

Great Lakes Panel on Aquatic Nuisance Species Meeting Summary
University of Toledo Lake Erie Center, 6200 Bay Shore Rd, Oregon Ohio | May 15-17

Additional meeting information including a final agenda and presentations are available on the Great Lakes Panel website (<https://www.glp-panel.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 November 2022 meeting summary

- One member noted that on the top of page five of the summary, it should read Great Lakes Seaways “Panel” member
- With the noted revision, the Fall 2022 meeting summary was approved

Review of November 2022 action items

- Weibert reviewed action items from the November 2022 meeting and their status toward completion
- Completed action items from the GLP Executive Committee (ExCom), GLP staff, and GLP members were reviewed

Committee reports

Organisms in Trade (OIT) Ad Hoc Committee

Francine MacDonald, Ontario Ministry of Natural Resources and Forestry (OMNRF)

- MacDonald reviewed the action items and progress of the OIT Ad Hoc Committee
- A summary of the BIOTIC symposium was prepared and shared with the Aquatic Nuisance Species Task Force (ANSTF)
- The OIT Ad Hoc Committee has discussed which industry pathways to focus on next
 - Members developed and submitted a pre-proposal for an interjurisdictional Great Lakes Restoration Initiative (GLRI) funding project focusing on the bait pathway
 - They will be working on the final proposal over the summer
- The OIT Ad Hoc Committee is considering additional activities to undertake over the summer of 2023, which may include inviting Sam Chan (Oregon Sea Grant) to present on the biological supply house pathway

Information/Education Committee (I/EC)

Tim Campbell, I/EC Vice-Chair, Wisconsin Sea Grant

- The I/EC has been collecting grass carp outreach materials and will provide an index of materials for the Policy Coordination Committee (PCC)
- The I/EC is creating a position statement regarding the use of appropriate language with aquatic invasive species (AIS). More on this position statement will be discussed later in this spring GLP meeting
- The I/EC assisted with developing the new GLP website
 - The website is now live at <https://www.glpanel.org/>
 - Communications planning for the website is still needed before its official launch
- Lastly, the IE/C helped contribute ideas to the interjurisdictional AIS project funding

Research Coordination Committee (RCC)

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

- The RCC's primary focus since the last GLP meeting was to host a workshop in support of the interjurisdictional project *Regional Invasive Aquatic Plant Control Prioritization and Needs Assessment*
- The RCC is starting a new interjurisdictional project conducting a site- and species-based analysis of control activities of established invasive species. Anyone who wants to be involved in the project – especially state agency and Tribal representatives – should reach out to Lindsay Chadderton
- The RCC sent a formal request to access the Great Lakes Water Research Collaborative's summarized data and research plans
- Fischer noted anyone can help with committee projects, even those outside your own committee

Policy Coordination Committee (PCC)

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

- PCC staff and committee members are developing letters regarding the regulation of diploid grass carp to be sent to other regional ANS panels. This is a continuation of the grass carp ad hoc committee work.
 - The letters will need to be approved by the ExCom before being sent to the rest of the panel for review
- Last August, President Biden released a memorandum mandating that data collected and funded by the U.S. federal government be made publicly available immediately. The PCC will review these requirements and work through the ANSTF to help influence how updated agency policies are written and curb any negative outcomes that could occur due to open data
- Kočovský announced that anyone with ideas on what the PCC should address may bring them to a member of the committee

Interjurisdictional Project: Regional Invasive Aquatic Plant Control Prioritization and Needs Assessment update

Ceci Weibert, GLP Coordinator, GLC; Lindsay Chadderton, RCC Chair, TNC

- GLC contractor Alisha Davidson has compiled a series of risk assessments on 20 priority plants based on feedback from state agencies
- In January, over the course of a two-day workshop, 12 of the 20 species were discussed to develop priority research needs for each species
- GLC staff are working to revise the workshop notes, which will be sent out for review in June
 - The notes will then be used to develop a research agenda for each priority species and highlight the key outstanding research needs
 - The agenda will be used as a road map for future research projects and funding
- Chadderton asked Panel members to review the workshop notes and research agenda once they are made available
- The Panel will be applying for a no-cost extension to use funds for open access publishing and presentations at conferences in the fall

Programmatic updates

Great Lakes Aquatic Nonindigenous Species Information System (GLANSIS)

Rochelle Sturtevant, GLANSIS Program Manager, Michigan Sea Grant Extension

- Sturtevant announced that GLANSIS has experienced several staffing changes over the last six months
 - Felix Martinez has stepped down as GLANSIS co-Principal Investigator and will be replaced with Ashley Elgin
 - El Lower has been named as the Sea Grant Extension alternate member to the Panel
- GLANSIS is subcontracting with Illinois-Indiana Sea Grant (IISG) through GLRI funding to revitalize the “Nab the Aquatic Invader” program
 - IISG staff Greg Hitzroth and new Sea Grant Extension GLP member Katie O’Reilly will work on this project as soon as funding is available
 - Staff plan to meet with teachers and form a steering committee soon
- Another GLRI grant for the “Great Lakes Water Life” inventory will allow for the addition of native and non-native vascular plants
- The Lake Champlain Basin Program has funded a graduate student to create a Lake Champlain database similar to GLANSIS based on USGS’s Nonindigenous Aquatic Species (NAS) Database
- Sturtevant listed the new and revised species profiles in progress
 - The eel parasite profile is still in progress
 - The red eared slider profile is live, but their status as native to Michigan may change pending further discussion
 - The *Cyclops strenuss* (a copepod) profile has been re-examined and the record has been confirmed as a misidentification. The species is now split into two non-native species (*C. divergens* and *C. siberica*)
 - Lyuba Burlakova is reviewing the oligochaetes of the Great Lakes; new data suggests three non-native species will likely be added to the database
- GLANSIS risk assessments are being relocated to improve access; the new URL is <https://www.glerl.noaa.gov/glansis/assessments/>
- GLANSIS is working with USGS’s NAS Program to create new fields, images, and formats that are more relevant to the Great Lakes and easier to read
 - They are working to improve information access to the impact data and will allow for direct access to the primary literature of all impact assessments

- GLANSIS is still looking to collect Canadian data to have equal amounts of U.S. and Canadian data
- GLANSIS staff are working to compile available education materials in the GLANSIS educator hub

Aquatic Nuisance Species Task Force (ANSTF)

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

- Pasko provided an overview of the ANSTF, its structure, and its relation to the regional panels
- The ANSTF held its last meeting in January 2023. The full meeting agenda and meeting minutes can be found on the ANSTF webpage
 - The ANSTF approved the establishment of an ad-hoc subcommittee to determine the financial impacts from limitations on motorboat registration fees as presented by the U.S. Coast Guard guidance letter
 - Panel members interested in joining the subcommittee should reach out to Pasko for more information
- Pasko outlined the Action items from the January 2023 meeting:
 - USGS will provide information on the timing and intent of the Black Carp Community of Practice
 - Distribute the “Decontaminating Firefighting Equipment to Reduce the Spread of Aquatic Invasive Species” guidance document to ANSTF members and regional panels
 - Distribute the “Model for Process for a Rapid Response Fund” document to ANSTF members and regional panels members for comment
 - The Outreach Subcommittee will consider options to develop a single online national resource for communicating watercraft inspections and decontamination requirements, procedures, and state program contacts
 - Each ANSTF subcommittee will submit their workplans to the Executive Secretary for distribution to ANSTF members and regional panels
- Pasko reviewed the six goals of ANSTF’s strategic plan
- In 2022-23, the ANSTF Prevention Subcommittee’s work includes evaluating seaplanes as a potential pathway for ANS and assessing new ANS introductions to determine where prevention measures may have been lacking or ineffective
 - The subcommittee established an OIT Hitchhikers Workgroup
- In 2022-23, the ANSTF Early Detection and Rapid Response (EDRR) Subcommittee’s work includes developing a plan for capacity-building in NAS to meet stakeholder needs, developing ANS horizon scanning and watchlists, and modernizing and enhancing the ANSTF Experts Database
- In 2022-23, the ANSTF Control Subcommittee’s work includes revising species management plans for the European Green Crab and the New Zealand Mudsnaill 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 ANSTF Research Subcommittee
- In 2022-23, the ANSTF Research Subcommittee’s work includes developing a communication plan for and a process to update the National AIS Priority Research List and surveying the AIS community for current and planned research that aligns with the Priority Research List
- In 2022-23, the Outreach Subcommittee’s work includes conducting an assessment of national campaigns that target outdoor recreational users, populating the Stop Aquatic Hitchhikers portal, and establishing an ANS outreach Community of Practice

- Panel members should reach out to Susan Pasko to subscribe to the ANSTF newsletter

FWS Metabarcoding project update

Amy McGovern, FWS

- The FWS is working with Great Lakes partners to ramp up AIS Metabarcoding efforts, which include collecting Great Lakes water samples to analyze genetic materials in the sample
- The FWS's Fish and Wildlife Conservation Offices (FWCOs) will collect 500 samples across the basin and increase coverage through more partners in 2024
- Additional genetic analysis may take place for samples that test positive for invasive carp
- The FWS will begin creating its communication plan and will provide more details on its structure and content in the Fall of 2023
 - It is important to consider the timely communication of the study's results

Great Lakes St. Lawrence Governors and Premiers (GSGP)

Mike Piskur, GSGP; Ceci Weibert, GLP Coordinator, GLC

- The GSGP worked with the GLC to develop an interactive map showing the status of pathways through the Great Lakes and Mississippi River Interbasin study (GLMRIS). The map is hosted on the Blue Accounting website at <https://www.blueaccounting.org/metric/prevention-of-interbasin-ais-transfer-through-aquatic-pathways/#Overview>
 - Panel members are encouraged to reach out to Weibert or Piskur if anything on the map should be updated or improved
- Weibert reviewed the features of the mapping software
 - The map focuses on other pathways apart from the Chicago Area Waterway System (CAWS), though there is also a tab for more information on CAWS
 - Users can click on each pathway to learn about the pathway, its status, and species of concern and their associated risks at each location
- The GLC does not have any plans to add further watersheds such as the Hudson River, but Piskur noted that they are looking for comments for improvements
 - There are currently photos available for closed pathways, though additional photos may be helpful
 - It may be helpful to include Google Earth Coordinates on the map as well

GLRI Action Plan IV development update

Kevin O'Donnell, U.S. Environmental Protection Agency (EPA)

- O'Donnell emphasized the importance of receiving input on GLRI Action Plan IV development from state and Tribal invasive species managers and the Panel between May-August 2023
- The U.S. EPA will hold public engagement meetings throughout the region from June-July 2023. These meetings are open to the public to allow anyone to provide input on the Action Plan
- In September 2023, a full draft of Action Plan IV will be open for comments by states and tribes
- O'Donnell provided an overview of the objectives, narratives, and measures of progress that are in the process of being drafted

- Invasive species objectives have remained mostly unchanged in each Action Plan. The EPA is proposing to change these objectives for Action Plan IV to split the “prevent introductions” objective into “prevent introductions” and “limit range-expansion of invasive species”
 - This will also include combining the “control established invasive species” and “develop technologies” objectives into one “prioritize invasive species control” objective
- The EPA has proposed to reduce the number of measures of progress in Action Plan IV from six to four, with a greater focus on pathways of regional importance, identifying future funding, and tracking progress
- The EPA and the GLP participated in a listening session regarding the two new measures of progress in March 2023
 - O’Donnell noted that he is interested in hosting a second listening session with the GLP if there is sufficient interest

Emerging issues and announcements

- Rebecca D’Orazio announced that the Invasive Species Centre (ISC) is hosting the International Conference on Aquatic Invasive Species (ICAIS) in Halifax, Nova Scotia, from May 12-16, 2024
 - The conference theme is ‘meeting challenges with innovation’
 - The call for abstracts is now open and more information can be found on icaais.org
- Ashley Elgin announced that, following the Invasive Mussel Collaborative’s (IMC) in-person meeting in April, a federal working group is meeting this week to discuss recommendations for a pilot control project for invasive mussel control
- The next Upper Midwest Invasive Species Conference (UMISC) will take place in Duluth, Minnesota, from November 12-15, 2024
- The North American Lake Management Society (NALMS) will meet next in Erie, Pennsylvania, from October 22-26, 2023

Public comment period

- No public comments were put forward during the public comment period
- The GLP clarified that it is permissible to end a Panel meeting before the public comment period ends, so long as an announcement is made beforehand

Discussion of I/EC Position Statement on Appropriate Communication Messages

Doug Jensen, I/EC Chair, Minnesota DNR, Tim Campbell, I/EC Vice-Chair, Wisconsin Sea Grant

- Jensen explained that following an I/EC meeting in December 2022, the Committee agreed to lead the development of a resolution in support of inclusive and respectful language when discussing invasive species
- The I/EC is looking for feedback on its position statement before its upcoming meeting later this month
- Campbell gave an overview of the position statement’s structure, which includes an introduction explaining the issue’s importance, a message of support for using inclusive names, and specific actions to take in support of the resolution
- A glossary of militaristic language to avoid is currently being developed

- The I/EC aims to have the resolution approved by the ExCom to become an official statement of the Panel
- The state of Michigan is following the effort led by the University of Minnesota Extension to create a common name protocol using genus for watchlist species instead of country-of-origin names

Plenary Session: Grass carp research updates

Welcome and introductory remarks

Tom Bridgeman, Director of the University of Toledo Lake Erie Center (LEC); Patrick Kočovský, PCC Chair, USGS

- Bridgeman welcomed the GLP to the Lake Erie Center and described his background in invasive plankton species
 - The LEC conducts work on such fields as harmful algal blooms, the effects of environmental stressors (e.g., road salt runoff), and grass carp
- Kočovský provided background on the history of invasive carp in Ohio
 - Invasive carp were first brought over from China as a form of biocontrol in the 1970s
 - The GLRI and USGS have been funding the LEC's grass carp program since 2015
 - Core substrate and turbulence are important factors for grass carp spawning
 - On the Sandusky River, the goal is to prevent grass carp from spawning in the first place

Strike team update

Bob Mapes, University of Toledo (UT)

- Mapes talked through the history of grass carp in the Great Lakes
 - In 2018, the Michigan DNR and the FWS began grass carp captures
 - After starting grass carp captures in 2019, UT had four crews in 2020, but their activities were limited due to restrictions from the COVID-19 pandemic
 - UT received new boats in 2020, allowing researchers to access new capture areas where the old boats could not reach
 - In 2022, more crews were added in Michigan, Wisconsin, and New York to expand the grass carp sampling range
- Before 2018, most grass carp captures in Lake Erie were commercial; since 2018, the vast majority of grass carp captures in Lake Erie were made by agency representatives
 - Lake level fluctuations likely led to the decrease in commercial captures, though the Lake Erie Committee is paying \$75 per grass carp captured, providing a commercial economic incentive
- The Sandusky River is the main reproductive river for grass carp, but 2022 was the first year that most grass carp were captured from the Maumee River
 - This could be because spawning grounds were found much further upstream in the Maumee River than were previously sampled or because populations in the Sandusky River are decreasing
- Fluvial Egg Drift Simulator (FluEgg) modeling has been conducted in the St. Joseph River to understand invasive carp reproduction in the Great Lakes
- In 2022, 147 grass carp were removed from Lake Erie and 14 were removed from Lake Michigan

- The Lake Erie Committee increased the number of grass carp to be tagged to 85, up from the 28 currently active tags
 - These tagged grass carp provide telemetry data to inform capture locations and strategy
- Future plans for UT researchers include revising protocols based on a recent analysis of the most efficient capture methods and increasing removal efforts in the upper Maumee and Huron Rivers
- UT is co-organizing the Invasive Carp Symposium to be held in Grand Rapids, Michigan, later this year

Oblique bubble screen (Sandusky)

Ryan Jackson, USGS

- Jackson provided a research update on oblique bubble screens as two-way multi-life stage dispersal barriers
- A proposed control option to prevent grass carp from reproducing in Lake Erie tributaries is to stop them from reaching spawning areas using bubble screens
 - Bubble screens are effective at reducing passage for common and bighead carps, though they have not yet been tested on grass carp
 - Bubble screens have been used as river filters and to collect microplastics, so USGS researchers aimed to understand if they could prevent eggs from moving upstream
- Jackson explained the physics of oblique bubble screen barriers to demonstrate how they work
- The objective of this project was to create a two-way system to collect eggs drifting downstream and prevent spawning adults from passing upstream, targeting two life stages at once
- Researchers have completed a series of experiments, including a 3-D hydrodynamics characterization, surrogate grass carp egg trials, and live grass carp egg and larvae trials
- Key preliminary results of the surrogate grass carp egg trials include: better redirection and capture rates are achieved at higher airflows and inclination angles of the bubble screens, redirection and capture efficiency decreases with increasing velocity, and optimal airflow rates depend on velocity
- In 2022, USGS transitioned to conducting five live egg and larval spawning trials with 20 eggs/larvae per trial
- Key preliminary results of the live grass carp egg trials include: in contrast with the surrogate study, researchers found no consistent redirection of eggs by the bubble screen, particle size and density are important to understanding the nature of particle redirection, and better surrogates are needed to understand the effects on live eggs/larvae
- Ongoing work includes redesigning and testing bubble screens with custom-made surrogates and preserved, rehydrated, and dyed grass and black carp eggs, though no additional live egg experiments are planned until 2024
- Flow velocities seen during spawning events are highly variable, depend on the section of the river, and drop off downstream

Acoustic telemetry update

James Roberts, USGS

- Roberts described the threats posed by grass carp in Lake Erie, the life history of grass carp, and previous and ongoing management efforts

- In order to remove and eradicate grass carp, USGS researchers are using acoustic telemetry to understand their seasonal movement, behavior, and habitat use
- A basin-wide array of acoustic receivers on Lake Erie and a fine-scale array on the Sandusky River allow researchers to track grass carp movement
 - A three-alert array is made up of real-time and near real-time receivers and real-time buoys to detect grass carp in nearshore areas and at river mouths
- Results show that grass carp are found in areas beyond their typical spawning locations, including in the eastern Erie basin, and that grass carp distribution changes based on seasonal patterns, as measured from 2014-2021
- Basin-wide results of tagged grass carp show 55% were found only in one Lake Erie tributary, 31% in multiple tributaries, 11% in one tributary and Lake Erie, and 3% in Lake Erie only
- Fine-scale results of tagged grass carp in the Sandusky River show the movement of grass carp before and after a spawning event to target removal efforts during spawning events
 - There does not seem to be any overlap in the spawning of grass carp and walleye at Brady's Island in the Sandusky River, though there is some overlap with other native species including buffalo, freshwater drum, and silver redhorse
- Roberts's takeaways are that understanding grass carp ecology and life history allows for management (e.g., removal) by knowing which tributaries to focus on and when grass carp arrive for spawning

University of Toledo research updates

Robert Hunter, University of Toledo (UT)

- Hunter presented a timeline of grass carp invasion in the U.S. since 1963
- UT's control efforts and research are conducted in collaboration with agencies and universities across the basin
- Early life history crews collect grass carp eggs and inform removal efforts by feeding information into the USGS FluEgg simulator to adaptively manage populations
- Work conducted by UT researchers in 2022 shows there is a high overlap in maximum depths reached in occupied areas for each grass carp sampling gear type (e.g., trammel nets, electrofishing)
- Further UT research aims to model grass carp populations and use telemetry to understand how to implement barriers without interrupting walleye spawning areas
- Hunter's research objectives include understanding grass carp population dynamics, behavior, and impacts to inform management, implementing control efforts, and minimizing the likelihood of introducing new breeding populations
- UT crews primarily capture grass carp by electrofishing using a combination of one or two electrofishing boats and a trammel net
 - By combining the complexity of sampling efforts with different combinations of gear, researchers aim to increase their chance of success; however, there is a tradeoff between detection and efficiency
- Hunter's research found trammel nets were less efficient at capturing grass carp regardless of time or location of use, while electrofishing alone is almost five times more efficient
 - Further findings show captures vary by year and by month; capture efficiency is high in May and November but much lower in August
 - This may be because grass carp are returning to spawning areas to overwinter

- Next steps include modeling grass carp distribution based on capture data and modeling trammel net bycatch by species
- If there is a low chance of encountering bycatch, it is recommended that trammel nets are used for sampling
- Hunter's main takeaways are that electrofishing only results in more captures per hour, tandem sampling gear efforts do not catch more fish per hour, high probability times and locations should be prioritized, and this research may be having a local impact based on the last three years of data

ICRCC updates

Jamie Schardt, EPA; Mike Weimer, FWS

- The Invasive Carp Regional Coordinating Committee (ICRCC) consists of 26 U.S. and Canadian agencies and is convened by FWS and EPA to assist member agencies to reduce and eliminate invasive carp threats to the Great Lakes
- The ICRCC's central activity is developing and publishing the Invasive Carp Action Plan each year which is supported by \$75 million in state agency funding and \$21 million in GLRI funding
- The ICRCC first supported grass carp research, removal, and control in 2016 and has included support for grass carp management in each subsequent plan
 - Funding provided for the Action Plan has increased significantly from Fiscal Year (FY) 2016 to FY 2023
- In 2023, the Action Plan aims to prevent establishment of grass carp in the Great Lakes with a primary focus on detection and removal from the western Lake Erie basin

GLP Q&A and Discussion

- A Panel member asked about the status of grass carp management in Lake Michigan
 - The Grass Carp Advisory Committee (GCAC) may be the best pathway to gauge the level of interest or concern on shifting the focus to Lake Michigan
 - There is currently no full-force effort in Wisconsin to address grass carp due to the low number of catches in the Milwaukee River
 - The Michigan DNR is aware of potential efforts in Lake Michigan but does not want to spread its resources too thin based on statewide priorities

Plenary Session: Outreach

Welcome and introductory remarks

Doug Jensen, I/EC Chair, Minnesota DNR

- Jensen stated that, since its inception, the I/EC has been a leader on public outreach with a focus on AIS

Analysis of outreach campaigns in the pet trade

Wes Daniel, USGS

- Daniel presented on a story map that features an analysis of eight major local outreach campaigns regarding the pet trade; the story map is publicly available at <https://geonarrative.usgs.gov/assessingpetriskcommunication/>
- Objectives of the project were to understand the effectiveness of the information presented by individual outreach campaigns at various scales, the scope of messaging, and how to approach communications
- USGS's analysis used a combination of interviews and an Internet analysis of materials found online. For example, if users Google "Should I release X species", what are the online material being generated by that search.
- Key findings from interviews include: encouraging influencing behavior is important, creating collaborative partnerships was common, emphasizing rehoming and not releasing non-native pets was common, most campaigns are using in-person discussions and social media outreach, and most campaigns look for cost-effective actions that will be received well by the audience
 - Challenges of the outreach campaigns include a lack of time, funding, and participation among the right audience
 - No campaign used any type of formal monitoring
 - The general public and pet owners were the most common audiences
 - Over 80% of campaigns utilized harsh and negative language, though over 60% of campaigns used empowering language; this exemplifies the variety of messaging used for these campaigns
- USGS used a web engine search to understand how often these campaigns show up as a response to commonly searched questions; 93% of search results had no connections to the original eight campaigns, emphasizing the need for campaigns to improve their reach through marketing
- Daniel recommended investing in long-term monitoring and evaluation of campaign effectiveness to understand pet owner behavior change and retailer impact
- Daniel concluded that pet trade outreach campaigns require consistent messaging and should include consistent alternatives to releasing non-native species
 - It is important to increase storytelling and decrease negative language in outreach efforts, though it is unclear if a specific positive message will be effective

National AIS outreach assessment

Tom Beppler, Responsive Management

- Beppler explained the goals of the outreach assessment, including assessing the effectiveness of AIS outreach campaigns
- The study consisted of an online survey of 5,000 adult US residents who participated in at least one of seven water-based outdoor recreational activities in the past 12 months
 - The study utilized survey methodology that was developed by the ANS Task Force Outreach Subcommittee. The survey instrument was based on previous work done by Minnesota Sea Grant, the current interjurisdictional boater behavior project led by Wisconsin Sea Grant, and work funded by the Western Regional ANS Panel.
 - The survey was presented to participants as a general study on environment issues rather than as an AIS study
- Beppler described the breakdown of respondents broken down by each recreational water user group

- The survey found that water-based outdoor recreationists tend to be less concerned about AIS compared to other environmental issues (e.g., water pollution, loss of habitat, climate change)
 - Responsive Management recommends linking AIS to water quality issues since these are seen by the respondents as more important than many other conservation and environmental concerns
- While concern about AIS is lower than other environmental issues, about half of respondents had heard a great deal or a moderate amount about AIS in their state and about 40% were aware of laws regarding AIS prevention
- The two most important motivations of respondents' actions to reduce spread of AIS were to keep AIS out of state lakes and rivers and to abide by laws and regulations intended to prevent the spread of AIS
- 37% of water-based recreationists were aware of an AIS campaign, though only 2% could name a specific campaign or program
 - Responsive Management recommends that the AIS community adopt a single overarching campaign theme and tagline and be aware of why some campaigns and programs do not succeed. For example, campaigns that do not have consistent messages or funding are often not successful nationally
 - Despite generally low awareness of campaigns, respondents are taking at least some actions to prevent the spread of AIS
- The survey found that among the campaigns with the highest familiarity and strongest effectiveness rating, many were state-specific rather than national campaigns
 - Texas' "Protect the Lakes You Love" and Wisconsin's "Clean Boats Clean Waters" campaigns were two state campaigns with high familiarity and perceived effectiveness. Protect the Lakes You Love receives significant traditional advertising effort while Clean Boats Clean Waters is a long-standing in-person outreach effort that has involves consistent branding for program participants.
- The more familiar recreationists are with major AIS campaigns, the more likely they are to engage in steps to prevent the spread of AIS; this finding suggests that campaigns are having a positive impact
- Beppler presented several areas for improvement among each subset of water-based recreationists to increase AIS prevention efforts
- The most important reasons as to why recreationists do not always take proper action are that they prefer to take action at home rather than at the access point and they do not have the cleaning tools necessary to take action

Social media and influencer marketing

Rebecca D'Orazio, Invasive Species Centre (ISC)

- ISC targets anglers in the Great Lakes basin with messaging specific to grass carp prevention
- ISC's influencer marketing involves working with anglers on social media to promote the ISC's call to action on invasive carp
 - ISC created a grass carp media kit which is used when reaching out to influencers to ensure the content is related to their interests
 - ISC vets each influencer and must approve all content before it is posted to ensure the content is relevant and not controversial
 - D'Orazio listed some of ISC's grass carp influencers, including Ashley Rae, Taro Murata, Paul Castellano, Averie Rose, Jay Seimens, Gord Pyzer, and Chris Johnston

- ISC's targeted angler outreach entails email marketing (e.g., with Anglers Atlas), posting to angling websites, publications, and forums, sharing banner ads on relevant websites, and running ads on podcasts (e.g, Blue Fish Canada and Fish'N Canada)
 - This outreach also included a partnership with FISHBRAIN, the number 1 fishing app in the world
- ISC's social media campaigns include organic content and paid promotional ads on Facebook and Twitter
 - After an initial lack of engagement, ISC began sharing more realistic imagery, sharing video ads, and implementing messaging with the same call to action
 - Overall, content with photos received more engagement than content with illustrations
- In FY2022-2023, ISC's social media campaigns received over 6 million impressions across all platforms, which is more than double the total from FY2021-2022
- Targeted angler outreach/influencer marketing and social media campaigns vary in engagement and value
 - Influencer marketing campaigns and paid ads are more expensive to run and they receive fewer impressions, but they receive more engagement from a more caring, targeted audience
 - Social media campaigns receive more impressions for the cost, but they are not geared toward a target audience

Enhancing aquatic invasive species outreach through values framed messages

Elizabeth Golebie, University of Illinois (U of I)

- U of I researchers have worked to address the role of recreational water users in the transport of AIS and understand how to encourage people to take actions more frequently to prevent the spread of AIS
- Values used in this study were biospheric (i.e., preserving nature positively predicts environmental beliefs), altruistic (i.e., helping others positively predicts environmental beliefs), and egoistic (i.e., influencing others negatively predicts environmental beliefs)
- Golebie described the importance of values and how they guide people's behavior using past work that found biospheric and egoistic values predicted behaviors related to AIS prevention
- U of I researchers aimed to investigate if using values-framing is an effective strategy for conducting AIS outreach
- U of I researchers generated a control message and two experimental messages – a biospheric/altruistic message and an egoistic message – to understand how anglers and boaters would be respond to each based on their values
- The U of I project team used a structural equation model to address relationships among values, elaboration, and beliefs
- U of I researchers found that all three messages were perceived to be effective and tested favorably among study participants, though elaboration (i.e., the depth of thinking about the message) varied depending on the participant's values
 - Results for the control message show no relationship between values and elaboration
 - Results for the biospheric message show the stronger someone's biospheric values, the longer they contemplated the message
 - This may be because recreational water users generally have higher biospheric values

- Results for the egotistic message show no relationship between values and elaboration
- U of I researchers also found that the longer a participant viewed a message, the stronger their beliefs regarding the risk of AIS and their ability to take action became
 - These results did not differ by control, biospheric, and egoistic messages
- Takeaways include that future messages should incorporate multiple values to ensure the messaging resonates with more recreationists and that research is needed to understand responses to message frames that draw on multiple messaging types

Q&A and Discussion

- There was discussion on the difference between the high familiarity and slightly lower effectiveness of state AIS prevention campaigns
 - It was noted that the longevity, resources, and messaging of each campaign varies, leading to a difference in public familiarity and effectiveness
- A member asked D’Orazio her opinion on which ISC outreach campaign she felt the best about
 - D’Orazio responded that engagement with social media influencers is often the most positive as they seem to generate genuine questions and concerns compared to Facebook or Twitter ads

Plenary Session: Horizon scanning and early detection of AIS

Welcome and introductory remarks

Lindsay Chadderton, RCC chair, TNC

- This plenary session will share new surveillance data across the states and provinces and at the national level

Minnesota new detections (*Marsilea quadrifolia*, *Oenanthe javanica*)

Kelly Pennington, GLP Vice Chair, Minnesota DNR

- Pennington focused on two notable nonnative detections in Minnesota in 2022: *Marsilea quadrifolia* and *Oenanthe javanica*
- *M. quadrifolia* (water clover) has been observed in the eastern Great Lakes basin before, but it was first detected in Minnesota in 2022
 - Water clover was likely deliberately introduced into the basin through trade
- *O. javanica* (water celery) was detected for just the second time in Minnesota
 - Minnesota DNR has been hand-pulling and monitoring water celery populations
- While neither water clover nor water celery have special regulatory status, it is illegal to release them into Minnesota waters
 - Both species were detected outside the Great Lakes basin, around Minneapolis-St. Paul
- Pennington described new observations of didymo in North Shore rivers where it had not previously been found
 - In 2022, didymo tended to be found at 2 meters or less in Lake Superior
 - In Lake Superior and its tributaries, didymo has high interannual variability and high density compared to other sites around the world

- In 2023, Minnesota DNR plans to conduct molecular samples of didymo and examine its impact on stream food webs

Noteworthy USGS-NAS detections (*Cherax quadricarinatus*, New detections recorded in PA)

Matt Neilson, USGS

- Neilson provided an overview of the NAS Database, a federal repository for introduced aquatic species in the U.S. that tracks almost 1,400 species and includes almost 700,000 observed records
 - The NAS Database displays maps and data aggregated from databases, citizen science reports, literature, and risk assessments
- The NAS alert system for new species introductions and records sent out about 300 alerts in 2022 to its more than 1,100 subscribers, with most reports originating in Pennsylvania, New York, and Ohio
 - Alert system reports come from literature through inaturalist, sighting reports, and personal communications
- Neilson outlined some notable alerts in the Great Lakes from 2022-2023
 - Brazilian waterweed was detected in the Cleveland area in September 2022
 - Two silver carp were sighted in the Scioto River south of Columbus in August 2022; this is one of the furthest upstream records in the Ohio River basin
 - A Cuban treefrog was observed in the Chicago Botanical Garden in March 2022
 - Redclaw crayfish were observed in several places throughout the U.S. – most recently in Nevada in 2023 – though not in the Great Lakes basin
 - A northern snakehead was caught in the Allegheny River near Pittsburgh in June 2022
 - A black carp was caught far upstream in Illinois in February 2023
- USGS has a draft tool to serve as a unified source for environmental DNA (eDNA) data in NAS
- USGS is looking for feedback on its NAS Database while enhancements are in progress

Michigan new detection (*Enteromorpha*)

Sarah LeSage, Michigan Department of Environment, Great Lakes, and Energy (EGLE)

- LeSage provided background information on *Enteromorpha* (Ulva), an invasive algae species
 - According to GLANSIS, Ulva can be identified by its smooth, tubular thallus that is linear and uniform in width and can be found primarily in marine environments but can tolerate freshwater conditions
- In 2003, a Michigan State University algal ecology professor found Ulva in Muskegon Lake while recreational boating, and MSU confirmed populations in two other lakes after conducting follow-up surveys in eleven western Michigan lakes
- In 2022, EGLE partnered with Great Lakes Environmental Center to investigate the impacts of European frog-bit on native plant communities
 - Through this work, new Ulva populations were found in two western Michigan lakes
- FWS's Ecological Risk Screening Summaries database categorizes Ulva's overall risk assessment as high and there are no known control options
- LeSage shared a novel AIS detection description form with AIS coordinators across the basin
- A member noted a potential connection between Ulva and metal contamination, which could explain populations in Muskegon Lake and other Michigan Areas of Concern

Tench Working Group (Expansion of Tench in the St. Lawrence River)

Jeff Brinsmead, OMNRF

- Brinsmead presented on behalf of the Tench Bi-national St. Lawrence River Working Group, which is made up of Canadian and U.S. agencies
- In the mid-1980s, tench was illegally stocked north of Lake Champlain; it has since spread south to Lake Champlain and north to the St. Lawrence River
 - Tench was first found in a farm pond in Ontario northwest of Toronto in 2014; the working group worked with the landowner to eradicate the population and monitor downstream of the pond
- In Ontario, most tench have been captured in commercial hoop nets, including an extensive netting effort in the Bay of Quinte after detection in 2018
- No tench were captured in Ontario in 2021 or 2022, though some results from a community eDNA study in 2022 are pending
 - In 2023, OMNRF intends to expand this eDNA monitoring with sites in Lake Ontario and the St. Lawrence River
- In 2022, the Québec Ministry of the Environment, the Fight Against Climate Change, Wildlife and Parks (MELCCFP) conducted electrofishing on Lake St. Francis and captured more tench than in previous years, though populations are still not abundant
 - There is evidence that tench populations in Lake St. Francis are slowly increasing
 - In 2023, MELCCFP will continue netting and electrofishing, but may concentrate efforts upstream in the Ottawa River
- In 2022, FWS conducted field work in the New York section of the St. Lawrence River and caught one tench below the Long Sault Dam, though eDNA results from samples along the Wiley Canal are still pending
- The New York State Department of Environmental Conservation (NYSDEC) and the River Institute in Cornwall, Ontario, did not capture any tench in 2022, though both entities will conduct similar work in 2023
- Fisheries and Oceans Canada (DFO) is preparing a publication on population dynamics of tench in the St. Lawrence River and a study to metabarcode tench diet
- Brinsmead's takeaways include: the tench invasion has moved slowly upstream since 1991, though it has not moved since 2016, and Tench appear to be spreading up Ottawa River
- A member asked if there are any ongoing conversations on using behavioral barriers for tench
 - Brinsmead noted that there does not seem to be sufficient interest in spending the money necessary to implement behavioral barriers

Ontario Marbled Crayfish Response

Jeff Brinsmead, OMNRF

- Brinsmead presented a brief history of OMNRF's marbled crayfish project
 - City of Burlington, Ontario, staff and another user posted pictures of marbled crayfish to iNaturalist in 2021 and 2022
 - While no physical specimen were detected, eDNA tested positive for marbled crayfish in August and October 2022

- Despite a lack of physical specimen, OMNRF decided to move forward with its marbled crayfish response plan with a goal of complete population eradication
 - OMNRF's response action included pond dewatering in Winter 2023, effectiveness monitoring and eDNA surveillance in Spring and Summer 2023, and are beginning the process of registering a pesticide to control marbled crayfish as a contingency plan
- Brinsmead described the progress that has been made to drain ponds and prepare to start monitoring
- OMNRF plans to install signage in Burlington to prevent public releases into the ponds

Federal Rapid Response Fund update

Susan Pasko, FWS

- Pasko described the background of the model process for developing an AIS rapid response fund as part of the U.S. Department of the Interior's (DOI) EDRR framework
 - A National EDRR Framework is coordinated, strategic, and focuses on the right species, at the right time, and at the right scales
- In 2021, a pilot AIS Rapid Response Fund to be coordinated by the ANSTF was created through the enactment of the Bipartisan Infrastructure Law (BIL)
 - The ANSTF created a working group to establish the scope of the fund, including eligible taxa, locations, and applicants
 - The BIL recommends a rapid response fund coordinator to serve as point of contact for applicants, manage negotiations, and communicate recommendations to the ANSTF
 - BIL funding will provide \$1 million for FY 2024; the first round of awards should be distributed by the end of FY 2024
- Pasko outlined the eligible activities through the fund, including planning and site delineation and the deployment of response actions
 - The fund strives to attain eradication of identified AIS, so funding cannot be used for long-term management and has a three-year expiration date
- Pasko detailed the award type and cycle as well as application and submission requirements
 - The funding opportunity will be opened quarterly (every three months)
 - Important information to be included in the application is a description of the target species and what its impacts would be without the use of funding
 - Rapid Response Fund Review Teams will have at least four people, including the fund coordinator, an ANSTF member, a regional panel member, and a subject matter expert
 - Merit criteria for funding includes the potential impact of invasion; the proposed approach and preparedness of the applicant; and the experience and qualifications of those implementing the funding; and the post-response commitment of the applicant
 - Each funding recipient will be required to report on their progress to the USFWS every six months and submit a final report due 120 days after the award period ends
- The ANSTF working group is determining how unused funds will be allocated and what metrics will be used to assess and track the performance of response efforts
- The ANSTF working group's next steps include discussing comments from ANSTF members and panels and presenting a final draft of the National EDRR Framework to the ANSTF in July 2023

Final comments and meeting adjournment

Eric Fischer, GLP Chair, Indiana DNR; Ceci Weibert, GLP Coordinator, GLC

- Weibert noted that the Panel is planning to meet in Ann Arbor, Michigan, in Fall 2023, and in Ontario, Canada in Spring 2024
- Fischer thanked the speakers, the Lake Erie Center, and Panel members for attending
- A motion to adjourn the meeting was accepted