

Great Lakes Panel on Aquatic Nuisance Species Meeting Summary

Virtual Meeting | October 26-28 – Virtual Meeting

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

Welcome and introductory remarks

Eric Fischer, Great Lakes Panel (GLP) Vice Chair, Indiana Department of Natural Resources and Ceci Weibert, GLP Coordinator, Great Lakes Commission (GLC)

- 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

GLP Business Items

Eric Fischer, GLP Vice Chair and Ceci Weibert, GLP Coordinator

- The June 2021 Great Lake Panel (GLP) meeting summary, incorporating revisions previously provided by GLP members, was approved
- Weibert summarized progress on and the status of the June 2021 GLP meeting action items

Response to GLP and NEANS joint recommendation to the ANSTF on GLLCISP funding

- Funding for GLLCISP was authorized for \$50 million for 2019 – 2023 for each year
 - The funding has not yet been appropriated by Congress
- The recommendation included ensuring funds are not taken away from other Great Lakes program, which was a concern the EPA shared
- Some confusion existed surrounding how funds are able to be appropriated since the EPA is not able to request funding
- A member from the EPA was identified to provide an update on the GLLCISP program at the upcoming ANS Task Force meeting as part of the response to this recommendation
 - U.S. EPA confirmed that there was not a line item in the FY22 President's Budget request for GLLCISP

GLP elections, membership review, and nominating committee announcement

- The GLP staff are required to do a bi-annual member review prior to GLP elections. The review was completed in October and was shared with GLP members
- Weibert reviewed proposed changes to GLP membership. An electronic vote will be held after the conclusion of the GLP meeting and will be finalized prior to the spring 2022 GLP meeting
- GLP members discussed the distinction between the pet industry and aquaculture industry, determining that separate representatives may be appropriate.
 - It was suggested that the GLP consider adding an aquaculture representative if there is interest from members and a representative can be identified. North Central Regional

Aquaculture Center (NCRAC) was previously an at-large member, but the GLP guidance operations do not specifically name this organization as a member, thus the membership was not renewed when the previous member left NRAC. A discussion on this topic will be added to the Executive Committee's (ExCom) agenda for consideration

- Tom Rayburn will propose an international shipping seat representative to the ExCom, as he will be retiring prior to the Spring 2022 Meeting and his seat will need to be backfilled
- The breakdown of different user group membership will change slightly given the proposed changes, but the ExCom is working to keep the balance similar
 - GLP members expressed concerns over increasing the number of members to the point where it could create problems for making progress on GLP objectives
- Sarah LeSage provided an update on GLP elections, in her role as the immediate past chair. The selection committee includes Sarah, Francine MacDonald, and John Navarro. Eric Fischer will move from acting chair to Chair at the Spring 2022 GLP Meeting
- There are currently vacancies for the Vice Chair, Policy Chair, and at large members; volunteers for the positions are welcome
- GLP elections are held via a slate vote instead of votes for individual positions

Committee reports

OIT Ad Hoc Committee

Francine MacDonald, NDMNRF

- MacDonald reviewed the outcomes from the BIOTIC Symposium, which was hosted in June 2020
 - A major outcome of the meeting was a desire to engage more in the Great Lakes Fisheries Commission's Law Enforcement Committee
- Tim Campbell and Ceci Weibert presented at the most recent Law Enforcement Committee meeting. LAW Committee members are planning to attend this week's OIT ad hoc meeting

Information/Education Committee (I/EC)

Doug Jensen, Minnesota Sea Grant

- Jensen reviewed the current I/EC action items
- The GLP website is slated to be updated with species profiles based on other panel websites
- The I/EC plans to work with the Research Coordination Committee of a template outreach/communication strategy to target and educate elected officials in in development

Research Coordination Committee (RCC)

Lindsay Chadderton, The Nature Conservancy

- Chadderton reviewed the status of action items from the Research Coordination Committee

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

Alisha Davidson, GLC Contractor, and Ceci Weibert, GLP Coordinator

- The upcoming manager surveys will use a spider web distribution approach
 - The surveys will be sent to AIS coordinators who will distribute them further accordingly. Committee members will be vital in the distribution process
- Davidson covered the priority plant species list that she is using for the literature reviews and the subsequent scoring.
 - She has completed 7 out of 20 literature reviews to date. The literature reviews include species that were of interest to managers and members. Species that were of lower interest, have lots of efforts already in place to control, or have more of a terrestrial presence were excluded from the priority plant species list
- Davidson discussed the components that she is including in the literature review for each species. Responses from the upcoming manager surveys will augment some of the information in the literature review
- The GLP can support the project by helping to distribute the manager surveys, which can help fill in the knowledge gaps

Programmatic Updates

GLANSIS

Rochelle Sturtevant, GLANSIS Program Manager, Michigan Sea Grant Extension

- GLANSIS has started the process of retiring species from the watchlist. Three species are proposed to be removed that have a low probability of introduction
- GLANSIS now has the capacity to upload Canadian data into the database. The Ontario Federation of Anglers and Hunters provided the initial data several years ago.
 - Members can send any Canadian data to GLANSIS
- The data can now be downloaded weekly on Fridays as a text file that can be imported into GIS
- Four new assessments have been added to the risk assessment clearinghouse. The clearinghouse now contains over 48,000 risk assessments
- Legislation was added to the risk assessment clearinghouse. Sturtevant covered how legislation is being incorporated in the clearinghouse.
 - Member commentary indicated this is a helpful resource and is worth investing time into
- GLANSIS has completed 9 out of 12 educator needs interviews, with MN and NY interviews still needing to be conducted.
 - Members were encouraged to send any New York teacher contact information to Rochelle or El Lower
- Rochelle sent out video link (<https://vimeo.com/bigfootcreates/review/625470092/0b0e27bdd4>) for review
- GLANSIS will be hosting two symposiums for the JASM meeting in May 2022

ANSTF

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

- Pasko covered the history, structure, and strategic plan of the Aquatic Nuisance Species (ANS) Task Force
- U.S. Fish and Wildlife Service provides \$50,000 dollars per panel per year
- 44 ANS state management plans have been approved in total, including 41 state plans and 3 interstate plans. Once plans are approved, the states are able to apply for funding. Each state received approximately \$95,000 in 2021
- Pasko reviewed and provided action item updates from June 2021 ANSTF meeting
 - The next ANSTF meeting is Nov 16-18, 2022
- Pasko reviewed and provided updates on ANSTF strategic plan objectives and subcommittee work

Great Lakes Water Quality Agreement Annex 6

Gavin Christie, Fisheries and Oceans Canada, and Mike Weimer, U.S. FWS

- Christie reviewed the purpose of Annex 6. The focus under the Water Quality Agreement is to reduce aquatic invasive species
- Weimer and Christie provided an update on the Annex 6 priorities, which include one science priority and five action priorities. These priorities are updated every three years
 - A new action priority includes a US-Canada Great Lakes federal agency mutual aid agreement for early detection and response
- The 2020-22 progress report, to highlight successes and challenges of Annex 6, is in development. These reports must be developed every three years
- There is an opportunity to contribute to sub-indicators for aquatic invasive species and provide input on the sub-indicator reports
- The State of the Great Lakes (SOGL) report will be released in June 2022
 - The report will look at the rate of secondary invasion among lakes broken down by pathway and assess impacts
- The SOGL messaging and highlights workshop will be November 1, 2021

Great Lakes St. Lawrence Governors & Premiers AIS Task Force

Mike Piskur, Great Lakes St. Lawrence Governors & Premiers

- Piskur provided an overview of the Great Lakes St. Lawrence Governors & Premiers. Their AIS Task Force has been increasingly active on AIS issues over the past five to seven years
- In 2013, a “Least Wanted” list was developed, which represented the highest risk species. Five new species were added in 2018 for a total of 21 species across fish, invertebrates, and plants
- The Mutual Aid Agreement is a good faith agreement between the Great Lakes states and provinces to prevent the introduction and spread of AIS and encourages resource and information sharing
- An outcome-based financing project for AIS, specifically focused on *Phragmites*, was overviewed.

- The project was piloted in the stormwater space successfully. The concept involves a similar approach for AIS but explored a different way to fund management and control work
- *Phragmites* presents an ideal proof of concept project. They are currently working with the Invasive Species Centre, The Nature Conservancy Canada and Quantified Ventures as partners
- Iceland Ocean Cluster is national initiative in Iceland and a joint venture to use 100% of the biomass fish
 - The project began with 40% of Cod biomass being utilized (as seafood, Omega-3 oil, fish leather, etc.) to currently 90% with the goal of 100%
 - The project goal is to take this idea and bring it to the Great Lakes region and apply it to invasive carp, with the idea of creating an industry around carp and create better incentives for invasive carp removal from the Great Lakes
- Piskur reviewed the next steps and ongoing work of the Great Lakes St. Lawrence Governors & Premiers

Great Lakes Detector of Invasive Aquatics in Trade (GLDIATR)

Erika Jensen, GLC

- GLDIATR is a 9-year effort that is wrapping up at the end of this year
- The GLDIATR program started as a webcrawler that collects, analyzes and allows users to access information about how many and what types of Great Lakes AIS are available for sale on the Internet
- Jensen provided an overview of the two phases of the Great Lakes Restorative Initiative EPA grant objectives and outcomes as well as the GLDIATR data workflow
- Across Bing web search results, Amazon, and eBay, GLDIATR was able to scan 582,000 pages a month (or 19,400 pages per day)
- GLDIATR's base code for web scraping, which was novel when first developed, became outdated and was not sustainable to continue to update and maintain. There are now third-party web crawling services available
 - As part of the revised Phase II work plan, three potential third-party web crawling providers were evaluated to see if they could serve the same purpose, two of which are likely candidates for future work
- A target species list was established by the GLDIATR Advisory Committee that met the following criteria: found in the U.S. or Canada, on a species watchlist, poses a risk to the region, and management agencies are willing to talk action if identified
 - These target species are the basis for the GLDIATR web page search for sales pages
- GLC staff are currently in the process of summarizing the results of the GLDIATR effort
 - Of the 22 target species that were searched for, 17 species were available for sale by 385 sellers, 66 of which were in the Great Lakes and 286 in the U.S. and Canada
 - Jensen reviewed the breakdown by species and location
- Once sellers were identified, the Advisory Committee members and other partners worked to reach out to the identified sellers either via phone, email, eBay message, contract form, or site visit. Of the 126 sellers that were reached out to, 36% responded
- After sellers were contacted, 67 websites were rechecked and of those, 8 were no longer selling the target species

- Next steps for GLDIATR includes completing a final report and a holding a discussion with stakeholders from the GLP and Advisory Committee
- The GLC does not currently have funding in place to continue this effort
- Further discussion is planned at OIT Ad Hoc Committee meeting on Thursday during the GLP meeting

Emerging issues and announcements

- None presented

Public comment period

- No public comments received
- GLP Business Session was adjourned

Plenary Session: Regional AIS Coordination through GLRI Interjurisdictional Projects

Welcome and introductory remarks

Sarah LeSage, Michigan EGLE

- LeSage called the meeting to order. The agenda and discussion prompts were reviewed

Background on interjurisdictional projects and selection process

Rob Simmonds, U.S. Fish and Wildlife Service

- Fiscal year 2020 was the first year for the interjurisdictional project and selection process
- A potential project list is developed each year based on Great Lakes Panel (GLP) AIS priorities, efforts addressing the Great Lakes St. Lawrence Governors & Premiers Least Wanted Species list, and shared interests/efforts among ongoing projects that multiple states are already working on (e.g., behavior change-based outreach, or the collective need to have treatment options more readily available for newly invading species)
- The potential project list is then distributed to states and tribes to add ideas to, and to rank potential projects according to highest need and/or if there is sufficient interest and scoping to develop a full proposal around
 - The highest-ranking options are discussed on conference calls between state and tribal representatives and eventually turned into a project
 - Interested states and tribes work together to identify a suite of projects that meet their highest priority needs and fit the available funding
 - Finally, an entity must be identified to lead the project (and submit the application) and manage the grant funding. This could be a state, tribe, or their designee
- The key to scoring well for this grant opportunity is to demonstrate support by multiple states and tribes, so one would need to have a coalition bring forward a project if it was to get funded
- The GLP is a good option to help translate overall Great Lakes priorities into interjurisdictional projects since the Panel is already identifying priority needs
 - In addition to addressing the needs of states and tribes, there's an added benefit of knowing what projects might also benefit the non-state/tribal members of the GLP

- The collaborative process is optional. A Notice of Funding Opportunity is posted that any Great Lakes state, tribe, or designee can apply to, but given the primary selection criteria for projects is support by multiple states and tribes, collaboration is strongly encouraged

Interstate Early Detection & Rapid Response

Lindsay Chadderton, TNC, and Ceci Weibert, GLC

- The purpose of the interstate early detection and rapid response (IEDRR) grants are to develop tools and documents that support region surveillance and response and to work with the GLRI actions goals to help with detection and tracking of newly identified invasives.
 - The scope of these grants has been primarily for Great Lakes waters, with Phase IV of the grant focusing more on inland waters
- A surveillance species watchlist was developed based on GLANSRA species risks assessments; species with low impact scores were removed from the list of all possible watchlist species resulting in a surveillance list of 144 species
 - The surveillance species list is informing the development of sampling methods and surveillance site prioritization
- Surveillance site prioritization is a system based on an additive model that combines surrogate propagule pressure to the major pathways of invasion, to predict the likelihood of AIS introduction at coastal sites spanning the U.S waters of the Great Lakes
- Annual surveillance coordination meetings allow participants ranging from federal, state, and tribal entities to academic researchers to share annual surveillance results, horizon scanning efforts, advances in surveillance methods, and future priority setting
- A surveillance framework has been developed to aid in the efficiency of surveillance efforts and also provides operational guidance including adaptive management
- In addition to the surveillance framework, a regional response plan based on the 2010 Mississippi River Basin Panel model provides guidance to management agencies on how to assess potential threats to the region and coordinate a regional response
- A series of regional response exercises have been conducted alongside product development. These fictional response effort help build response capacity and refine regional response frameworks and communication plans
- In the second phase of development, it became apparent that there needed to be increased clarity and guidance who needs to be communicating with who and what information should be included.
 - In the third phase of development, a complementary communication protocol that can work both with the surveillance coordination framework and the regional response plan was developed in response to this need
- Another key gap that was identified was that there was not a lot of macrophyte surveillance in the Great Lakes. Through Phase II-III, five different sites were surveyed. The outcome was a method that is quite intensive, detecting 80-90% of the species pool for the area
- An aquatic plant pathway risk assessment was also developed as a way to explore pathways by which invasive aquatic plants can enter the basin that classifies pathways by associated risk levels. Gaps in prevention efforts were identified including a review of approaches used in each Great Lake state for education, management and compliance, and law enforcement
 - The output of this assessment aims to help states and regional partners quantify pathway activity for invasive aquatic plants

- Phase IV of the IEDRR (2021-2022) has four objectives:
 - Objective 1: Facilitate interjurisdictional surveillance planning and coordination
 - Objective 2: Refine the Great Lakes Priority Models. This will incorporate ports with the Great Lakes. This objective will investigate how to build natural connectivity and environment suitability.
 - Objective 3: Expand the site prioritization system to inland waters of Great Lakes States and Tribal territories
 - This objective will bring existing state prioritization efforts together
 - Objective 4: Building out IAP invasive aquatic plant methods to inland lakes.
- A separate, standalone programmatic website is also in development to make all of these tools, products, and resources publicly accessible

Boater Behavior Survey

Tim Campbell, Wisconsin Sea Grant

- This interjurisdictional project seeks to establish a working group to publish a literature review of boater behavior change research and outcomes that is accessible to AIS managers. This project will also seek to establish consistent social science methods for evaluating boater behaviors in regard to AIS throughout the Great Lakes basin
- Once methods have been developed, behavior change surveys will be implemented in participating states (IL, IN, MI, OH, PA) and results of those surveys will be compared to existing ongoing survey efforts MN, WI and NY
 - The results will be released in on comprehensive report
- Different states might have different branded outreach messaging, but what this project will investigate is if boaters are taking the recommended prevention actions, and if boaters recognize their statewide outreach brand.
- The grant also allowed for some funding to determine needs for AIS message testing
- Tasks that have been completed so far include:
 - Literature review on boater behavior and boats as a pathway of invasive species
 - Collection of regional and statewide boater surveys from 1994-current
- Next step for this project is to develop a survey instrument, logistics for the survey implementation and measure testing priorities

Aquatic Plant Survey Implementation

Julie Heinlein, Great Lakes Environmental Center

- Early detection of invasive aquatic plants in coastal waters of the Great Lakes builds on previous interjurisdictional early detection and response projects
- TNC subsequently developed an early detection survey design and sampling approach that increases survey efficiency and facilitates a quantitative assessment of survey performance
- This project builds on this progress by operationalizing a regional aquatic plant surveillance program based on the TNC sampling protocol, the species watchlist, and site priorities identified by that interstate team
- Project is a 3-year baseline survey starting in 2022 that is targeting many of the yet-to-be-surveyed top 25 priority sites and a number of additional sites based on emergent risks or regional incursion response efforts
- A total of 16 sites were selected to be surveyed in the next three years

- Sampling will be a standard plant sampling using a double-sided rake or hand pulling to enable identification of resident plant species
- A certified botanist will be present during sampling efforts to aid in accurate species identification. They will be using an accepting set of keys that has been used for Great Lakes macrophytes in the past

Watermilfoil Management Given Variations in Response to Herbicides for Different Strains

Ryan Thum, Montana State University

- Genetic variation in AIS populations can influence management outcomes. So, it is important to figure out how we can use genetic information to predict management response
- There is genetic diversity in Eurasian watermilfoil, and that diversity influences response to management
- The goal of the project is to connect the molecular information of watermilfoil to how they responded to herbicide out in the field and therefore improve management actions
- Database creation and management of this project has included:
 - An experiment using watermilfoil collection from a variety of regions and tested on their response to fluoridone (a popular herbicide in MI)
 - Results found that some strains of watermilfoil were more sensitive than others to fluoridone. This information will help managers to understand what herbicide is best to use in their geographic region

Invasive Crayfish Early Detection and Surveillance

Brian Roth, Michigan State University

- Invasive crayfishes represent a basin wide threat to Great Lakes ecosystems and human infrastructure and the live trade is a likely vector of introduction. While there are many restrictions in place in the live trade, compliance is often a problem
 - Once crayfish get into a system, the response effort is costly
- The project includes many partners basin-wide and is in the first of three phases
- Objectives of this project include:
 - Identify introduction pathways and data gaps which will help determine priority locations for early detection and monitoring.
 - This will include an updated compilation of literature and datasets of invasions and invasion pathways in the Great Lakes
 - Understand the prevalence of invasive crayfishes in the retail aquarium trade which will include a region-wide database
 - To develop relationship for education outreach and bring training material to a focal audience
 - The hope for Phase II of the project is to design and test standardized early detection methodologies that can be used across the basin
 - For Phase III, the project goal is the implementation and evaluation stage where we can develop sampling methodologies for early detection across the basin and implement and evaluate the outreach efforts
- The timeline for this project is:
 - Phase I: Jan 2022-Dec 2023
 - Phase II: Jan 2021-Dec 2026
 - Phase III: Jan 2027-Dec 2029

Great Lakes AIS Landing Blitz

Ceci Weibert, GLC

- The Great Lakes AIS Landing Blitz, a coordinated regional outreach effort targeting recreational boaters, has been supported by the Great Lakes Panel in the past
- Prior to 2019, individual Landing Blitz events were happening within individual jurisdictions. Under the leadership of Michigan Environment, Great Lakes and Energy, the first regionally coordinated Great Lakes AIS Landing Blitz was held in 2019. Over the past three years, the events have been extremely successful, educating approximately 380,000 boaters and performing 335,000 inspections
- Analysis of project map where location events were held in 2021 highlighted the uneven spread of event locations in the northern region of the Great Lakes. This posed the question; how can we improve Landing Blitz outreach in the southern Great Lakes region?
- Project officially starts January 1, 2022, and will run through December 31, 2023
- The project team will be comprised of representatives from Great Lakes states and Tribes

Q&A and Discussion

GLP Members

- What role could the GLP play in future project submissions and/or selections?
 - It was mentioned that one role the GLP could play will be a coordination and organizational role to help streamline the process and lift that responsibility from FWS
 - The most difficult part of the process is coming up with the initial list of priorities and project ideas. The GLP is an ideal place to have those conversations because it consists of many different AIS interests and expertise
 - Committees can take the lead on identifying projects
 - It was noted that we need to continue and ensure Tribal participation in the process
- How can the GLP continue to support and improve regional AIS coordination through these projects?
 - Annual updates on projects are valuable, and the GLP provides a venue for continued collaboration with these efforts
 - The GLP can also work to identify remaining gaps within regional coordination, working at a higher level to prioritize these needs
 - The GLP also provides spaces in-depth discussion, project workshops, and trainings of tools that are in use and could be scaled up to a regional scope

Plenary Session: Social Science and AIS Management

Welcome and introductory remarks

Doug Jensen, I/EC Chair, University of Minnesota Sea Grant Program

- Jensen introduced the session and reflected on how the Great Lakes Panel (GLP) and the Information-Education Committee have supported outreach efforts and advancement of social science in the past

GLP issue engagement/issue primer

Tim Campbell, Wisconsin Sea Grant

- Campbell reviewed the needs for relying on social science when designing outreach messages and material
- The diversity of social sciences disciplines can help us diversify outreach efforts and allow us to answer new and existing outreach questions

Willingness to pay for AIS management at Minnesota lakes

Lucy Levers, University of Minnesota

- Levers et al. conducted surveys at lakes throughout Minnesota in coordination with the Minnesota Aquatic Invasives Species Research Center to assess the values and attitudes of lake users and how they differ between lakes that are infested with aquatic invasive species (AIS) versus lakes that are free of invasion
 - Shared video that provided an overview of the research conducted (<https://youtu.be/756MCDt3aX0>)
- Chose 4 different Minnesota lakes to survey and reviewed the results in an article published by the research team (<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0246860>)
- The research team looked at changes in attitudes given the presence of two different invasive species: stary stonewort and zebra mussels
- The survey asked anglers about their willingness to pay by making lake access fee-based
 - Willingness to pay changed across multiple variables. Average willingness to pay did not change (\$9-10 per day) if the lake was infested or not. The individual characteristics of the people surveyed (e.g., age, gender) was a more important factor than the characteristics of the lakes themselves (i.e., infested vs uninfested)
- Within the survey, AIS were framed in a negative light (e.g., used terms such as “invasive” and described impacts) but did use more neutral imagery to avoid biasing respondents

Lakeshore property owners' attitudes toward aquatic invasive species management strategies

Bret Shaw, University of Wisconsin

- There is currently limited research on lakeshore property owners as the main stakeholder and how they respond once an AIS is present in their local lakes. Most research is focused on transient boaters who do not live on the lake
- The lakeshore property owner survey Shaw et al. conducted on how homeowners feel about invasive species practices within Wisconsin and explored how to improve messaging to both prevent and manage AIS
 - Nativist metaphors invoke a fear response to encourage stakeholders to take action
 - Tested different messaging and found that a straightforward science approach performed just as well as fear inducing approaches
 - There have been a number of products from this project: a report (<https://go.wisc.edu/aisreport>), a press release (<https://go.wisc.edu/xzpo12>), and a newsletter piece more geared towards lake organizations (<https://go.wisc.edu/e29r1f>)
- Lakeshore property owners are getting most of their AIS education through homeowner/ lake associations, and many stakeholders are aware of how to prevent AIS but not how to manage nor what management techniques are being implemented on their local lakes

- Stakeholders are most unfamiliar with regulatory, physical, and biological management options
- Lakeshore owners know that AIS are harmful and may be prone to overreacting when an AIS is detected within their lake
- Respondents were asked questions to assess their risk/benefits with different management options. Manual and mechanical benefits outweigh the risks of implementation. The risk likely outweighed the benefits of chemical and biological controls options and are often seen as a last resort
 - Negative emotions tend to predict preferences for specific management strategies and influence decisions made
- Discussed recommendations for engaging and communicating with lakeshore property owners that came out of the lakeshore owners survey
- The next steps include creating a rapid response kit for homeowners with AIS to let them know what their management options are. Can utilize social media including local ads and newsletters
 - The toolkit includes a factsheet, newsletter article, and template social media posts. Would like to develop a website for science-based information on aquatic plant management
- Negative emotions are more likely to predict a more aggressive management strategy. Positive emotions did not seem to drive decisions. This is the rational for wanted to avoid the unintended consequences of negative/fear-based outreach

Genetic Biocontrol of Invasive Rodents (GBIRd) partnership

Jason Delborne, North Carolina State University

- One aspect of the international multidisciplinary Genetic Biocontrol of Invasive Rodents (GBIRd) partnership is using gene drives to control invasive rodents. Gene drives work by changing the odds of inheritance from one generation to the next and transform mice populations to all male to collapse populations
 - Gene drives can be controversial thus public engagement cannot be an afterthought. Outcomes of engagement are likely as important as the science to do so
- Delborne's team conducted a landscape analysis by interviewing stakeholders around the world to understand the interest in genetic biocontrol
- An in-person workshop was hosted in 2019 prior to the development of a genetically modified gene drive mouse so a group of diverse stakeholders could have input in what decisions were made
 - Used a structured decision making approach to explore different scenarios
- Reviewed lessons learned for workshop engagement
 - A report was published based on the workshop (<https://research.ncsu.edu/ges/2019/06/workshop-report-gene-drive-mice/>)
- Ideally, next steps include expanding to solicit feedback from indigenous groups, identify potential islands for the release of a gene drive mouse, and seek partnerships with local groups
- Experiments are underway to design a gene drive mouse, however, one has not been created at this time
- There has been a lot of discussion about who is the best convener for stakeholder engagement but there is not clear guidance. There may be an advantage to including a facilitator who has community trust

- The Great Lakes has an additional level of complexity with so many jurisdictions that are very interconnected so any actions taken in one area would have impacts in other jurisdictions. We need to think about the scale of engagement, keep expertise at the table, do more than a standard public comment period
- It is important to be honest and open with the public that genetic biocontrol technologies are GMOs, however they are a different generation of GMOs from the first round of genetically modified crops we often think of. The public is generally receptive to the benefits of genetic biocontrol over other technologies and control methods
- Many of the concerns the public has regarding gene drives surround the potential for spread and it is important to organize stakeholder dialogs where we compare different technologies and thinking about this as a management decision that is based on the latest research

Economics of AIS and effectiveness of outreach campaigns in Illinois

Reuben Keller, Loyola University Chicago

- There is a large economic impact of AIS in the Great Lakes that is difficult to estimate and thus not well understood
- Long-term outreach efforts have been in place to reduce the overall impacts from AIS based on the idea that water users are more likely to change behavior to reduce risk, leading to fewer invasions. This effort requires a large financial investment
- Typically, outreach is evaluated by estimating how much outreach was conducted instead of looking at how well that outreach worked (i.e., was there a behavior change). Often the lack of funding prevents the assessment of these additional metrics
- Keller's team interviewed managers in Illinois from 14 outreach organizations. They compared responses with a paired boater survey that was sent out across the state and asked what they knew about AIS, what outreach they've received, and what actions they take to prevent AIS
- The organization survey found that each outreach organization interviewed coordinate their messages with other organizations, with a few taking the lead
 - None of the organizations had a rigorous or formal assessment of the effectiveness of their outreach efforts
- The paired boater survey found that boaters were aware of 5-6 AIS and many took actions to avoid spreading
 - No relationship was found between increased outreach/engagement of boaters and their behavior cleaning boats
 - There was a weak correlation between awareness of AIS and willingness to take action, although it explains very little of the overall boater behavior
 - The likelihood of a boater to travel between waterbodies also does not change boater cleaning behavior
- The landscape is likely saturated with outreach materials and this explain why additional outreach materials is not resulting in additional behavior changes
- It would be likely be more effective to target resources towards groups that are more likely to change their behavior and design materials specifically for those groups

Social-ecological systems

Elizabeth Golebie, University of Illinois

- Golebie takes a conservation psychology approach to her research by identifying ways to change behavior to minimize the risk of AIS transport
 - We need to understand why specific behaviors are occurring before we can change them, so one must look at psychological factors to help predict behavior
- Many previous studies focus on knowledge of AIS. These studies tell us there is a knowledge-action gap, where a large proportion of people will not change behavior based on knowledge alone and require additional motivation
- To change behavior, we need to consider other factors like values, which are stable. If a stakeholder can be convinced that taking an action aligns with their values, it can help permanently change behavior
- Golebie et al. conducted an angler survey aimed at understanding angler behavior and values
 - Reviewed the three study questions and provided an overview of the methodology used to develop and implement the survey
 - Anglers surveyed reported that they washed boats rarely to sometimes which highlights the knowledge-action gap
 - Personal risks were more influential at predicting behavior
 - Social risk perceptions predicted Great Lake boater behavior social risk outreach should be complimented by personal outreach. Inland waterway anglers are more impacted by personal outreach and mixed-use anglers are also influenced by egoistic values
- Focusing outreach on longer-term drivers of behavior will likely yield long-term behavior changes for individuals while outreach focusing on values/ personal risk will reach a group
- Golebie collaborated with Illinois-Indiana Sea Grant to look at implementing values framing in messaging via a survey experiment to evaluate biospheric and egoistic values
- It may not be possible to align divergent stakeholder and management agencies, but it is important to recognize those differences and where those values and core beliefs come from

Q&A and Discussion

GLP Members and Speakers

- There is interest in continuing to engage social scientists in AIS management and many opportunities exist to collaborate on research projects, co-create research questions, and identify applied outcome. Using social science to engage stakeholders early in the process (prior to the selection of management actions) can help build trust and buy-in
- There are different types of invasive species public knowledge, specifically species awareness and awareness of available prevention methods. The public are generally interested in being able to identify invasive species although that type of knowledge is unlikely to change behavior
- People's values and attributes are bigger determinates of their actions than if they are aware that an invasive species is present in an area, which highlights how knowledge of this issues does not equate to actions taken. The public cares more about the larger issue of invasive species and less about the presence/impacts of a single invader
- Social scientists are unlikely to work exclusively on invasive species even though many of the current management issues surrounding invasive species (e.g., prevention, behavior changes to prevent spread) are largely social science based. The ecological and social science communities have an opportunity to learn from each other

- It is important to GLP members to continue looking at knowledge/behavior gaps that need to be addressed and how best to push past the standard outreach efforts. May need to shift where we are investing our resources and focus on the group of stakeholders who is likely to see a behavior change

Great Lakes Panel Closing Session

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

- Eric Fischer called the meeting to order and reviewed agenda

Committee reports

Committee chairs

- Committee chairs reviewed outcomes and discussions held during committee meetings; committee meeting notes are available separately

Spring meeting plans

GLP Staff

- Current Department of Interior COVID-19 policies restrict the GLP from meeting in-person until further notice. Therefore, the spring 2022 will be held virtually
- There are currently four possible dates for the Spring meeting (weeks of 5/23, 5/30, 6/6, 6/13). The ExComm will send a poll to GLP members to get feedback on dates following this meeting
- An additional survey will be sent out for GLP members to vote on member changes and elections