Great Lakes Panel on Aquatic Nuisance Species Meeting Summary
Michigan Department of Natural Resources Outdoor Adventure Center,
1801 Atwater St, Detroit, MI 48207 | November 14-15

Additional meeting information including a final agenda and presentations are available on the Great Lakes Panel website (https://www.glpanel.org/meetings-admin/past-meetings/)

Welcome and introductory remarks

Eric Fischer, Great Lakes Panel (GLP) Chair, Indiana Department of Natural Resources (DNR)

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

GLP Business Items

Eric Fischer, GLP Chair, Indiana DNR; Ceci Weibert, GLP Coordinator, Great Lakes Commission (GLC)

Approval of May 2023 meeting summary

- The May 2023 meeting summary was approved

Review of May 2023 action items

- Weibert reviewed action items from the May 2023 meeting and their status toward completion
    - All action items have been met
- Completed action items from the GLP Executive Committee (ExCom), GLP staff, and GLP members were reviewed
    - For the action item of discussing opportunities to invite participation from an aquaculture representative as a GLP at-large member, Illinois DNR noted that there is an aquaculture listserv run by the Illinois-Indiana Sea Grant that may be helpful to collaborate with

Committee reports

Organisms in Trade (OIT) Ad Hoc Committee

Greg Hitzroth, OIT Ad Hoc Co-chair, Illinois-Indiana Sea Grant

- The OIT Ad Hoc Committee was awarded Great Lakes Restoration Initiative (GLRI) funding for a two-year project focused on regional coordination, outreach, and engagement with the bait industry
    - This project plans to host a symposium, develop a regional bait guide, and evaluate current bait outreach material
    - The OIT Ad Hoc Committee requests that members share any bait outreach material they know of from their jurisdiction with committee chairs
- The committee is participating on the GLDIATR advisory committee and providing support to that project when necessary

- The committee is planning a learning session focused on other OIT industry pathways for Panel members to inform future interjurisdictional projects

Information/Education Committee (I/EC)

Doug Jensen, I/E Committee Chair, Minnesota Department of Natural Resources

- The GLP website has been launched and has been reviewed by the I/E committee members
- The I/E Committee has completed their Grass Carp Outreach Index. I/E members will vote on next steps for this assessment at the upcoming committee meeting
- The Language of AIS Position Statement has been approved by the GLP and submitted to the Aquatic Nuisance Species (ANS) Task Force for consideration in adoption as a national position on language and naming issues for invasive species communication
- Wildlife Forever has changed their carp outreach campaign (previously called War on Carp) to Citizen Carp Control following discussion on militaristic language in messaging from the I/E Committee and other concerned organizations
- Future I/E related interjurisdictional projects will be discussed at the next committee meeting

Research Coordination Committee (RCC)

Lindsay Chadderton, RCC Chair, The Nature Conservancy (TNC)

- The committee has reviewed and provided edits to the Invasive Aquatic Plant Research Agenda
- The committee continues to participate on the project team for the new interjurisdictional Control of Established Species project
- The RCC held a brainstorming session to identify areas for future work/projects
- The RCC is hosting a working lunch as part of this fall meeting in regard to the National Invasive Species Council's request for marine and Great Lakes eDNA techniques
    - The U.S. Fish and Wildlife Service has already reviewed the questions and provided comments

Policy Coordination Committee (PCC)

Patrick Kočovský, PCC Chair, U.S. Geological Survey (USGS)

- The PCC wrote letters to the other five regional ANS Panels to assess their members' level of concern about the risk of establishment of reproducing and self- sustaining populations of grass carp. The letters were tailored to address areas of risk to each panel's jurisdictions, based on records of diploid grass carp in the USGS Non-Indigenous Aquatic Species Database
- The committee has received written responses from the Gulf and South Atlantic Regional Panel and have been communicating with the Western Regional Panel and the Mississippi River Basin Panel. They are awaiting responses from the Mid-Atlantic Panel on Aquatic Invasive Species and the Northeast Aquatic Nuisance Species Panel
    - The PCC has discussed what the next steps for this motion may look like at their most recent committee meeting
- There is a plan to review the proposed Environmental Protection Agency (EPA) ballast water standards and the committee will review next steps if members wish to provide comments.

- Comments are due December 18, 2023
- Note: In a subsequent call, the GLC informed members that as a Federal advisory committee, comments could not be submitted to Federal rulemakings.

GLP Interjurisdictional Project updates

Regional Invasive Aquatic Plant Control Prioritization and Needs Assessment

Lindsay Chadderton, Research Coordination Committee chair, The Nature Conservancy

- Since the last update at the Spring Great Lakes Panel meeting, the project team has worked on writing and developing the Aquatic Plant Research Agenda. The agenda is focused on generalized research needs, followed by species-specific research needs
    - In addition to the agenda itself, which focuses on operational control needs, there will be an appendix that captures additional research needs and knowledge regarding the stated invasive plants
    - The agenda is still in a draft format but will be sent out for members to review soon
- Materials, including the PDFs of all the species-specific literature reviews and the workshop proceedings, are available on the Research Committee webpage
- This project is intended to end in June 2024. In that period, Alisha Davidson will be working on a manuscript that will go over the development of the research agenda

Evaluating Control of Priority Established Species: Species- and site-based analysis of control efforts in the Great Lakes region

Alisha Davidson, GLC, and Ceci Weibert, GLC

- This project began in January 2023 with a funding deadline of December 2024
- The site-based analysis portion of this project involves drawing from the publicly accessible GLRI database with a series of search terms to identify projects that funded control of AIS. The project team has already narrowed the list of GLRI projects to projects specifically controlling AIS
    - For the most part, there is not clear control information in the public database so there is a pending request with EPA for additional information on those projects. The goal is to eventually map these control projects according to the control options being used and species being targeted
        - This map will help identify the conservation and management target of species control and where management is actually occurring
        - The map will be able to pinpoint where AIS are present and not being managed due to lack of control options. The geographic scope of the map is the Great Lakes basin
    - The project team is requesting ANS/AIS management plans and other habitat/restoration, fisheries, and cultural management plans
        - Plans should be emailed to Ceci Weibert or Lindsay Chadderton
- A list of 22 species have been identified for the species-based analysis
    - Geographic scope for this project is the Great Lakes region (by HUC-2), including Lake Champlain
    - Taxonomy included for consideration are fish, invertebrates (not microscopic), amphibians, and reptiles

- Davidson reviewed additional criteria for consideration as a priority animal
    - The list excludes those species that have a high beneficial impact that will not be controlled (e.g. salmonids)
    - The species included on the priority list all have a Great Lakes Aquatic Nonindigenous Species Information System (GLANSIS) total impact score of 4, 5, or 6 (unless they have a top score in either environmental or social/cultural category)
    - If a species is on the priority list, it will be given a species-specific literature review on the gaps and challenges on current available control options. It will also be included in a site-based analysis and priority-setting assessment to prioritize future management actions
- Davidson reviewed the priority animal species currently included on the list
    - Two notable exclusions include the red-ear slider, which is being left off due to questions regarding its native range, and rainbow smelt, due to the species not being a priority for control
- Davidson asked members to share any past, ongoing, future or otherwise funded control work on any of the listed 22 priority animal species. Information should be sent to Alisha Davidson at alisha.dahlstrom@gmail.com

Programmatic Updates

Aquatic Nuisance Species Task Force (ANSTF)

Susan Pasko, U.S. Fish and Wildlife Service (FWS)

- Pasko provided an overview of the ANS Task Force, its structure, and its relation to the regional panels. The ANS Task Force currently has five standing subcommittees (Prevention, Early Detection/Rapid Response, Control and Restoration, Research, and Education and Outreach)
- The ANS Task Force held its last meeting in July 2023. The full meeting agenda and meeting minutes can be found on the ANSTF webpage
    - The Task Force approved the formation of the "Legislative Report" workgroup
    - The "Management Plan for the European Green Crab" was approved and is currently open for public comments
    - The ANS Task Force adopted the "Decontaminating Firefighting Equipment to Reduce the Spread of Aquatic Invasive Species". The adopted rules are not yet on the ANS Task Force website
    - The ANS Task Force approved the Model Process for a Rapid Response Fund for AIS. A workgroup determined who would be eligible for funds and how proposals will be reviewed. Decisions on proposals will be determined later this month
- The ANS Task Force Prevention Subcommittee is evaluating seaplanes as a potential pathway for ANS movement and assessing new ANS introductions to determine where prevention measures may have been lacking or ineffective
    - The subcommittee established an OIT Hitchhikers Workgroup
    - Upcoming work for the subcommittee will be to facilitate a discussion to encourage the use of the guidelines to prevent AIS transport by wildland fire operations
- The ANS Task Force Early Detection and Rapid Response (EDRR) Subcommittee is developing ANS horizon scanning and watchlists, modernizing and enhancing the ANS Task Force Experts Database, and implementing the Rapid Response funding process

- The ANS Task Force Control Subcommittee is revising species management plans for the European Green Crab and the New Zealand Mudsnail and identifying gaps in available control and restoration measures
    - The subcommittee will seek feedback on where control measures seem to be lacking for certain species. Results will be given to the ANS Task Force Research Subcommittee
- The ANS Task Force Research Subcommittee is promoting the annual priority research list, surveying the AIS community for current/planned AIS research that align with priorities, and developing a process to update the National AIS Priority Research List
- The Outreach Subcommittee has completed a national assessment of recreation water users. The subcommittee is currently sharing the results of this assessment and working to implement the results. The subcommittee also has been working on populating the Stop Aquatic Hitchhikers portal, and establishing an ANS Outreach Community of Practice
- The Next ANS Task Force meeting will be January 24-25, 2024, in Virginia

Great Lakes Aquatic Nonindigenous Species Information System (GLANSIS)

Rochelle Sturtevant, GLANSIS Program Manager, Michigan Sea Grant Extension

- The GLANSIS team has been reviewing the risk assessment clearinghouse to determine which of those species, if any, should be included in GLANSIS
    - Staff are working through the species that are the highest risk for introduction in the region and, to date, have reviewed 121 species assessments
        - From this process, eight new species have been added to the GLANSIS database (*Anguillicola crassus, Filipendula ulmaria,* and *Salix cinerea* complex)
        - Water soldier and hydrilla have moved from the watchlist to the non-indigenous list
        - *Ictiobus bubalus, Ictiobus cyprinellus, Ictiobus niger*, and *Pylodictis olivaris* were moved from the range expansion list to the nonindigenous list
- Five new watchlist species have been added (*Alosa chrysochloris, Crassula helmsii, Egeria naja, Nelumbo nucifera*, and *Oenanthe javanica*)
- Two species (*Cambarus robustus* and *Faxonius propinquus*) have been removed from the watchlist, as their native range have been updated
- The GLANSIS website has been updated with a new direct profile access search bar
- GLANSIS staff have been working on adding impact information to the database. An icon bar now exists on all profile pages that indicate impact data. All icons direct users to a table with the cited impact data
- GLANSIS has pulled the last three years' worth of Risk Assessments and Organism Impact Assessment from NOAA technical memos and have published the documents directly on the website alphabetized by species name. 84 assessments have been completed and are now all published online
- Sturtevant noted that an expert reviewer of the didymo species profile is needed. If you can assist with the review, let Sturtevant know. GLANSIS has listed didymo as a cryptogenic species

VIDA Update

Holly Galavotti, U.S. Environmental Protection Agency (EPA)

- Galavotti provided an overview of the Vessel Incidental Discharge Act (VIDA).
- Under the VIDA, the EPA is responsible for promulgating national standards of performance for vessel discharges
    - In general, VIDA requires these standards to be as stringent as the current requirements in the EPA's Vessel General Permit (VGP) and U.S. Coast Guard (USCG) regulations. After the EPA completes its standards, the USCG is then responsible for developing and implementing regulations for these standards
    - Once the EPA and USCG regulations are final, effective, and enforceable, states are preempted from adopting or enforcing more stringent requirements except through one of several petition options established by VIDA
- In October 2020, the EPA proposed national discharge standards in the *Federal Register* for public comment
    - This included general standards that apply to all vessel incidental discharges and specific standards for 20 different areas/systems onboard a vessel
    - The EPA also proposed to codify the VIDA requirements for states to apply to the EPA and/or the USCG to seek more stringent requirements to address state-specific concerns
    - After proposal, EPA re-engaged with stakeholders to address several pressing concerns raised by commenters, notably by the states. The feedback the EPA received was the driving force behind the EPA's decision to publish a supplemental notice of proposed
- In October 2023, the EPA published in the *Federal Register* a Supplemental Notice of Proposed Rulemaking (SNPRM)
    - The SNPRM consisted of two primary elements: an analysis of newly acquired ballast water type-approval data from the USCG and additional regulatory options for several discharges being considered for the final rule
        - Public comments on the SNPRM are due December 18 after the 60-day comment period
        - There will be a second virtual public meeting November 16
    - The SNPRM data analysis, based on Clean Water Act Best Available Technology Economically Achievable (BAT) criteria concluded that available data do not justify a more stringent numeric discharge standard than proposed (and as currently in place)
- Four additional regulatory options discussed in the SNPRM are as follows:
    - <u>Ballast Uptake Best Management Practices (BMPs)</u>
        - In 2020, the EPA proposed to not continue the ballast water uptake BMPs from the VGP based on the EPA's determination that these measures are not practical to implement
        - While the vessel community supported removing these BMPs, states wanted to keep the BMPs in place. The SNPRM added an alternative approach that would require vessel operators to instead address and identify uptake practices as part of their ballast water management plan
    - <u>Lakers</u>
        - In 2020, the EPA proposed to exempt all Lakers from the ballast water numeric discharge standard. The SNRPM proposed an alternative to require new Lakers to meet a ballast water "equipment standard" in lieu of the numeric discharge standard
    - <u>Hull Cleaning</u>
        - In 2020, the EPA proposed specific in-water hull and associated niche area cleaning requirements

        - The SNPRM clarified that the rule applies to both passive and active biofouling of organisms from vessel equipment and systems
        - The SNPRM also added an option prohibiting discharges from in-water cleaning of macrofouling, and that cleaning of macrofouling with a capture device would be covered under existing permit programs rather than under these discharge standards
    - Graywater
        - In 2020, the EPA proposed that graywater discharges from certain vessels, including any new vessels 400 gross tons (GT) and above, would be prohibited unless the discharge meets numeric discharge standards for fecal coliform, biochemical oxygen demand, suspended solids, pH, and residual chlorine
        - The EPA added an option in the SNPRM to exempt from the numeric discharge standard any new vessel 400 GT and above that carries fewer than 15 persons and provides overnight accommodations for those individuals

Brandon Road update

Scott Whitney, U.S. Army Corps of Engineers, and John Rogner, Illinois DNR

- The latest Brandon Road project statuses can be found at the webpage https://www.mvr.usace.army.mil/Missions/Environmental-Stewardship/BR-Interbasin-Project/Documents/
- Whitney reviewed the goal of the project, which is to stop the potential introduction of AIS in the Great Lakes through the Illinois waterway, while minimizing impacts to navigation
    - The goal is to have the deterrents in place and operational within a few years of the started construction
- The design agreement for the project has been officially signed
- The project has been operating on the CG funds that are in place and the project partnership funds while the negotiation for the Project Partnership Agreement (PPA) takes place
- In December 2022, the cost share changed from 90% federal to 90% federal/10% non-federal for construction
- In Jan 2023, the USACE received additional general construction appropriation funds, which will be available after the PPA is signed
- The new project cost estimate is $1.146 billion with 52% contingency, given the level of design
- In June 2023, Illinois and Michigan passed state budgets that include the $114 million for the non-federal cost share
- Since December 2020, the project has been in an engineering and design phase
- In June 2023, partners had a sit-down negotiation with Michigan, Illinois, and USACE. Progress was made and the USACE applied for an Illinois state permit from the Office of Water Resources
    - The fish mitigation plan was altered from a trap and transport model to a hatchery-based model
    - The state of Illinois must provide all of the necessary real estate, including the land owned by Midwest Generation. The land needed does have contamination and Illinois needs to know the liability, should they require the land
    - In November 2023, Michigan Governor Whitmer and Illinois Governor Pritzker meet to discuss on how the PPA is moving forward
    - The current plan is for the PPA to be executed by December 2023

- In October 2023, there has been a resolution for action that through the Water Resources Reform and Development Act (WRDA) that the Brandon Road be fully federalized
- Potential groundbreaking of the project is proposed for October 2024, followed by rock removal (Increment II)
- Whitney reviewed Increment 1-A, which includes field and laboratory testing, all of which is complete
- Increment I-B will be bedrock removal and scoping and market research
- Increment II will involve the flushing lock of three phases (gates, controls, and culverts)
- Next is for increment I designs to be sent to contractors in an open house and Industry Day on December 5 and 6, 2023

GLRI Action Plan IV development update

Kevin O'Donnell, U.S. EPA

- More information on the GLRI Action Plan can be found at http://glri.us/action-plan
- Input received over spring and summer 2023 reaffirmed that the proposed changes to GLRI Action Plan IV for Focus Area 2 are in improvement relative to Action Plan III
    - In spring 2023, EPA solicited input from state and Indigenous Nation AIS managers via specific questions for them to consider
- To complete drafting targets for Action Plan IV years (2025-2029), state and federal agencies will need to continue discussions about multi-year efforts to achieve significant outcomes, especially for addressing pathways of continued invasive species introduction and spread
    - What pathways should state, Indigenous Nation, and other entities focus GLRI-funded efforts during a five-year period?
    - What multi-year project(s) would be needed to significantly address this pathway?
- Changes that are being proposed for Action Plan IV for Focus Area 2:
    - The Action Plan III objective of "Prevent introductions" is proposed to being split into "Prevent introductions" and "Limit range-expansion of invasive species"
    - The Action Plan III objective of "Control established invasive species" is proposed to be changed to "Prioritized invasive species control"
- From the received comments, the EPA is considering removal of "interjurisdictional" from Metric of Progress 2.1.1 to allow more flexibility in types of projects that will be prioritized for addressing priority pathways and can be supported by GLRI
- For Metric of Progress 2.2.1A, the EPA needs to define the term "high-priority locations", so that all are aware of what counts toward percentage under surveillance each year
    - For this proposed metric, the EPA is in discussion with USFWS to better define "hot spot" locations
    - There is interest in doing a similar annual surveillance program for aquatic plants. The EPA is talking with states to see if top "hot spots" for invasive plant surveillance should be a part of an annual surveillance program as well
- There is an unmet need for large invasive species control efforts addressed with GLRI support
    - GLRI is seeing an evolution of the program. After many years of control work, there is a trend of moving to spot treatment, sustainable management, and site restoration
- The full plan is projected to have a 60-day public comment period January-February 2024

    - In addition to the changes on Focus Area 2, there will be changes in the administration priorities to focus on climate change adaption and working with underserved communities
    - O'Donnell agreed to schedule another GLP listening session once the draft is public in early 2024
- USFWS will continue to support the state ANS plans and integration into the new Action Plan. They are interested in hearing how pathway work can be integrated into the whole suite of work on Focus Area 2 and how pathway work can integrate into state ANS plan funds

Public comments

- International Conference on Aquatic Invasive Species (ICAIS) will be held May 12 – 16, 2024 in Halifax, Nova Scotia, Canada
- The Upper Midwest Invasive Species Conference will be held in Duluth, Minnesota, November 12-14, 2024
- Nick Frohnauer will be communicating with partners on the metabarcoding project
- USFWS is working hard to integrate lessons learned from the Great Lakes on the National EDRR Framework
- Fischer congratulated Dave Reid on his retirement and thanked him for all his years of service to the Great Lakes Panel

Special Topic: FWS review of Ruffe Control Program

Mike Rucinski, USFWS

- Rucinski provided a summary of the Ruffe invasion timeline in the Great Lakes region
- In 1992 the national Aquatic Nuisance Species Task Force (ANSTF) created a Ruffe Control Committee, and the U.S. Fish and Wildlife Service (USFWS) initiated the ruffe surveillance program to control the expansion
- In 1996 the Ruffe Control Committee published the Ruffe Control Program as a highly collaborative multiagency and international program with eight objectives. The USFWS review of ruffe surveillance and control activities found that all eight of these objectives have been completed
- A Ruffe Control Program Summary of Actions Report is being developed by USFWS to serve as a compilation of actions, facts, and literature into a summary report to update the ANSTF on progress
    - The Ruffe Control Program effectively influenced current procedures, protocols, legislation, regulations, and research that are in place today
    - The Great Lakes Panel will have the opportunity to review the report following this fall meeting and recommendations from USFWS are anticipated to be submitted to the ANSTF by early 2024
    - This report is not an update to the 1996 plan, it is a review of what work has occurred since publication
- Ruffe have recently established in the lower St. Marys River and Lake George; Lake managers have requested no additional action at this time aside from continued surveillance
    - USFWS will continue to monitor this population. It is unknown if multiple year classes were found

Plenary Session: Invasive species and climate change risk

Welcome and Introductory Remarks

Kelly Pennington, MN DNR

- Pennington called the meeting to order and reviewed the agenda for this session

Northeast Regional Invasive Species & Climate Change (RISCC) management network

Toni Lyn Morelli, USGS

- Nine USGS Climate Adaptation Science Centers exist across the United States. These partnership-driven centers aim to help fish, wildlife, water, land, and people adapt to climate change.
- Translational invasion ecology in practice follows a stepwise, repetitive procedure of identifying the problem and its stakeholders, meeting to discuss needs and possible solutions, implementing strategies, synthesizing research, and finally achieving outcomes that are relevant and appropriate for all parties of interest (e.g., researchers and managers)
- There are five Regional Invasive Species & Climate Change (RISCC) management networks in the U.S. (Northwest, Northeast, Pacific, North Central, and Southeast) and one in Canada
- The Northeast RISCC began in 2016 by surveying managers about invasive management needs
    - Survey results found the biggest challenges to invasive species management were limited funding/personnel and lack of information relating to climate change
    - The survey also found that when people have information and are concerned, they are more likely to act on climate change issues
    - Recent survey results showed longer-term RISCC network members are more knowledgeable about invasive species and more likely to incorporate climate change into management plans
    - Surveys also confirmed the importance of network building, as most managers indicated that they receive their information from one-on-one interactions with peers
    - A manager-identified priority topic that sparked several publications was range shifting species. This includes both invasive species range expansions and native species that might expand to new areas and become invasive (e.g. giant reed, winter primrose)
- The Northeast RISCC has grown to about 800 researchers and practitioners that publish articles, give presentations, facilitate an annual symposium, produce research summaries, and host workshops/networking events
- The Northeast RISCC strives to increase information accessibility by developing concise synopses of journal articles and they have created a series of one-page documents called “management challenges”. These documents summarize information about a specific intersection of climate change and invasive species into an easy-to-digest graphic.
- Panel members discussed the possibility of initiating a Midwest RISCC network
    - A Midwest Climate Adaptation Center exists, but not a specific Midwest RISCC
    - Many members of the GLP could partner in developing a Midwest RISCC but it would need commitment from a few key initiators to lead
    - Partnering with a university or agency is helpful when developing a RISCC network
    - The Northeast RISCC network’s time commitment is weekly 90-minute meetings, but in other regions it’s monthly. More frequent meetings lead to better engagement over time
    - Joanne Foreman, *MI DNR*, is coordinating a list of people that are interested in a Midwest RISCC and if there are others interested, please email her at ForemanJ@Michigan.gov

Great Lakes Water Quality Agreement (GLWQA) Annex 9: Climate Change Impacts

Alisa Young, NOAA

- The GLWQA is a binational agreement between the federal governments of the United States and Canada to coordinate management of the Great Lakes. Through the GLWQA, there is a series of issue-specific subcommittees, referred to as Annexes of the agreement. The activities of the Annex subcommittees are overseen by the GLWQA's Great Lakes Executive Committee, and each subcommittee is also co-chaired by a U.S. federal agency as well as a Canadian federal agency
- Annex 9's key commitments are to develop/improve regional-scale climate models for the Great Lakes region, enhance monitoring of climate variables to validate model predictions, develop analytical tools to understand the predicted risks of climate change, and coordinate binational climate change activities to proactively address climate change impacts
- Annex 9's 2023-2025 priorities for science include collaborations with Annex 2 to enhance Lakewide Action Management Plans (LAMPs) to include the most current climate predictions
    - This process just began for the Lake Erie LAMP and is expected in 2024 for Lake Michigan
- Annex 9's 2023-2025 priorities for action include promoting manager knowledge exchange of climate projections and producing/sharing climate information with the Great Lakes community
    - Deliverables include hosting climate modeling workshops, updating the *Climate Change in the Great Lakes Basin* report, hosting Annex 9's *Climate Change Webinar Series and Extended Subcommittee calls*, publishing quarterly *Climate Impacts and Outlook* reports, and publishing annual *Climate Trends and Impacts* reports
    - The Great Lakes climate modeling workshop was held in 2019 and 2021 with plans for another in spring of 2024. This workshop brings people and ideas together to inform modeling efforts. Themes for the workshops include physical climate modeling, bias/bias correction, lake level impact modeling, and translating climate change information. Activities include reviewing existing climate modeling efforts, sharing work, identifying gaps, and developing recommendations to inform next steps
    - The *Climate Change in the Great Lakes Basin* report was published in 2022 and goals for future publications include adding more modeling and projection information
    - The quarterly *Climate Change Webinar Series and Extended Subcommittee calls* are designed to share climate change information and Great Lakes Executive Committee (GLEC) members are invited to participate and share their work
    - The *Climate Change and Outlook* and *Climate Trends and Impacts* reports are aimed to highlight studies across regional boundaries and jurisdictions

<u>USFWS Climate Change Action Program</u>

Jason Goldberg, USFWS

- The Department of Interior (DOI) developed the DOI Climate Action Plan and DOI Sustainability Plan in response to a series of Presidential Administration executive orders directing federal agencies to better plan for and incorporate climate change into their work. The USFWS has developed an internal Climate Change Action Program (CCAP)
- The National Fish, Wildlife, and Plants Climate Adaptation Strategy and CCAP serve as the guiding framework to ensure climate change is incorporated in all USFWS activities
- In 2021 CCAP was prepared and it is annually reviewed to identify progress and new priorities each fiscal year. Implementation of the plan is led via a coordinating group comprised of staff from the programs and regions that help with week-to-week program implementation
    - No specific section highlighting invasive species existed in the 2021 CCAP text, but the 2012 adaptation strategy made it apparent that invasive species are a threat exacerbated by climate change that should be monitored

- The CCAP focus on seven main elements, including: adaption and resilience, climate science, adaptation strategy, partnerships, climate mitigation, policy, and capacity
    - These seven elements give USFWS framework for addressing climate change in their work
    - Goldberg reviewed the CCAP priorities for work in FY23 and discussed the process USFWS uses to coordinate teams across these cross-cutting themes
- The National Invasive Species Council, USFWS, and other agencies are working together to develop standardized language and terminology for the issue of assisted migration, which has implications for invasive species management
- The Fish and Aquatic Conservation (FAC) program recently step-downed CCAP which will provide future climate match information in ecological risk screening summaries (ERSS), promote habitat resilience in a changing climate, and develop tools to share climate-related data
- USFWS and partners developed the "Resist-Accept-Direct" framework as a way to help managers identify choices needed to manage ecological transformation due to climate change and other changes. From an invasive species perspective, "resist" could mean suppressing a population and working to keep invasive species out, "accept" could mean maintaining a population where it's established when resisting isn't feasible, and "direct" could mean reducing the invasive population
- USFWS has helped to establish and support the RISCC management network, which has largely focused on information sharing (e.g., webinars, symposiums, etc.)
- USFWS produces a monthly summary USFWS concerning recent research on climate change and natural resources, including a section on invasive species. Request to join the list to receive the summaries from Jason Goldberg, USFWS, at Jason_Goldberg@fws.gov

NOAA Research: Climate change and mussel effects on the Lake Michigan food web
Ed Rutherford, NOAA

- NOAA is working to explore the effects of climate change on Lake Michigan using the Atlantis Ecosystem Model to run scenarios with differing mussel abundance and seasonal water column mixing/lake turnover
- Projections of climate change show an increase in lake surface temperature, decrease in ice cover, and longer lake stratification leading to lower water levels, shorter winters, longer ice-free periods and higher risk of hypoxia
- The Atlantis Ecosystem Model is a deterministic, three-dimensional, end-to-end model that integrates chemistry, physics, biology, economics, and fisheries management
    - This is the first attempt to integrate this type of model into the Great Lakes and it is best used to look at "what if" scenarios with competing variables that impact the Great Lakes
    - The three-dimensional structure of the model considers both surface area and lake depth to model the flow of water, nutrients, and plankton
    - When incorporating average mixing curves into the model, most fish benefit from mixing and in the absence of mussels a higher fish biomass response occurred
    - The model showed that turbulent diffusivity (i.e., mixing) varies among cold and warm years due to ice formation which lowers wave turbulence
    - Within the model under warm and cold mixing, there was too much nutrient cycling beyond what happens in reality leading the model to crash. Model recalibration is needed in addition to running the model for cold, warm, and normal years to understand how climate change will affect future ecosystems
- Both mussels and mixing are important components of the food web that effect the lake system

- Next steps include projecting climate change over the next decade so managers can operate at a time scale rather than from year to year
- Future efforts include looking at ice effects on cold water fishes and modeling warm water fishes that may "win" under warm water scenarios

Closing Remarks
Kelly Pennington, MN DNR

- Pennington thanked the speakers and attendees for their active engagement and discussion

Plenary Session: Federal agency research updates

Welcome and introductory remarks
Lindsay Chadderton, The Nature Conservancy

- Chadderton introduced the session and provided opening remarks for the session

NOAA
Ashely Elgin, National Oceanic and Atmospheric Administration (NOAA)

- Driessenid mussel research continues to be a priority for NOAA. NOAA participates in invasive mussel monitoring under the Great Lakes Lakewide Action Management Plans
    - Between 2015-2023, NOAA assessed mussels at 80 stations
    - The survey found body condition is highest for mussels in shallow and deep waters. The mussels with the lowest body condition were those found a mid-depth (30-90 m)
    - In Lake Michigan, there has been a slight decline in mussel body condition at all depth zones, while in Lake Huron, numbers have remained consistent
    - Annual surveys occur in southern Lake Michigan to evaluate mussel body condition and reproduction. This includes bi-weekly to monthly veliger surveys
        - Surveys have found that spawning production peaks match up across all water depths
- NOAA is starting to explore the consequences of mussel removal and developing different removal mechanisms
    - This project is in collaboration with Harvey Boostma's lab at University of Wisconsin-Madison who are assessing local-scale environmental impacts of mussel removal
    - NOAA Great Lakes Environmental Research Laboratory (GLERL) is testing the use of tracked underwater vehicles to remove/destroy mussels as well as monitor mussels in control locations
        - Field tests are planned for Summer 2024
- Other work that NOAA GLERL is working on includes invasive species models and predictions that focus on exploring current and future invasive species impacts on Great Lakes food webs and socioeconomics
    - Models include interactions with anthropogenic stressors, such as climate change and hypoxia/eutrophication
    - While the main focus of the model is quagga and zebra mussels, the team also looks at potential future invaders such as invasive carp, golden mussel, killer shrimp, and ruffe
        - One study looks at the habitat suitability of invasive carp as influenced by mussels, nutrients, and climate

        - The model found that the best habitat for invasive carp is in embayments with high nutrient inputs and that habitat suitability in Lake Michigan will increase with a warming climate. Overall, nutrient pollution is the most influential form of human activity in determining invasive carp habitat suitability
- Elgin reviewed new projects that NOAA is participating in. These include modeling mussel dynamic energy budgets, a long-term quagga mussel field growth study, and collaborating with USGS to develop genetic markers for priority invasive species in the Great Lakes for eDNA sampling
- Elgin provided an update on the GLRI Federal Mussel Control experimental control project. GLRI is supporting a collection of federal agencies to implement experimental mussel control to improve spawning success of lake whitefish in sites in northern Lake Michigan and Lake Huron. A major input of the project will include efforts from the Invasive Mussel Collaborative's Planning and Implementation work group
- NOAA has discussed experimental control of invasive mussels to preserve historical Great Lakes shipwrecks. However, any efforts in the future would need to be strategically implemented to protect the integrity of the shipwrecks

<u>USACE</u>

Mike Greer, US Army Corps of Engineers (USACE)

- Greer manages two of the aquatic invasive species management programs for USACE: Aquatic Plant Control Program (APC) and Aquatic Nuisance Species Research Program
- The APC was authorized by the Rivers and Harbors Act of 1958
    - The research program is federally funded, field driven, and intended to address priority issues identified by stakeholders
    - Water hyacinth biocontrol from 1974 – 2016 in the St. Johns River, Florida, provides a great example of the valued added from the program
    - The APC focuses on biological control, chemical control, ecological assessment, and application and management strategies
- Notable biocontrol efforts implemented under APC include:
    - The control of flowering rush with weevil *Bagous nodulosus,* which was petitioned for field release in April 2022
    - *Phytoliriomyza ornate* (leaf mining fly) has also been a promising biocontrol agent for flowering rush
    - There is a smut (fungal pathogen) that has been identified as having an impact on flowering rush and may be investigated as a biocontrol in the future but there is uncertainty on the regulatory approval process
- Integrated pest management for European frog-bit (EFB) and water soldier is being researched, as they co-occur in their native range, with the objective to capitalize on biocontrol and chemical control and integrate those control options into best practice management strategies
    - Research is not far enough along in the process to begin testing biocontrol on native species, such as American frog-bit
    - 2024 will be the first full year of the USACE biocontrol program for EFB and Greer expressed hope that the timeframe will be quicker than previous biocontrol initiatives

- Additional biocontrol projects include exploring for agents for hydrilla, most recently in Australia. Two *Hydrellia* flies were identified that displayed host specificity
    - Hydrilla chemical control is also being evaluated by USACE in partnership with North Carolina State University
- Greer provided an overview of USACE work using underwater remotely operated vehicles (ROV) for submerged aquatic invasive plant monitoring. This work will be continuing in coming years, with FY24 objectives focusing on hydrilla and Eurasian watermilfoil and incorporating ultraviolet-C (UV-C) treatment for isolated patches detected while monitoring
- *Phragmites* gene silencing is another project that USACE is working on with partners including USGS. Recent advances in health care and agriculture use are promising for cost-effective control of invasive species (e.g., disrupting photosynthesis in *Phragmites*)
    - The work unit has been successful in finding the gene silence agents and now work is focused on which agents work best and rate of application
- Greer provided an overview of the Connecticut River hydrilla population, which is a different Clade (Clade C) of hydrilla than hydrilla found elsewhere in the United States, demonstrating different ecological and biological characteristics
    - The main reproductive strategy for Clade C hydrilla includes higher productions of turions and tubers, which is different than the productions of these reproductive structures from monecious and diecious hydrilla. The production of male flowers raises the possibility of hybridization with monecious and diecious hydrilla
    - This is a relatively new invasion that has initiated a multi-year field effort by USACE
    - Productive public engagement and support has been a priority
    - USACE is currently looking into biocontrol agents that are more cold tolerant, should this species invade the Great Lakes region
    - The Hydrilla Collaborative is still a functional group coordinated by the USACE
- The Aquatic Nuisance Species Research Program is much smaller than the APC. Greer reviewed some noteworthy projects including research on reducing the cost/impacts on infrastructure due to invasive mussels, scalable technologies for reducing harmful algal blooms, and invasive carp distribution modeling
- The USACE manages a large number of terrestrial projects but there is no ongoing research focusing on spotted lanternflies. However, lanternflies were detected in Michigan (one confirmed population), Illinois, and Pennsylvania with populations detected along the railways and under bridges. The current protocol is “stomp and squish”

<u>USGS – Great Lakes Science Center</u>

Wes Bickford, US Geological Survey (USGS)

- Bickford provided background on the importance of managing non-native *Phragmites*
- Bickford shared background on the Great Lakes *Phragmites* Collaborative (GLPC), which was initially championed by USGS and the Great Lakes Commission
    - The GLPC provides a forum to connect research and management to inform best management practices
    - A program facilitated under the GLPC is the *Phragmites* Adaptive Management Framework (PAMF), which is strategically designed to reduce uncertainties surrounding *Phragmites* management efficacy and efficiency

        - Participants enroll in the program and submit data to a state and transition model, with the ultimate goal of having defined best management practices for managing non-native *Phragmites* in the Great Lakes region
        - With the management guidance provided from the PAMF model, 65% of users that followed guidance saw a decrease in their *Phragmites* invasion state since enrollment
            - For those users that saw no change in invasion state, or even an increase, the PAMF team is always trying to find ways to tweak the model and provide better guidance
        - A new component of the PAMF program is the Active Adaptive Management Program. This program is aimed to help generate additional data for the PAMF model by offering funds to managers that can test out underutilized PAMF management combinations
            - A RFP for this program will be available in March 2024
        - The PAMF program needs more participants all the time. Enrollment information can be found at the PAMF website https://www.greatlakesphragmites.net/pamf/about-pamf/
- USGS has been working to develop a non-toxic bioherbicide in collaboration with Rutgers University through a series of field trials. The bioherbicide targets the microbial community associated with invasive *Phragmites*. Initial results are promising, and further refinement is planned for the coming field season
    - The bioherbicide appears to be effective via contact and not systemic. The team is continuing to look into additional microbes to add to the herbicide mix
    - Additional testing with the same bioherbicide formulation is being testing on EFB with some initial promising results
- USGS is working with USACE to use genomic manipulation and genetic biocontrol to induce changes in gene expression and phenotypic responses through mechanisms like RNA interference
    - Current work also includes sequencing the native *Phragmites* genome. Comparing genomes between the invasive and native strands will identify drivers of invasiveness and more efficient targets for genetic biocontrol
    - The team has found multiple target genes that exhibit reduced gene expression and phenotypic responses
- USGS is also testing the efficacy of a novel management technique called “cut-to-drown”, which involves cutting *Phragmites* below the water level to cut off the plant’s oxygen supply
    - Field and greenhouse experiments areunderway to measure the plant’s responses. Current results show that this technique drastically reduces the plant’s growth capital
    - The method is a lot of work. The next step will be to figure out what is the least amount of effort that still produces effective results
- Bickford reviewed a recently funded project that looks at invasive plant management under fluctuating Great Lakes water levels. Through this project, USGS will be developing a decision support tool for managers to prioritize management activities based on changing water levels
    - The tool will incorporate water-level changes into habitat suitability and identify priority parcels for management given current water-levels

    - Water-level comes from the NOAA Great Lakes Water-Level Viewer, but users will be able to pick water levels themselves, rather than the tool using forecasting or projecting
- Muskrats are known to consume *Phragmites* and cattail, however they are likely not present in high enough densities to control populations
- Researchers in Ontario are conducting field tests for two biocontrol moths to control *Phragmites* and it is anticipated that they will make their way over to the United States, given the moths are being released along the US-Ontario border

<u>USGS-Upper Midwest Environmental Sciences Center</u>
Diane Waller, USGS

- The research at the Upper Midwest Environmental Sciences Center (UMESC) encompasses the full rapid response framework (e.g., forecasting, detection, responses)
- Horizon scanning and climate matching projects are aimed to determine invasion risk by looking at climate match for species
    - UMESC implemented the CLIMATCH algorithm into an R package, climatchR, for rapid calculation of climate scores
- Population dynamic models are used to predict the risk of spread and compare efficacy of control tools
    - UMESC uses the SEICarP model to compare the effectiveness of invasive carp removal versus deterrent placements. The per capita movement models predict the movement of carp to identify where the optimum placement of a deterrent might be
- UMESC uses eDNA and occupancy models aimed at refining eDNA sampling protocols as an early detection tool
    - Occurrence modeling is used to predict optimal sampling methods for eDNA detection of rare and common species. These types of models are important for understanding what an eDNA detection means and what is the appropriate response
- For field-based detection of invasive species, UMESC uses isothermal lamp assays of eDNA samples for rapid field-based detection. UMESC recently initiated pilot field tests, in partnership with the National Park Service, of this process for zebra and quagga mussels
    - Assays are currently developed for invasive carp, dreissenid mussels and spiny water flea
- Advances in automated eDNA collection can improve early detection and more comprehensive monitoring of invasive species populations. UMESC has tested automated eDNA sampling on grass carp populations in Lake Erie in combination with traditional sampling of spawning events. Initial results show a correlation between eDNA detections and grass carp spawning events
    - This pilot will be used to assess the ability of continuous eDNA to detect onset grass carp
- UMESC is involved in a lamprey control program with the Great Lakes Fishery Commission, evaluating non-target impacts on species of concern, which were identified by partners
    - This program also seeks improve the lampricide TFM bar formulation for treating low-discharge tributaries by including Bayluscide (used to reduce the amount of TFM required). However, applications have safety concerns for applicators that need to be addressed during testing and prior to registration
    - Another group at UMSEC is working to identify new chemicals to control invasive sea lamprey in the Great Lakes, as there are concerns that long-term use of lampricides may cause resistance in sea lamprey

- Invasive Carp-Toxicant development aims to register a historical pesticide for nuisance fish removal, identify and screen new chemicals, and develop formulations to control invasive carp
    - Some pesticides are tested *in vitro,* and promising agents are testing on the whole organism
    - A grass carp bait with toxins incorporated into the fish is being piloted
- Underwater Acoustic Deterrent System (UAD) is a four-year study that will wrap up in 2024. The system consists of 16 speakers in the upper Mississippi River's Lock 19 to deter carp into the Great Lakes
    - This year, UMESC hopes to tag and track more silver carp and more native species of concern
- The BioAcoustic Fish Fence (BAFF) installed in Lake Barkley Dam in Kentucky, is a recently completed three-year project to prevent silver and grass carp from entering the Great Lakes
    - Current research shows native fish movements are similar when the BAFF is on or off. The team is currently evaluating grass carp responses to the BAFF
    - Mary Beth Bray and Andrea Fittz can answer questions regarding invasive carp barrier work
- RNA interference molecular control tool is under development for invasive carp control. RNAi provides control tools that are highly selective and reduces the risk to non-target species
    - Control tool development for grass carp is furthest along
    - The delivery mechanisms being explored for RNAi include algae
- Invasive crayfish work includes developing and applying red swamp crayfish control techniques to support integrated pest management including carbon dioxide as a toxicant, manual trapping, telemetry to understand behavior and movement, burrow control strategies, and the development of neofemales
- Control tool research and development continues for zebra and quagga mussels including low dose copper treatments to reduce establishment, CO_2 applications systems, tarping, and new formulations of molluscicides
- USGS is part of the Federal Working Group core team responsible for leading the GLRI experimental mussel control project. USGS will spend the next two years testing different site-specific mussel control techniques and trying to scale them up before doing field trials

Plenary Session: GLRI Interjurisdictional Projects

Welcome and Introductory Remarks
Eric Fischer, Indiana DNR

- Fischer called the session to order, introduced the session, and reviewed the agenda
- The Great Lakes Panel holds a unique position in the field of aquatic invasive species that has allowed committees and subcommittees to scope out interesting and important interjurisdictional projects that have mutually beneficial outcomes

Boater Behavior Survey
Tim Campbell, Wisconsin Sea Grant

- Campbell discussed results from a Great Lakes regionwide boater survey, a new AIS marketing technique, and recent related publications
- Boater behavior surveys were collected from 5 different Great Lakes states via mail

    - Due to a low response rate from Michigan, the survey was re-administered there via an online paid service. Pennsylvania and Ohio provided large initial survey samples
    - Survey answers showed a link between boater awareness of the brands "*Stop Aquatic Hitchhikers (SAH!)"*, *"Clean Drain Dry Initiative"*, *"Play Clean Go"*, *and "Be A Hero Transport Zero"* and completing boat cleaning actions. Additionally, the "*SAH!"* campaign was the most recognized by survey respondents, but the "*Be A Hero"* Campaign also produce similar awareness in Illinois specifically
    - Brand evaluation work was partially completed by the Aquatic Nuisance Species Task Force (ANSTF) and there will be additional work completed by University of Wisconsin
    - Boaters reported compliance with AIS prevention steps, but differences existed between states potentially due to differing monetary investment in advertising
    - State differences existed with where boaters prefer receiving their AIS information (e.g., at the boat launch, website, email, bait shop) and opportunities exist to work together through shared information sources
    - Full reports for each state will be completed and shared with the Great Lakes Panel
- An article was accepted that compared the advantages of narrative and didactic communication approaches which showed that storytelling importance is situational
- Another article investigated support for additional decontamination regulations in Wisconsin particularly what supplemental actions boaters are willing to take outside of just cleaning, draining, and drying their boats

<u>Supporting transition from nonnative *Phragmites* at wastewater treatment facilities</u>
Julia Bohnen, University of Minnesota

- Sixteen of eighteen wastewater treatment facilities in Minnesota use or have used invasive *Phragmites* to process biosolids. Eight facilities have transitioned away from using invasive *Phragmites*, eight still use it, and two use native *Phragmites* for remediation
    - The eight facilities that no longer use invasive *Phragmites* are either using screw press technology, native wetland plants, or drying beds
- Minnesota has 1,905 verified populations of invasive *Phragmites, about 75% of which occur in the 13-county Metropolitan area*. Four wastewater treatment facilities using invasive Phragmites are found in Wright County on the western edge of the Metropolitan area, with another 4 facilities in other exurban counties
- It cost approximately one million dollars for each of three facilities in northern Wisconsin to transition from using invasive *Phragmites*, but Bohnen's team is working to develop an effective and less costly protocol for transitioning
    - Reed beds have gravel and sand layers over which the biosolids are applied. Rhizomes of the reeds were found to grow into the sand layer, making it difficult to effectively remove the biosolids without disrupting the sand layer. Bohnen's team is exploring the option of screening the sand layer and reapplying it, instead of disposing of the sand layer at a landfill which would add cost
    - Native plant establishment in beds can be difficult. The conditions of reed beds in each facility are unique due to the combination of commercial and residential waste inputs of each municipality. Variables include moisture, nutrients, volatiles, sedimentation levels, pH, and FOG (i.e., fats, oil, grease)

    - Replanting with locally sourced native *Phragmites* is recommended if reeds will be used. *Phragmites* can be propagated from rhizomes, stem cuttings, root stocks, and plugs, though more work needs to be done to determine the optimal propagule type and increase establishment success
- Two facilities in Wisconsin have contracted with a commercial grower to produce native *Phragmites* plugs which will be installed in spring of 2024. Bohnen's team is consulting with the grower. Information gleaned from the WI effort will be used to inform transition strategies for MN facilities Bohnen's team is drafting a protocol for hauling out and planting beds at wastewater facilities
- In 2023 58% of Minnesota's *Phragmites* populations (1,100) were visited. 22% of sites (420) were monitored and showed no regrowth. 35% of sites (660) were treated

Aquatic Plant Survey Implementation
Julianne Heinlein, Great Lakes Environmental Center (GLEC)

- In 2022, point intercept surveys were conducted in waterbodies in Michigan, Ohio, and Indiana to aid in early detection of nonnative aquatic plants
    - Completeness metrics were high at all sites and site construction was based on a tiered random design looking at lake depth and focusing on shallow areas of concern
    - Choa values (i.e., a true species pool estimate) agreed with the completeness values except for areas with emergent vegetation in shallow wetlands. This should be considered in future selection of sites to increase efficiency in early detection
- In 2023, sites were focused near Green Bay, Wisconsin and Detroit, Michigan
    - Most sampling efforts were concentrated near canals built for housing developments
- 2024 is the last year of grant funding and if attendees have site recommendations, please reach out to Julianne Heinlein, *GLEC*, at jheinlein@glec.com
    - Tentative planned sites for 2024 include the Detroit River in Michigan, Milwaukee harbor and Sturgeon Bay in Wisconsin, and the Port of Erie in Pennsylvania
    - One possibility is to sample where hydrilla was recently discovered in Michigan. For Michigan assistance with hydrilla sampling contact Billy Kieper, *Michigan EGLE*, at keiperw@michigan.gov or Alex Florian, *SWXSW CISMA*, at invasivesed@vanburencd.org
- Reports from point intercept survey are being finalized and will be disseminated to the state's invasive species coordinators and data will be added to MISIN. If anyone else would like the reports or data, contact Julianne Heinlein, *GLEC*, at jheinlein@glec.com
- Overall, no unexpected or novel AIS were detected via this project's efforts in any sampling years

Interstate Early Detection & Rapid Response (EDRR)
Lindsay Chadderton, The Nature Conservancy (TNC)

- The Interstate EDRR Phase IV Project is a collaborative effort to plan, expand, and disseminate guidance for EDRR work throughout the Great Lakes region
- Project partners include The Great Lakes Commission, The Nature Conservancy, The University of Minnesota, and Ball State University
- Objective one involves facilitating annual regional surveillance meetings with representation from all Great Lake region states and tribal partners

    - The next meeting will be held in February 2024 in Ann Arbor, Michigan, and will discuss aquatic plant surveillance priorities and new methods for practitioners
- Objective two involves developing a framework for Great Lakes EDRR site prioritization based off the Great Lakes Aquatic Habitat Framework (GLAHF)
    - This framework is adapted to using 15km grid squares centered on high risk priority sites
    - Anthropogenic disturbance layers were added to the framework on the assumption that sites with minimal disturbance are more vulnerable
    - Next steps will incorporate shipping connectivity data, build out habitat diversity measures, and complete analyses on predictors of invasive and native species richness
- Objective three involves developing a baseline dataset of inland lakes and ponds over 10 acres in size across the Great Lakes region to expand the site prioritization system
    - Of the 78,000 waterbodies identified, each was related to its local catchment/watershed
    - Model input variables predict invasion pressure, habitat suitability, and lake condition
- Objective four involved developing best practices for aquatic plant surveillance
    - Workshops occurred to discuss traditional sampling methods, remote sensing, and eDNA
    - Written products include an annotated bibliography and guidance document for early detection methods in the Great Lakes

<u>Invasive Crayfish Early Detection and Surveillance</u>
Brian Roth, Michigan State University

- Data on crayfish prevalence, naming, and regulation knowledge was collected from retail pet stores in all Great Lakes states via visual inspection of merchandise and structured interviews
    - A total of 7 different species, both native and invasive, were identified
    - A quarter of stores basinwide sold crayfish and Michigan had the most sellers
    - Surveys showed that 20% of stores always try to purchase crayfish and 50% never do
    - 40% of stores receive hitchhiker crayfish that they did not purchase; most stores received them less than three times a year but some received them over ten times
    - Over 80% of stores receiving crayfish did not attempt to identify them
    - Most stores sell or give away hitchhiker crayfish or feed them to other organisms
    - The highest species observed in retail stores was *Procrambarus alleni*
    - The third highest species observed was *Procrambarus clarkii*, an invasive species
    - Crayfish identification is difficult due to inconsistent labeling of trade and scientific names in addition to the same species having different coloration patterns. 40% to 60% of store owners reported not being confident in their ability to identify crayfish
    - Most retailers were unaware of the regulations in place by their state; New York store owners were least aware and Michigan store owners were most aware
    - Regulated species were found in at least one store in over half of the Great Lakes states and store owners have very little education about them
- The project team plans to publish a manuscript on this work and is developing an outreach poster that can be placed in retail stores to help with identification
- Phase two of this project is expected to start in early 2025 and the team plans to do concentrated outreach to retailers to quantify recognized supply chain issues
- The project team is also looking to develop a basinwide network for crayfish surveillance including CISMA's, law enforcement, watershed councils, etc.

- The Invasive Crayfish Collaborative (ICC) has a five year strategic plan survey that is live and if attendees are interested and want to join the ICC, do so using this link

Great Lakes AIS Landing Blitz
Ceci Weibert and Theresa Gruninger, GLC

- Weibert discussed the Great Lakes AIS Landing Blitz project goals and achievements from 2023 funding
- A series of subawards ($4K-$10K) were given to local partners to host landing blitz events
- Geofencing was used to administer ads to promote the two week event
- Foundational outreach materials were created focusing on event logistics and considerations for both first time and returning/expanding event hosts
- A template was developed that outlines steps for working with influencers to advertise events
- Additional voluntary watercraft outreach training materials are being created via Moodle
- In 2023, thirteen grant applications were received, twelve were funded, and $90K was awarded
    - Starter kits and a virtual safety training were given to subrecipients
    - Over 150 watercraft decontaminations occurred, and no unexpected species were found
    - Subrecipients achieved thousands of social media impressions and engagements
- Gruninger presented the 2023 geofencing marketing strategy using the platform *GroundTruth* to promote Landing Blitz events. This platform provided more in depth analytics when compared to other marketing agencies and was more cost-effective
    - A geofence is an outlined area on a map that if someone enters with a smart phone that has location services enabled, they are served an ad
    - Connected TV (CTV) ads are served at home to a person previously in a geofence
    - Every state had a $2K budget split evenly between onsite geofenced ads and CTV ads
    - On-site geofencing and CTV ads achieved hundreds of thousands of impressions with the cost per impression being 0.3¢ per person which is below the average of 10¢ per person
    - The CTV ads showed people visit Great Lakes states from all over the country
- In 2024 the Great Lakes AIS Landing Blitz request for proposals will be released earlier
- In 2025 ice anglers will be targeted
- A new Great Lakes AIS Landing Blitz logo is in development

GLDIATR
Ceci Weibert, GLC

- The Great Lakes Detector of Invasive Aquatics in Trade (GLDIATR) project collects, analyzes, and shares information about the online sale of AIS to bolster education and surveillance efforts
- The project advisory committee includes managers, researchers, enforcement, and educators
- Once a month a web scraping tool uses scientific and common names as search terms to find and extract information about potential AIS being sold online
    - Data is collated into a user friendly web interface accessible by the advisory committee
    - The interface contains individual records for each sales page which are assigned to users based on their jurisdiction. Within each record a user can obtain seller contact information, assign priority levels, and note seller interactions that occur
    - A template letter was created for users to fill out and send to sellers and GLC staff are currently writing code to automate that process

- Amazon and eBay have their own rules for engagement so specific guidance for contacting sellers on those platforms has been created
- The Great Lakes Commission is responsible for contacting U.S. sellers outside of the Great Lakes states and international sellers are coordinated with federal agencies
- A short term pilot of this process will be completed between November 2023 - February 2024 with full launch occurring March - December 2024

Evaluate data sharing options for watercraft pathway
Theresa Gruninger, GLC

- Great Lakes jurisdictions were surveyed to inventory watercraft inspection data collection occurring in the region. Of the 16 jurisdictions contacted, 11 full sets of responses were obtained
- Survey results show that watercraft inspection data is being collected for a wide variety of reasons and data collection methods vary between jurisdiction (e.g., digital versus paper data collection systems) making a shared data system difficult
- A two day virtual data sharing workshop was hosted in June 2023 for partners to learn about the different data collection systems within the Great Lakes
- A guest presenter from the Western states' Watercraft Inspection and Decontamination (WID) Data Sharing System explained the process of data sharing between all the western states
    - Great Lakes jurisdictions discussed if they want to work toward the WID framework and the general consensus was yes, which led to another workshop in November 2023
    - The project team brainstormed three types of data sharing options that could be utilized including a written annual report, a shared ESRI dashboard, or an app similar to the WID
    - Consensus on one data sharing option was not reached, therefore the project team decided to pilot study the annual report option

Exploring Stakeholder and Community Perspectives on Genetic Biocontrol for Invasive Species
Rex Alirigia, North Carolina State University

- This project aims to use expert elicitation to help understand human perceptions of genetic biocontrol. A final product includes organizing a topical workshop to facilitate mutual learning
- The project team aims to look at this topic using Responsible Research Innovation principles including anticipation (i.e., identification of issues), reflexivity (i.e., rethinking the technology), inclusion (i.e., incorporating diverse stakeholders), and responsiveness (i.e., feeding learned information back into technology development)
- Deciding who and how to engage is defined in three levels including communities of people near the release of the organism, stakeholders with a professional interest, and the public
- Phase one of this project identified and interviewed 20 Great Lakes experts and regulators regarding the use of biocontrol technologies to manage aquatic invasive species.
    - Respondents highlighted organizations that work on research and development of genetic biocontrol methods including the University of Minnesota, University of Wisconsin, USFWS, and USGS
    - Respondents reported that genetic biocontrol bolsters the management toolbelt by being highly specific and having the potential to minimize environmental impacts
    - Respondents emphasized the need for early engagement from all partners in biocontrol technology development and risk assessments of unintended consequences

    - Respondents reported that regulation and governance is the responsibility of institutional ethics committees, existing regulators (e.g., EPA, FDA, USDA), and interjurisdictional governance
- A QR code was provided for meeting attendees to give feedback on who else the team should engage

Creating science-based outreach products and resources for aquatic plant management
Tim Campbell, Wisconsin Sea Grant

- This project is aimed at developing and administering guidance to lake organizations and property owners wanting to manage aquatic plants in their lake
- Project outputs include an informational website, outreach materials, and a management decision guide developed by the project team and a multi-state advisory group
- The team developed and had regional partners hand out educational brochures identifying the advantages and disadvantages of different aquatic plant management methods
- Using a web search collator the team found that most people seek out management information via typing physical lake observations (e.g., "lake weeds") into search engines
- SEMRUSH is a website that looks at search engine keywords, webpage traffic, and related websites to determine where a particular web page falls on a search engine results page
    - Using SEMRUSH the project team determined where different types of websites ranked on search engine results pages when searching for invasive species key terms
    - When searching aquatic plant management terms, commercial websites were ranked higher and populated before institutional or governmental sites
    - When searching scientific terms (e.g., a species name) institutional and government sites ranked higher, but with vernacular terms commercial sites ranked higher; vernacular terms also received more searches overall
    - Negative key words (e.g., "control") pulled up mostly commercial sites, but specific keywords (e.g. "invasive") pulled up mostly institutional/government sites
    - How people search for information and language they use impacts information they see
- The team developed twelve factsheets about aquatic plant management and intentionally added popular vernacular search terms to them
- Including more popular vernacular terminology within a webpage may increase its traffic
- Future prospects for this project include testing different google ad strategies to get more traffic to the new webpage in addition to creating a decision tool for lake organizations interested in the potential non-target impacts of herbicide applications
- The project team would like to hear from GLP members what outreach pieces would be useful

Enhancing the European Frog-bit Collaborative
Nichole Angell, GLC

- The European Frog-bit (EFB) Collaborative started in 2018 when GLRI funding was awarded to Michigan EGLE and sub-awarded to Central Michigan University who served as a technical advisory group
    - An adaptive management framework and stakeholder community in Michigan was established

- As EFB spread and became a Great Lakes region wide issue, the Great Lakes Commission received funding in 2022 to serve as the EFB Collaborative's neutral backbone
- Angell discussed the make-up of the EFB Collaborative including members, a steering committee, specialty workgroups, and stakeholders
- Three core focus areas of the EFB Collaborative strategy are regional coordination and collaboration, best management planning, and assessing information needs/advancing research
- The EFB Collaborative has developed a standardized delimitation application that provides a standard platform for managers to report their monitoring and management actions
- The EFB Collaborative administered a community questionnaire asking for information needs and the 94 received responses will help define EFB Collaborative objectives
- The EFB Collaborative recently launched a new website and quarterly newsletter
- To assess ongoing EFB eradication and control efforts, the EFB Collaborative is revising the Standard Treatment Impact Monitoring Protocol by creating a new application that gives managers the ability to record monitoring and treatment data in a standardized way over time
- The EFB Collaborative developed a prioritization map that helps focus EFB management locations
- The EFB Collaborative would like to incorporate more regional EFB research on its webpage, contact Taaja Tucker-Silva, *Great Lakes Commission*, at taaja@glc.org to add more to this page
- Opportunities exist participate in the EFB Collaborative by joining or using the resources it provides

Closing remarks
Eric Fischer, Indiana DNR

- Fischer thanked the speakers for their presentations and the attendees for their attention

Great Lakes Panel closing session

Spring 2024 meeting plans
Ceci Weibert, GLP Coordinator

- The Great Lakes Panel Executive Committee and Ontario members have submitted a proposal to USFWS that is under review to host the Spring meeting in Sioux St. Marie in Canada with back up locations in Minnesota or New York
- A date poll will be sent out to identify Spring 2024 meeting dates, but it will likely be in June
- Every even year the Great Lakes Panel hosts internal elections and those positions up for election are vice chair, standing committee chairs, and at-large members
    - Current GLP Vice Chair Kelly Pennington will assume the role of Great Lakes Panel chair and the current chair, Eric Fischer will move to the outgoing chair position
    - The Nominating Committee is made up of one representative from Canada (Francine MacDonald, *Ontario Ministry of Natural Resources and Forestry*), one representative from the U.S. (John Navaro, *Ohio DNR*) and the outgoing panel chair (Eric Fischer, in lieu of currently vacant outgoing chair position); they will determine an election slate by the end of 2023 and voting will occur virtually in 2024
    - The new executive committee and new or renewed at-large positions will be installed at the upcoming spring meeting

- If there are any questions on nominating or the elections process, that information can be found on the Great Lakes Panel Guidance of Operations Document

Final comments and meeting adjournment
Eric Fischer, GLP Chair, Indiana DNR

Fischer thanked everyone and adjourned the meeting