLP coordinator with preferred dates/conflicts

### **GLANSIS & Risk assessment clearinghouse update**

*Rochelle Sturtevant, GLANSIS Program Manager, Michigan Sea Grant Extension*

*Ceci Weibert and Patrick Canniff, Great Lakes Commission*

- 3,179 risk assessments were summarized under guidance from the risk assessment ad hoc committee and categorized by taxa, as well as a three-step review process prior to their addition to the clearinghouse
- Next steps for the clearinghouse are to transfer ongoing population from the GLC to NOAA GLANSIS and to share a summary report for GLP review
  - The summary report will describe the process used and lessons learned through clearinghouse development

- The risk assessment clearinghouse website was demonstrated, and all information has been reviewed and uploaded as of November 2019
- Now that it is populated, the risk assessment clearinghouse can be used to streamline information gathering for management actions (e.g., regulating species) and define the level of response to an early species detection, and directly aligns with a need that was identified by many regional groups and entities managing AIS
- Sturtevant provided a GLANSIS program update and reviewed the redesigned website and features (<https://www.glerl.noaa.gov/glansis/>)
- The GLANSIS species watchlist has grown from 80 species to over 1,200 species, and the program lacks staff capacity to create full profiles for each species
- Sturtevant proposed new criteria for listing species on the watchlist: a species must be officially regulated by at least one jurisdiction and have an established risk documented in peer-reviewed scientific literature in order to be added to the watchlist
  - These criteria would reduce the watchlist to about 150 species
  - There was general agreement among GLP members to move forward with the new criteria used to generate the watchlist
- GLANSIS staff are continuing to work with USGS NAS database staff to determine how to map or otherwise incorporate eDNA data and how can include Canadian species sighting data

### **ANS Task Force Report**

*Susan Pasko, Executive Secretary, ANS Task Force, U.S. Fish and Wildlife Service*

- Pasko provided an overview of the Aquatic Nuisance Species (ANS) Task Force
- Action items from the November ANS Task Force meeting were reviewed
- The ANS Task Force's Strategic Plan was reviewed, including goals for the six focus areas (i.e., coordination, prevention, EDRR, control and restoration, research, and education and outreach) and outputs for each
  - An annual work plan associated with each of the goals is being developed; GLP members will be given an opportunity to review the work plans before they are finalized
  - Committees have been formed around each of the workplan goals, and GLP members can sit on those committees at will
- The ANS Task Force is also currently developing bylaws which will clarify and formalize ANS Task Force operations
  - It was noted that regional panels are not members of the ANS Task Force – they are subcommittees – and do not currently have voting rights
  - The GLP ExCom will review and provide input on the draft bylaws as it relates to the ANS Task Force's relationship to the regional panels; GLP members interested in this discussion should notify the ExCom
- A new web portal for uploading graphics and resources for the Stop Aquatic Hitchhikers! campaign will be available soon

### **Genetic Biocontrol: Overview and opportunities**

*Moderator: Nick Phelps, Minnesota AIS Research Center*

#### Genetic biocontrol overview

*Chris Merkes, USGS*

- Genetic biocontrol is the exploitation of an organism's genetics to control itself

- There are many different genetic biocontrol technologies available, and the use of genetic biocontrol depends on many factors including the organism's life history, risk tolerance, size of the invasion, etc.
- Merkes provided an overview of the environmental persistence of different biocontrol methods
- Merkes reviewed the methods of several genetic biocontrol technologies, including RNA interference (RNAi), sterile male release, and direct gene editing tools
- RNAi makes an organism's cells treat important genes as unimportant, causing those genes to not be expressed and thus disrupting genes that are critical for survival
- RNAi is similar to a chemical treatment in that it is a highly selective treatment and only impacts specific gene sequences.
- RNAi can be cheap to implement, provides total control of deployment, does not persist in the environment, and there are no known non-target impacts (research is ongoing to confirm this)
- Sterile male release techniques suppress reproduction by inducing failed mating
  - A sterile male is released into the environment and mates with nonsterile females, leading to unsuccessful reproduction
- Y-Y male release skews population sex ratios so that there are only males and no sexual reproduction is possible. Males without X chromosomes cannot produce female offspring
  - Y-Y male release is reversible however there are some potential health concerns
- CRISPR (clustered regularly interspaced short palindromic repeats) is a tool used to specifically target and edit genomes directly in live organisms
- PRIMER (prime editing or base editing) is a new tool closely related to CRISPR and may have several advantages over CRISPR

#### Potential species-specific implications: *Phragmites*

*Kurt Kowalski, U.S. Geological Survey*

- Kowalski provided an overview the non-native *Phragmites* and the impacts that it has throughout North America, as well as an overview of Great Lakes *Phragmites* Collaborative
- The current management strategies that are used for *Phragmites* control are resource intensive and not species specific; genetic biocontrol is just one tool in a suite of possible control methods
- Microbiome research is ongoing at USGS, studying the impacts of disrupting *Phragmites* microbes on the plant's health and ability to reproduce
- Kowalski explained a specific method under investigation for *Phragmites*: gene silencing
  - Gene silencing is the regulation of gene expression that occurs on a cellular level and can be used to "silence" the expression of an undesirable gene.
  - RNA inference (RNAi) is a type of gene silencing that can be utilized to specifically target the plants' defense mechanisms
  - Current work is testing cell penetrating peptides as a vector for RNAi
- There is a specific RNAi research plan for *Phragmites* treatment facilitated by USGS, U.S. Army Corp of Engineers, and Wayne State University
- Genetic biocontrol is just one tool for *Phragmites* management that should be utilized in combination with other regional approaches

#### Potential regulatory implications

*Sarah LeSage, Michigan EGLE*

*Kelly Pennington, Minnesota DNR*

- Genetic biocontrol may be defined differently depending on state regulations, and regulatory authority for different technologies may lie with different departments depending on the type of biocontrol technology

- At a genetic biocontrol working group meeting in June 2019, participants expressed a need for more clarity on the regulatory framework for genetic biocontrol
- Under the U.S. federal regulatory framework, the “Coordinated Framework,” the U.S. Environmental Protection Agency (EPA), U.S. Food and Drug Administration, and U.S. Department of Agriculture may each be involved in the regulation of a genetic biocontrol technology, depending on the specific methods of control
- Other governance frameworks for regulating genetic biocontrol exist, including Tribal governments and First Nations, international conventions and agreements, and local communities
- Three hypothetical future scenarios were presented to demonstrate the practical need for state interagency coordination on genetic biocontrol
- Next steps include presentations and discussion with the ANS Task Force and GLP; holding webinars to increase awareness; and hosting a session at the 2020 Midwest Fish and Wildlife Conference

#### Discussion: Opportunities for GLP engagement

GLP members and meeting attendees asked clarifying questions and shared ideas for next steps. Key questions and discussion points included:

- The potential for non-target impacts, e.g., if non-target species ingest the compound delivering
  - Bait selection is critical to ensure the compound is consumed by the desired species
- Species-level control is possible due to the high specificity of the technologies, but trials should still be conducted to ensure impacts wouldn’t be experienced taxa-wide
  - EPA requires rigorous trials and testing prior to approval of any control technology
  - The smaller the portion of the genome that is targeted with biocontrol technology, the more species-specific it will be
- Resistance to genetic biocontrol is possible via mutation and can render the technology ineffective
- A key role for the GLP is to provide an opportunity for information exchange; suggested mechanisms for facilitating this are:
  - Develop a public position paper that summarizes the full scope of possible genetic biocontrol methods in manageable, specific, and distinct topics to help guide researchers through some of the regulatory uncertainties
  - Provide a forum for learning about genetic biocontrol methods currently under development and provide basic information about which technologies are being used for each invasive species
  - A combination of GLP meetings and webinars would be a good platform to share this information over the next few years

#### **Organisms in trade project updates**

*Moderator: Kelly Pennington, Minnesota DNR*

#### Injurious wildlife listing

*Susan Jewell, U.S. Fish and Wildlife Service (USFWS)*

- Injurious listing prohibits importation of that species, and species are listed either through Congressional amendment of the statute, or rule promulgation through USFWS
- Species not yet introduced into the U.S. are listed along with invasive species that are presently established

- This approach is particularly successful for banning species by genus or family, e.g., Channidae, where one harmful species that is present in the U.S. can provide justification to USFWS to list multiple harmful species within the same genus or family
- Jewell explained efforts to assess the Lacey Act's success of preventing the introduction of invasive species
- 309 species are included in the assessment and 19 of those were established in the U.S. at the time of listing
  - Since listing, 12 of those species' populations are contained (not spread to other states), and 7 continued to spread to other states
- All of the species not established in the U.S. at the time of listing are still not established in the U.S. (94% of the total number of listed species)
- USFWS will continue to list species preemptively by identifying unestablished high-risk species

### Cultural release study

*Tim Campbell, Wisconsin DNR/Sea Grant/Extension*

- The practice of life release involves purchasing a live animal(s) that would otherwise be killed (e.g., from a live food market) and releasing into a natural environment to live out the rest of its natural life to generate good karma/a virtuous mind-state.
- Study methods included a literature review and snowball sampling where life release practitioners identified other practitioners to interview, and structured interviews
  - Interviews were recorded and qualitatively analyzed to identify common themes in responses
- Every practitioner interviewed welcomed the advice/feedback of AIS experts
  - Given that the tenet of life release is to save lives and do good rather than harm, practitioners don't want to release something invasive that will endanger other wildlife
- Four of the 11 interviewed practitioners live in the Great Lakes region
- Only certain cultures/sects of Buddhism practice life release, and larger release events are more likely to be coordinated events, to coincide with a community day or a Buddhist holy day
  - Many Buddhists contacted for the interviews didn't know anything about life release, indicating that this may not be as widespread within the faith as initially thought
- Alternative practices with the same intention of saving lives were identified by the project team, including working with rehabilitated wildlife releases and animal shelters
  - Modifications of existing agency activities could also meet the needs of the practice and be low risk (e.g. alternative release times for an announced trout stocking event)
- An AIS manager survey will be conducted as a follow up to this work to determine which of the potential alternative practices to life release are acceptable by manager
  - Results will identify methods of practicing life release that are acceptable to both practitioners and managers, and who in each state can work with life release practitioner communities to implement alternative practices

### MRBP baitfish report

*Doug Jensen, Minnesota Sea Grant*

- This report was undertaken to examine the risk of introducing nonindigenous animals, plants, and pathogens via live aquatic bait movement, with a goal of reducing that risk and making regulation compliance easier for industry partners and users
- Through funding from the Mississippi River Basin Panel on Aquatic Nuisance Species (MRBP), management agencies within MRBP member states (28) were surveyed to characterize the

regulations related to aquatic bait farming, wild harvesting, importing/exporting, reporting, transportation and species allowed/prohibited.

- Phone interviews were also conducted with bait industry representatives including farmers, wild trappers, wholesalers, internet sellers and retail shop owners to understand what species were being sold, where the aquatic bait came from and where and how the aquatic bait was used.
- Experts were contacted within each state until it was determined that accurate and complete information was gathered then summarized as expert opinion
  - 42 species were identified as sold for live aquatic bait in MRBP member states
  - For each species, scientific name, common name, where they were used in MRBP, typical size sold, and where they are produced were recorded
  - Only five states in the MRB export live aquatic bait to other MRB states. Those states are Arkansas, Minnesota, North and South Dakota, and Wisconsin.
  - 50% of MRB states get their bait from Arkansas
- It is difficult to get an estimate of volume and value of bait fish production because every state collects data differently, inconsistent reporting and/or states didn't respond to the request for information
  - Adding to the difficulty are differences in definitions of raised vs. wild caught aquatic bait and the lack of bait vs. feeder fish market distinctions.
- Stop Aquatic Hitchhikers! prevention messages were found in 78% of state fishing licenses
- Farm raised and "winterkill" pond harvested bait poses less risk for AIS spread than wild harvest bait from public waters due to development, fishing, and boating
- Report outcomes indicated that aquatic bait is a relatively lower risk pathway for the spread of AIS due to certification programs (e.g., Arkansas Commercial Bait and Certification Program) and state regulatory programs, but is not risk-free due to the volume of bait fish moved through the pathway

#### Minnesota pathway assessment

*Chelsey Blanke, Minnesota DNR*

- A "rapid" assessment of pathways of trade, including species in trade, regulations, and prevention efforts was conducted for Minnesota
- The most influential and actionable objectives for all pathways included:
  - Develop relationships with industry to better understand species, scale, and structure for each trade pathway
  - Develop and distribute educational materials that are specific to each pathway, working with businesses to distribute information to customers
  - Conduct surveillance of online sales and educate online sellers
  - Increase inspection and enforcement, including improved identification training
  - Develop more industry self-regulating programs (e.g., HACCP)
  - Conduct ongoing risk assessments as new species are introduced for trade
- Blanke also discussed priority actions to address individual pathways
  - Ornamental horticulture - collaborate with existing state nursery inspection and certification program
  - Pet and aquarium trade - support and host more surrender events
  - Food trade - collaborate with state and local food licensing and inspection programs; crayfish boil outreach
  - Bait trade - support positive social norms regarding disposal
  - Biological supply - collaborate with curriculum developers and schools
- Developing relationships with industry is important

- The industry has significant cultural and economic impact, and regulation will be most effective with industry buy-in
- Industry participation is critical to documenting what species are moving through trade

### Grass Carp enforcement questionnaire results

*John Navarro, Ohio DNR*

*Erika Jensen, GLC*

- A letter was distributed through the Council of Great Lakes Fisheries Agencies to states that allow stocking of diploid (i.e., reproducing) Grass Carp to encourage a change to their regulations that would allow only triploid (i.e., sterile) Grass Carp to be stocked
  - Follow-up will be conducted to ensure that the letter was received by every state
- A questionnaire covering enforcement authorities and procedures surrounding Grass Carp was distributed to all ten Great Lakes jurisdictions through the Great Lakes Fishery Commission (GLFC) LAW committee
- It is important to know that some Great Lakes states prohibit all forms of Grass Carp, while some still allow triploid Grass Carp in specific instances
  - These differences in regulations influence questionnaire responses (e.g., notification and inspection of shipments of certified triploid Grass Carp)
- Eight jurisdictions responded to the questionnaire, and respondent expertise and level of knowledge on grass carp regulations in their jurisdiction were assessed
- Questionnaire responses regarding authorities and inspections were reviewed. Respondents generally had good knowledge of the issue and indicated that key legal authorities were in place to address grass carp shipments. However, inspections are occurring at rate lower than expected and a number of policy, resource, and information gaps were identified, documented and shared with the GLFC LAW committee
  - “Other” inspection procedures not explicitly asked about in the questionnaire were listed in free form and include procedures like reporting, ploidy testing, sample collection, and driver interviews
  - While only one or two states may have indicated that they follow a procedure included as “other,” this does not indicate that other jurisdictions do not use those procedures, just that they were not reported by other jurisdictions

### **U.S. EPA GLNPO Update: Report to Congress and GLRI Action Plan III**

*Kevin O'Donnell, U.S. EPA Great Lakes National Program Office (GLNPO)*

- EPA released the Great Lakes Restoration Initiative (GLRI) Action Plan III on October 22, 2020
- Regarding funding for invasive species work in fiscal year 2020, it is expected that approximately \$21 million will be allocated to support the Asian Carp Action Plan and another \$30 million will be allocated to support other invasive species work, including species-specific collaboratives
- Species collaboratives are expected to comprehensively cover work in the region for those species, including developing research trials
  - EPA is not seeking to create new collaboratives; instead it will support existing collaboratives and leverage them to lead work on that species' portfolio and reduce overlap in work within the region
- Funding will be used to maintain and build-on investments at existing project sites to ensure restoration efforts are sustained and do not revert to past conditions
- EPA will work with other governmental partners to leverage LAMPs as opportunities to advance GLRI goals and objectives



- The recently passed Vessel Incidental Discharge Act (VIDA) legislation established several new authorities and responsibilities for EPA including establishing a new Great Lakes and Lake Champlain Invasive Species Program and requiring an annual end of year report to Congress on program activities
  - There is some uncertainty around the program and the report because no funding was appropriated to implement the program in fiscal year 2019
  - EPA is developing its report based on agency and partner activities that are meeting the intentions of the program as well as recommendations/additional work that could be completed to fully meet the intention of the program and increase efficiency
  - GLRI reports to Congress are publicly available and so it is anticipated that the report on this program will also be available
  - The report currently focuses on U.S. activities; the EPA was not asked to confer with Canadian counterparts for the report
  - Forums like the GLP and the Great Lakes Water Quality Agreement Annex 6 subcommittee provide an opportunity to share this information with Canadian partners

### **Used watercraft as a pathway for invasive mussel spread**

*Thomas Woolf, Aquatic Invasive Species Bureau Chief, Montana Fish, Wildlife & Parks*

- Woolf reviewed Montana's AIS program, including mandatory inspections and funding via an angling fee, hydroelectric fee, and out of state boat fees, as well as inspection statistics and locations
- Standard data collection ensures that inspectors at different stations can see the history of a boat and its inspections
- Used boats that are sold online/remotely, taken out of the water, put on a trailer, and hauled out West are a major potential source of invasive mussel introductions and is a relatively unaddressed pathway
  - These boats are primarily an issue coming from Midwest states, where zebra mussel invasions are significant, into Western states
  - Most boats are recently purchased from Craigslist or brokers and commercially transported; some are out of the water only one-two days prior to arriving in the West for launch
  - Live mussels survive under shrink wrap
- The dataset of how these boats are moving is small, so combining data from other states helps to better understand the issue and origin of boats, as well as where solutions could best be applied
- Montana and other states are seeking ideas and opportunities to collaboratively address this issue with states where boats are originating; targeted outreach is a start, although Craigslist can be difficult to reach
  - Part of the solution could be to advocate for commercial haulers to contact the destination state to arrange an inspection
- There is enough of an understanding between Western states around this issue and its potential impact to AIS prevention that some funding would likely be available for a collaborative pilot project between states
- Washington and Utah will cite violators under AIS regulations, while Montana does not
  - Enforcement officers will stop people for not stopping at inspection stations
  - Boats that are found to be contaminated with invasive mussels will be decontaminated with 140° water and quarantined for a month

- The Clean Marina program, through which agencies distribute outreach materials to marinas, could also be leveraged as a way to inform boaters about AIS regulations in the Midwest
  - Clean Marina materials include AIS components in Michigan and Ohio

Thursday, November 14, 2019

All times Eastern

### **Ballast water research updates**

*Moderator: Sarah LeSage, Michigan EGLE*

#### Fisheries and Oceans Canada

*Sarah Bailey, Fisheries and Oceans Canada (remote)*

- Fisheries and Oceans Canada (DFO) is testing the effectiveness of ultra-violet (UV) ballast water management systems (BWMS) in meeting the discharge standard across five ship types and five ports (freshwater and saltwater)
- Uptake and treated water were both sampled using inline continuous sampling and model was developed from the sampling data to predict number of trips until an introduction of a non-native species in Canada waters occurs
- Different ballast water management practice scenarios were modelled for the spread of ballast water organisms discharged assuming that treatment may malfunction on a proportion (50%) of voyages
  - Scenarios included “no-management,” “exchange-only,” “treatment-only,” and “exchange plus treatment”
  - Exchange was modelled using mid-ocean environmental conditions as source location
- The results from the model exercises predicts that BWMS will reduce the projected number of new established species per decade compared to exchange alone, and BWMS have the highest benefit for freshwater ballast transport
- Overall, if 100% of ships are meeting the IMO D2 standards, the model shows that a large reduction in the number of species expected to establish per decade

#### Ballast water monitoring projects: The role of indicative monitoring, and eDNA of target organisms

*Allegra Cangelosi, Penn State Behrend*

*Jeff Ram, Wayne State University*

- Ram and Cangelosi explained two ongoing ballast water monitoring projects
- The first project is evaluating eDNA detection methods to understand eDNA persistence in ballast water, and if detection of eDNA can signal recently alive organisms
  - Project deliverables include an inventory of eDNA sequences for target species, probes for a set of species, design for larger assays, and outreach
  - A mesocosm experiment was conducted using Lake Erie water, focusing on the test organism *Hemimysis anomola*
  - Results from the first round of experiments were inconclusive but encouraging; there was some ambiguity in reading the sample, but the eDNA signal largely disappeared in one to three days
  - Investigators conducted a second round of experiments; results are not yet available
- A second project is assessing ballast water monitoring and the role of indicative monitoring devices

- Vendors for these monitoring devices were asked to determine their design priorities for their indicative monitoring equipment, either: 1) pre-regulatory self-assessment, or 2) regulatory monitoring for gross exceedance
- Vendors operated their own equipment and tested their devices in Great Lake conditions for real-world functional use in appropriate settings
- Results from sampling devices were evaluated via microscopy; some devices matched microscopy standard for detection of organisms, others performed less ideally
- Vendors identified challenges to their equipment such as high dissolved organic carbon (DOC) and coloration in water samples
- A study report will be released in late November 2019

#### Great Lakes shipping network model

*John Bossenbroek, University of Toledo*

- This project seeks to identify ports in the Great Lakes shipping network where shoreside de-ballasting could hypothetically be implemented to slow the secondary spread of AIS<sup>1</sup>
- A stochastic model was constructed to predict secondary spread
  - The historic spread patterns of zebra mussels and round gobies were then used to populate a predictive model for the invasion of golden mussels and monkey gobies, based on the movement of ship ballast between ports
  - The predictive model assesses the probability of a target species (i.e., golden mussels or monkey gobies) moving from a source port and invading a destination port over multiple years, and helps to determine which ports to monitor and manage to reduce spread
- Six different metrics of network centrality were used to run the model for the busiest ports within the Great Lakes
- The stochastic model predicted spread under the scenario that there is no management at or between the busiest ports for 10 years, and then evaluated what amount of effort (i.e., intensity of management and number of managed ports) is needed to reduce predicted spread
- Based on this model, effective management should be both intensive and collaborative
- This model could be developed into a web-based user-friendly interface, allowing users to select specific ports, the number of ports, the invasion level of a target species, management effectiveness, etc., to customize model analysis to individual purposes

#### Great Waters Research Collaborative

*Kelsey Prihoda, Lake Superior Research Institute, University of Wisconsin-Superior*

- The Lake Superior Research Institute and Great Waters Research Collaborative (GRWC) are implementing several GLRI funded projects to reduce the risk of ballast water as an AIS pathway
  - GWRC works with BWMS developers to create a plan to answer specific design and development questions through a test program
  - Outcomes from these projects and associated testing will provide better information for technology developers, particularly for how technology operates in freshwater
  - The Montreal Pier Facility is capable of conducting large scale control and ballast water treatment testing
  - Projects undergo shipboard testing as well, providing developers with real world conditions and performance evidence between different ports
- The technology testing program aims to accelerate ballast water treatment technology development

---

<sup>1</sup> The study did not investigate potential costs of construction and maintenance of onshore treatment facilities

- Several new treatment technologies and compliance monitoring devices are currently undergoing independent, laboratory-based testing for research and development purposes
- Freshwater-specific projects that are unique to the Great Lakes are also underway:
  - A validation study of methods for determining the concentration of living protists in ballast water; the final report for this project is currently in review
  - Identification and review of ballast water best management practices for “lakers”
  - Assessment of the toxicological response of abundant, multicellular entities (with cells <10 µm) in the Great Lakes to understand differences in treatment effects between different sized organisms
- Other projects are exploring options for real-time monitoring within Great Lakes ports

#### National Park Service

*Jeffrey W. Henquinet, Henquinet Consulting*

*Heather Bies, National Park Service (NPS)*

- The NPS, working with USGS, developed a mobile ballast water treatment system (BWTS) which uses a liquid biocide mixing system and can also be used with a neutralizer to discharge ballast
  - Currently the system uses bleach and sodium bisulfate for neutralizing
- The mobile system is ready for use and can be used as a contingency plan in cases of BWTS failure, error in operation or a mechanical issue, containment for an AIS outbreak, a ship without BWTS onboard, or other emergencies
- Two trials for testing the system under normal operations were conducted with three ballast tank tests for each trial
  - Treatment using this system resulted in significant drop in sampled organisms and particulates released, compared to pre-treatment measurement of ballast water uptake
- Some limitations of the system are
  - It can only be used on ships with top hatch access to the ballast tanks, and there is potential to develop an assessment and inventory of ships that need tank modifications to accept this system
  - The size and flow-through capacity of the system may not be enough for vessels with multiple tanks and significantly large ballast water volumes
  - From a regulatory standpoint, it is not type-approved by the USCG and any discharge will need to meet water quality standards for any chemical byproducts of treatment
- This system is one tool in the toolbox for emergency and contingency ballast water treatment of high-risk ships when planned ballast water discharges will not meet discharge standards or state requirements regarding AIS

#### **Public comment**

- The floor was opened for public comments; none were given

#### **Emerging issues and announcements**

- The 2020 Upper Midwest Invasive Species Conference (UMISC) will take place October 12-14, 2020 in Duluth, Minnesota