Great Lakes Panel Member Updates
Spring 2023

Meeting of the Great Lakes Panel on Aquatic Nuisance Species
May 15-17, 2023 | Oregon, Ohio

U.S. Federal

U.S. Fish and Wildlife Service
No update provided.

Contact: Amy McGovern, U.S. Fish and Wildlife Service, 612-713-5109, amy_mcgovern@fws.gov

National Oceanic and Atmospheric Administration

NOAA GLERL scientists continue to conduct long term research near Muskegon on Lake Michigan, which included winter-spring observations in November, December, January, March, April, and May. This broad temporal coverage provides additional insight into population dynamics for species such as *Bythotrephes, Cercopagis*, and *dreissenid* veligers. Work to evaluate veliger growth and production is ongoing.

There is a new NOAA BIL funded habitat restoration project titled: "Wisconsin Coastal Management Program/Bayfield County: Sand River Headwaters Acquisition", which has some invasive species connections. This project will allow Bayfield County to acquire 2,001 acres of ecologically significant land that are vital to the health and functioning of Lake Superior's coastal resources. The ecosystems within the acquired land provide stopover habitat for migratory birds, spawning areas for Great Lakes fish, aesthetic views of Lake Superior, and passive recreation.

Contact: Ashley Elgin, National Oceanic and Atmospheric Administration, 616-414-1059, ashley.elgin@noaa.gov

National Park Service
No update provided.

Contact: Brenda Lafrancois, National Park Service, 715-682-0631, brenda_moraska_lafrancois@nps.gov

U.S. Army Corps of Engineers
No update provided.

Contact: Mike Greer, U.S. Army Corps of Engineers Buffalo District, 716-879-4229, michael.j.greer@usace.army.mil

U.S. Coast Guard
<u>Ballast Water Regulation</u>
The Coast Guard published its ballast water discharge standard regulation in the Spring of 2012. The standard aligns with the IMO D-2 standard and require the installation of type-approved ballast water

management systems (BWMS) on "salties". The use of type approved ballast water management methods are required on those new ships constructed after 1 DEC 2013 and will be implemented on existing ships during the vessel's first scheduled drydock after 2014 or 2016 depending on the vessel's BW tank capacity and availability of type approved systems.
The Coast Guard anticipates that more than 3,000 United States domestic vessels in various classes will be required to install an approved ballast water management system (BWMS). In addition, about 9,000 foreign vessels that enter U.S. waters each year will be subject to the rule. The IMO estimates that more than 60,000 vessels worldwide will need to comply with the Ballast Water Management Convention when it enters into force.

CG Type Approval

The multi-faceted type approval process consists of land-based and shipboard-based testing (by independent labs) focused on the biological efficacy of the BWMS. For those systems whose performance could be affected by the cold and pure fresh water of the Great Lakes, additional testing may be necessary. Assessment of the BWMS' ability to properly operate in the harsh marine environment is also undertaken and all of the system's components are examined to ensure compliance with marine engineering, electrical, and mechanical standards. This testing and certification is usually conducted by vessel classification societies. The Coast Guard has certified five Independent Labs (IL) that are involved in the type approval process. Duluth-Superior's Great Ship Initiative is part of a certified IL. As of May 2023, the Coast Guard's Marine Safety Center has type approved 50 BW treatment systems.

Ballast Water Working Group (BWWG)

The Ballast Water Working Group has completed the 2022 annual report and it is posted on this website; 2022 Summary of Great Lakes Ballast Water Management (greatlakes-seaway.com)
In 2022, 100% of vessels bound for the Great Lakes Seaway from outside the Exclusive Economic Zone (EEZ) received ballast management exams on each Seaway transit. In total, all 10239 ballast tanks were assessed during the 521 vessel transits. Vessels that did not exchange their ballast water or flush their ballast tanks were required to either retain the ballast water and residuals on board, treat the ballast water in an environmentally sound and approved manner, or return to sea to conduct a ballast water exchange.
In 2022, there were 431 foreign flagged ships with a working Ballast Water Treatment System (BWTS) onboard (206 on first transit, 225 on subsequent transit). Vessels that were unable to exchange their ballast water/residuals and that were required to retain them onboard received a verification exam during their outbound transit prior to exiting the Seaway. In addition,100% of Ballast Water Reporting Forms (BWRFs) were screened to assess ballast water history, compliance, voyage information and proposed discharge location. BWWG verification efforts indicated that there was no non- compliant ballast water discharged in the Great Lakes Seaway system.
Vessel Incidental Discharge Act (VIDA)
On December 4th, 2018, the Vessel Incidental Discharge Act was signed into law as part of the Coast Guard Authorization Act. The title provides for a uniform, national standard to govern discharges that are incidental to vessel operations, such as ballast water discharges. It makes the Environmental Protection Agency the lead for establishing these standards, and it makes the Coast Guard the lead for monitoring and enforcing the standards. The Coast Guard and the EPA are working on their respective regulatory mandates.
On Monday, October 26th, 2020 the EPA published its "Vessel Incidental Discharge National Standards of Performance" proposed rule in the *Federal Register*. This proposed rule would establish national standards of performance for discharges incidental to the normal operation of a vessel that will apply primarily to commercial vessels 79 feet in length and above that discharge into waters of the United

States or waters of the contiguous zone. The proposed rule also includes procedures for states to petition EPA for additional requirements as provided for under the VIDA. Public comments on the proposed rule were accepted for 30 days and the EPA is currently reviewing the comments from the docket.
VIDA requires the USCG to promulgate implementation, compliance, and enforcement requirements for EPA's national performance standards:

- The USCG program will be no less stringent than the EPA's current VGP, to ensure, monitor, and enforce compliance with the EPA's national performance standards.
- Implementing regulations will include vessel management practices, design and construction, testing, approval, installation, and use of marine pollution control devices.
- VIDA includes additional requirements such as developing an intergovernmental workgroup with Federal and State agency cooperation, submitting annual invasive species reports to congress, and developing an invasive species contingency plan.

The Coast Guard established a working group in December 2019 to help implement several of state coordination requirements. The Ballast Water Reporting and Enforcement Data Working Group with interested State partners, the CG's Navigation Center, EPA, and members of the Smithsonian's National Ballast Water Information Clearinghouse (NBIC) continues their work virtually. This workgroup's current focus has been on ensuring States have access to the Marine Traffic Automatic Identification System, as well as information on how to receive commercial vessel BW reporting information from NBIC. The participating states now have direct access to the NBIC data.

- Note: The EPA is developing a Supplemental Notice to the Vessel Incidental Discharge National Standards of Performance proposed rule. EPA anticipates that the Supplemental Notice will provide clarification on the proposed rule, share new ballast water data that EPA is receiving from the U.S. Coast Guard, and discuss additional regulatory options EPA is considering for the final rule. EPA intends to sign the Supplemental Notice in the Fall of 2023 and make it available for public comment in the Federal Register shortly thereafter. During the comment period, EPA will solicit comments specific to the issues identified in the Supplemental Notice. EPA anticipates that the final rule addressing public comments received on both the proposed rule and the Supplemental Notice will be signed for publication in the Fall of 2024. This schedule will be reflected in the 2023 Spring Semi-Annual Regulatory Agenda.

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Contact: Lorne Thomas, U.S. Coast Guard Ninth District, 216-902-6022, Lorne.w.thomas@uscg.mil

U.S. Forest Service
No update provided.

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U.S. Department of Agriculture-APHIS
No update provided.

Contact: Vacant

U.S. Department of State
No update provided.

Contact: Nadia Sbeih, U.S. Department of State, 202-647-3228, SbeihND@state.gov

U.S. Environmental Protection Agency
No update provided.

Contact: Kevin O'Donnell, U.S. EPA- Great Lakes National Program Office, 312-353-0813, ODonnell.Thomas@epa.gov

U.S. Geological Survey
Invasive Crayfish Control Technologies

USGS continues collaborative research with Michigan DNR on control of invasive crayfish Highlights from this research include:

- Chemical treatments of ponds and burrows in Michigan
    - Workplans for chemical treatments in 2023 were completed and approved
    - Permits for chemical treatments in 2023 are approved
    - Training on new chemical application system will be conducted in May 2023
    - Treatments of pond planned for late May 2023 and Sept 2023
    - Burrows will also be treated with Benseal
    - Burrows will be treated with hot water, if ongoing trials yield promising results
- Laboratory and experimental pond studies planned or ongoing in FY23
    - Chemoreception and behavioral responses to enhance aggregation/harvest of crayfish
    - Completed acute toxicity of CO_2 to adult crayfish, plan to test juvenile crayfish in FY23/24
    - Trials to test the effectiveness of hot water using a commercial hot water pressure washer on drained pond-bottom burrows are planned for FY23
    - Burrowing chamber trials to test environmental cues to trigger and/or suppress burrowing by adults are ongoing
    - Laboratory flume trials using internally pit-tagged crayfish to test effectiveness of flow as an attractant/repellent are ongoing
- Master student research
    - Use of telemetry and pit tags to assess impacts of CO_2 and flow on pond populations of red swamp crayfish
    - Effectiveness of pyrethrin, Benseal (clay sealant), and/or hot water (singly and in combination) in treating red swamp crayfish in burrows
    - Effects of environmental cues on triggering/suppressing burrowing behavior
- Working groups continue
    - Possible registration of pyrethrin are ongoing
    - Sterile male technologies are being investigated
        - Physical manipulation
        - RNAi
        - Neofemale
- Research Products
    - Five peer-reviewed manuscripts and USGS reports on physical blocker treatments, chemical treatments in ponds and burrows, acute toxicity of CO_2 on adult crayfish, acoustic telemetry evaluation of invasive crayfish behaviors, CO2 as behavior control
    - Three data releases tied to publications above

- Several presentations at professional meetings

Grass Carp research

Early life history

USGS early life history research provides managers spawning locations of Grass carp to inform control efforts to minimize risks of Grass Carp expansion in the Great Lakes. Prior to 2022, Grass Carp spawning had only been documented in the Maumee and Sandusky rivers in Ohio. During the 2022 field season, we sampled seven Great Lakes tributaries for Grass Carp eggs and larvae, including the Cuyahoga (OH), Grand (OH), Huron (OH), Maumee, Sandusky, St. Joseph (MI), and Tittabawassee (MI) rivers. Fourteen eggs with characteristics similar to Grass Carp eggs were discovered from the Huron River (Ohio) and were confirmed as Grass Carp eggs using genetics. For 2023, we will conduct focused efforts on monitoring the Huron River for Grass Carp eggs and larvae, continue monitoring five additional Great Lakes tributaries (Cuyahoga, Grand (Ohio), Maumee, Sandusky, and St. Joseph), and integrate new sampling gears. We will also conduct research to examine how time of day and hydrological factors influence spawning initiation, estimate detection probabilities of existing sampling gears, and evaluate spawning synchrony with other species using DNA metabarcoding.

Grass carp spawning robotic eDNA surveillance

The USGS conducted a pilot study using an automated water sampler to determine if environmental DNA from Grass Carp could be used to detect spawning. A sampler was deployed for ~2 months in 2022 near Wightman's Grove and sampled water during one confirmed Grass Carp spawning event. Analyses demonstrated a correlation between eDNA detections and confirmed spawning events, with overall eDNA detections outside of spawning conditions rare. A manuscript is in preparation.

We concluded attempts to use DNA from Grass Carp eggs to attempt to estimate numbers of spawners from a 2017 event. Additional testing indicated that it is possible that DNA concentration from eggs was not sufficient for reliable genotyping. We are currently working on completing simulations that can guide future study design for genetic spawning estimation. We are also considering population genetic approaches that could test whether different tributaries have unique genetic spawning populations.

Acoustic telemetry

This project is addresses Grass Carp movement and habitat use at both coarse and fine scales to improve efficiency of eradication efforts in Ohio, Michigan, Pennsylvania, and New York jurisdictional waters of Lakes Erie and Huron including tributaries to these lakes. In FY23, USGS deployed 25 VPS receivers for the third year around the confirmed Grass Carp Spawning location in the Sandusky River near Brady's Island in Fremont, Ohio. To aid in the development of a planned behavioral barrier to disrupt Grass Carp spawning and minimize impacts to native fishes at this location, 57 native fish were tagged in April and May of 2023. This was the second year native fish have been tagged in the Sandusky River bringing the total to 182 fish tagged across 8 species. One new real-time receiver has been installed on a nearshore buoy in Lake Erie adjacent to the mouth of the Huron River (Huron, OH), the third confirm spawning tributary in the Lake Erie basin. We will deploy three new receivers in the Huron River to track movement of Grass Carp and inform the increase in planned removal efforts for 2023 in this system. The first monthly download of the 6 stations in the near real-time alert array has been completed for May 2023 and will continue with periodic updates for removal crews throughout the summer and into the fall. There will also be a coordinated and concerted effort to tag additional Grass Carp starting in the spring of 2023 that will be focused on the Sandusky and Maumee rivers to ensure

the continuation of Grass Carp movement and habitat use information to aid in removal efforts of this invasive species.

U.S. Geological Survey deployed 100 acoustic receivers in the lower Sandusky River spanning 10 rkm in late April 2023. This is the second year the extended array (SRVPS) has been deployed. The SRVPS array has generated valuable data on Grass Carp movements and habitat use. The array will also help inform native fish movement in preparation for a behavioral barrier constructed on the river. A Master's student at the University of Toledo will be processing data generated by USGS receivers.

The Grass Carp Advisory Committee telemetry task group identified critical locations in the upper Maumee which need to be monitored for tagged Grass Carp. USGS in conjunction with the Michigan Department of Natural Resources and U.S. Fish and Wildlife Service scouted and deployed 19 acoustic receivers every 2-4 rkms. The new array was deployed in early May 2023 and spans 35 rkms from RKM 53 to 88. This stretch of the Maumee River has seen a marked increase in Grass Carp captures starting in 2022, hence the increased telemetry focus.

In support of GCAC's continuing interest in acoustic telemetry data related to Grass Carp, USGS hosted a surgery workshop to increase the number of trained surgeons in the Lake Erie basin. A concerted effort will be made in 2023 to tag additional Grass Carp.

Bait and attractant studies

USGS continues to test amino acid mixtures on Grass Carp and Silver Carp for physiological responses. This research is intended to identify candidate compounds as attractants that can be incorporated into baits for Grass Carp or food-sized microparticles for filter-feeding Silver Carp. We are using genetic metabarcoding of diets of Grass Carp removed from Lake Erie to identify species of vegetation consumed which will inform potential bait formulations and, in combination with recently published data on vegetation in western Lake Erie, locations where Grass Carp feed to inform where to deploy baits and attractants.

In 2022, USGS deployed nine bait/attractant platforms in the Sandusky River to test the congregating ability of one bait and one algal attractant pellet. Using the extended VPS array (see USGS update on acoustic telemetry) we have been able to conduct preliminary analysis. The VPS array produces two-dimensional position over a wide area which encompassed all feeding platforms in the river. During feeding trials, when bait and attractant are being delivered, tagged Grass Carp were in closer proximity to the platforms than at any other time or at any of the three control sites. Additional analyses are ongoing.

<u>Phragmites research</u>

Great Lakes Phragmites Collaborative

The GLC and USGS are jointly leading a regional partnership – the Great Lakes Phragmites Collaborative (GLPC) – to improve communication and collaboration leading to more coordinated, efficient and strategic approaches to managing non-native *Phragmites australis* (Phragmites) across the Great Lakes basin. The GLPC provides educational resources tailored to diverse interest groups, connects invasive species managers with the latest research and technology, encourages the use of adaptive management, and facilitates alignment of partner efforts across jurisdictional barriers.

- Continued to provide information via the high-traffic website www.greatlakesphragmites.net
- Hosted several webinars in 2023, including overviews of experimental management techniques, post-treatment native plant recovery, European frog-bit (which frequently co-occurs with Phragmites), and molecular genomic tools to assess Phragmites hybridization
- Continued to draft audience-specific outreach materials across various multi-media formats

- Maintained a database and dynamic map of regional organizations (including CISMAs, CWMAs and PRISMs) working on invasive species in the Great Lakes
- Hosted over 20 case studies of Phragmites management in both Canada and the U.S.
- Shared the work of the GLPC at many national and international conferences

Phragmites Adaptive Management Framework (PAMF)

The GLC and USGS are working to promote effective Phragmites management and track the effectiveness and resource efficiency of management activities through the PAMF program (http://www.greatlakesphragmites.net/pamf/). PAMF engages a variety of land managers across the basin, from state and federal employees to private citizens, in a strategic attempt to help and learn from people actively managing Phragmites. The program needs your participation to develop data-driven best management practices as quickly as possible.

- In 2021, leadership of PAMF transitioned to the GLC, which continues to work daily with PAMF participants (representing over 65 different organizations) to coordinate efforts effectively
- Since 2017, PAMF conducted 38 total training sessions reaching over 400 people across the Great Lakes basin to educate Phragmites managers about PAMF and encourage their participation. In response to the COVID-19 pandemic, PAMF hosted live virtual trainings in summers 2020-2023, and it introduced self-paced online training courses through the Moodle platform. In 2022, PAMF reinstated in-field trainings for the first time since 2019.
- Increased total enrolled management units to 281 across all eight Great Lake states and Ontario; provided management guidance to 95 enrolled management units for the 2022/23 cycle
- During 2020-2022, PAMF staff assisted with monitoring 35 management units that managers were unable to monitor due to COVID-19 travel or budget restrictions
- Since 2018, PAMF staff promoted PAMF or presented at >20 scientific meetings or conferences
- The animation "Phragmites Adaptive Management Framework: Participation Cycle" won a USGS Shoemaker Award for Communications Product Excellence in 2019
- Developed the PAMF Strategic Plan to guide successful implementation of PAMF by setting program-specific goals, objectives, and measures for five years (2020-2026)
- In 2022, PAMF added voluntary monitoring for invasive European Frog-bit to its monitoring protocol, providing 89 survey results to the European Frog-bit Collaborative
- In 2023, PAMF staff conducted an expert elicitation exercise to inform the PAMF predictive model. This and other improvements to the model will be reflected in management guidance for the 2023/24 cycle.
- Currently enrolling new management units for the 2022/2023 PAMF cycle year – contact the PAMF Coordinator at pamf@glc.org

Research update

The USGS is conducting research into innovative control measures for non-native Phragmites australis (common reed), a highly invasive species with wide-ranging social, economic, and ecological impacts, based on the bacteria, fungi, and other microbes that it supports. A USGS-led group developed a science agenda (Kowalski et al 2015, https://pubs.er.usgs.gov/publication/70147339) that is guiding a nation-wide effort to develop new management approaches that promote the microbes that are harmful to this invasive plant and inhibit those that help it outcompete native plants. There have been many publications on this topic since 2015, all of which are highlighted in the Published Phragmites Research section of the GLPC web site (https://www.greatlakesphragmites.net/research/).

Close partnerships with the University of Michigan, Rutgers University, Tulane University, Louisiana State University, and other organizations are identifying the key microbes and microbial

processes to target for manipulation as a form of plant control. Field and greenhouse studies over the past few years have tested the virulence of harmful microbes on Phragmites plants, cataloged the microbes associated with this invasive plant, and evaluated how the application of non-toxic antimicrobial treatments affect plant growth. These and other studies are helping identify the mechanisms associated with plant-microbe mutualisms and leading to the development of new management tools for managers of Phragmites and other non-native plant species. Field studies were initiated in Michigan and New Jersey to test potential treatments and patented technologies.

USGS continues to work closely with colleagues at the U.S. Army Corps of Engineers Engineer Research and Development Center (ERDC) to develop genetic biocontrol treatments for non-native Phragmites australis. Based on the natural plant process of RNA interference, the research team is developing species-specific treatments that limit the expression of plant traits (e.g., high growth) and offer managers additional treatment options. This work is being informed by genomic and transcriptomic analyses by USGS, Louisiana State University, and Tulane University, including the first published full genome description of non-native Phragmites. Additionally, we are working to describe the genome of the North American native Phragmites to be able to take a comparative genomics approach to understand the genetic underpinnings of Phragmites invasiveness and identify more specific and effective targets for genetic control.

The USGS is partnering with the U.S. Fish and Wildlife Service to explore the impacts of Great Lakes water levels on the growth, spread, and management of Phragmites. After several years of prolonged high water, many existing Phragmites populations in the coastal zone of the Great Lakes are being stressed or drowned. Additionally, land managers are taking advantage of the high water and cutting Phragmites below water to drown the plant as a control strategy. However, very little data have been collected on the viability of rhizomes following natural drowning or the efficacy of cut-to-drown management. We are combining field and greenhouse studies as well as cataloging geographic zones where retreat or expansion may occur under future water-level patterns. This work is funded by the USGS-FWS Science Support Partnership Program.

As Great Lakes water levels are predicted to fluctuate more rapidly and produce more frequent extreme high and low water events, three USGS centers are partnering to develop a decision support and management prioritization tool to help guide managers to control Phragmites stands that are either most at risk of expansion in low water periods or most easily drowned in high water periods. This work will produce a user-friendly, public webtool designed to guide high-impact decisions.

<u>European frog-bit research</u>

The USGS is working with the Shiawassee National Wildlife refuge, ERDC, and Louisiana State University (LSU) to develop species-specific control measures for the non-native *Hydrocharis morsus-ranae* (European frog-bit), an invasive floating leaf plant species spreading westward through the Great Lakes region. The RNA interference approaches being developed for non-native Phragmites will be adapted for application to European frog-bit. The first step in this process is to sequence and analyze the genome and transcriptome of the plant. LSU will initiate this analysis in FY23 to provide the foundation for ERDC to design gene silencing agents in FY24 and beyond. Lab, greenhouse, and ultimately field testing of treatments will be initiated after promising gene silencing agents are identified.

USGS centers involved in research on aquatic invasive species in the Great Lakes Region include:

Central Midwest Water Science Center
Columbia Environmental Research Center
Eastern Ecological Science Center

Great Lakes Science Center
Midwest Climate Adaptation Science Center
Upper Midwest Environmental Sciences Center

Contact: Patrick M. Kočovský, U.S. Geological Survey, 419-625-1976, pkocovsky@usgs.gov

State/Provincial

Illinois
No update provided.

Contact: Brian Schoenung, Illinois Department of Natural Resources, 217-558-4581, brian.schoenung@illinois.gov

Indiana
No update provided.

Contact: Eric Fischer, Indiana DNR, 317-234-3883, efischer@dnr.in.gov

Michigan
No update provided.

Contact: Sarah LeSage, Michigan DEQ, 517-243-4735, lesages@michigan.gov

Minnesota

- Watercraft Inspection and Enforcement: In 2022, Minnesota DNR and local government watercraft Inspectors completed 439,770 inspections of watercraft arriving at and leaving water accesses in Minnesota. DNR Conservation Officers completed 11,014 hours of invasive species education and enforcement.
- Pledge to Protect Minnesota Waters: The Minnesota DNR started a campaign for individuals to "Take the Pledge" to take AIS prevention steps. Over 400 people made a public commitment to protect Minnesota waters in 2022 (mndnr.gov/AIS Pledge).
- Lake Superior Didymo: Minnesota DNR researchers continue to work with scientists at other organizations to investigate the distribution, density, and impacts of Didymo in Lake Superior and Minnesota's North Shore streams.
- Regulation: The Minnesota DNR proposed rule changes that would add species to the state prohibited invasive species list. The rule was proposed to strengthen our ability to prevent the introduction and spread of priority species like jumping worms and nonnative Phragmites, align invasive species classifications with regional priority species lists, and fill critical gaps created by a 2015 legal decision that reinterpreted federal injurious species authorities. The public comment period for the proposed rule closed on December 9, 2022, and the comments are being reviewed by the agency.
- Invasive carp: The Minnesota DNR invasive carp program takes an integrated approach to monitoring and management. We monitor for all life stages of invasive carp using a variety of fisheries gears, tag and track invasive carp, contract with commercial fishers to capture invasive carp, and develop new techniques to remove invasive carp in our low-density population (such as adapting the modified-unified method, or MUM, for our use). The DNR continues to build partnerships with the U.S. Geological Survey (USGS), the U.S. Fish and Wildlife Service (USFWS), Wisconsin DNR, NPS, and Wild Rivers Conservancy with two MUM events on the Mississippi River in

2022. Additional upcoming projects include using attractant stations to concentrate invasive carp for capture, identifying watershed breaches that can be blocked to prevent invasive carp movement, and modeling invasive carp reproduction in the Upper Mississippi River to identify priority locations for management. The Minnesota DNR is kicking off a structured decision-making (SDM) process to inform the update of the Minnesota Invasive Carp Action Plan in 2023.

- County AIS Prevention Aid: The Minnesota DNR provides technical support to local government staff leading their county's AIS Prevention Aid programs by facilitating regional workshops. During winter-spring 2023, DNR AIS prevention planners hosted six workshops for staff and stakeholders involved in developing and implementing local AIS programs. Four workshops featured short presentations on topics of interest including: AIS Activities at Water Accesses, Public engagement, Strategic Planning and Evaluation, and Monitoring, Detection and Response. Two workshops, one online and another in-person, provided opportunities to network, share experiences, problem solve, gain knowledge, support inter-county collaboration, and leverage resources.
- Early Detection: The Minnesota DNR partnered with the Minnesota Aquatic Invasive Species Research Center (MAISRC), the University of Minnesota Extension, and many counties and local partners on an annual statewide search for new populations of starry stonewort, called "Starry Trek." In 2022, 233 volunteers searched 248 Minnesota waterbodies. No new starry stonewort infestations were found during the 2022 Starry Trek.
- Invasive aquatic plant management grants: In 2022, the Minnesota DNR Invasive Species Program issued 404 permits to control invasive aquatic plants and the DNR AIS Control Grant Program provided funding for 223 invasive aquatic plant treatments through 142 grants, totaling $1.25 million. In 2023, $400,000 in grants has been made available to local entities for DNR AIS Control Grants, funding 102 projects to treat Eurasian watermilfoil, curly-leaf pondweed, flowering rush and starry stonewort. Projects funded for two years of treatment in 2022 will be wrapping up work in 2023, which includes one-year of post-treatment monitoring to evaluate innovative control projects.
- Nonnative Phragmites: The Minnesota DNR continued to fund nonnative Phragmites control throughout the state. Management efforts focused on "clearing counties" by targeting control in areas of the state with a limited number of small infestations. During the 2022 treatment season DNR contractors visited 423 nonnative Phragmites sites in 31 counties. At 100 sites no treatment was done because no live nonnative Phragmites was found, largely due to previous years' effective treatments. During the 2022-2023 winter, the DNR contracted to knock down dense standing dead nonnative Phragmites to facilitate treatment this coming summer at about 30 sites.

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New York

No update provided

Contact: Catherine McGlynn, New York State Department of Environmental Conservation, 518-408-0436, catherine.mcglynn@dec.ny.gov

Ohio

- Continued following the Lake Erie Grass Carp Response Strategy (2019-2023) with the deployment of multiple Grass Carp Strike Teams through the University of Toledo dedicated to the eradication of Grass Carp from the western basin of Lake Erie. The GLFC is developing the next five year plan. Over 800 adult Grass Carp have been removed to date. We continue to track tagged Grass Carp with the GLATOS system and real-time receivers, and we are working through the University of Toledo to

determine Grass Carp catchability and population size. Partners also include Michigan DNR, GLFC, USFWS, and USGS.

- Working with the GLFC, Michigan DNR, USACE, and USGS to develop a seasonal Grass Carp behavioral barrier on the Sandusky River to prevent their movement to spawning habitat. The USACE is currently working on the feasibility for design and construction.
- Continue closure for the three of the four Great Lakes Mississippi River Interbasin Study connections in Ohio at the Ohio Erie Canal, Little Killbuck Creek, and Grand Lake St Marys: 1) The USACE completed the closure of the Ohio Erie Canal connection in March 2020 and ODNR is maintaining the deterrents; 2) We have secured GLRI funding request for Phase 1 of the Little Killbuck Creek closure with HDR consulting; 3) The preliminary design for the final phase to close the connection at Grand Lake St Marys has been completed and final design was completed in 2023.
- Continue the surveillance of Ohio's bait supply chain to determine if AIS, including Bighead and Silver Carp, are being transported through the bait trade. To date, no high risk AIS have been detected.
- Continue to work with Cleveland MetroParks on invasive plant EDRR in the Lake Erie watershed. Partnering with ODNR Parks and USACE on control efforts on Hydrilla just outside the Lake Erie basin at Pymatuning Lake and Mosquito Creek Lake.
- Continue the AIS outreach campaign through Wildlife Forever to target anglers moving bait. This outreach program includes billboards, print media, and items for distribution at events with the slogan "Trash Unused Bait".
- Participated in the following groups: Great Lakes Panel, Ohio Aquatic Invasive Species Committee, and Invasive Carp Regional Coordinating Committee.

Contact: John Navarro, Ohio DNR Division of Wildlife, 614-265-6346, john.navarro@dnr.state.oh.us

Ontario
No update provided.

Contact: Francine MacDonald, Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry, 705-755-5136, Francine.macdonald@ontario.ca

Pennsylvania
No update provided.

Contact: Jim Grazio, Pennsylvania DEP, 814-217-9636, jagrazio@pa.gov

Québec
No update provided

Contact: Annick Drouin, Québec Ministère des Forêts, de la Faune et des Parcs, 418-654-6984 annick.drouin@mffp.gouv.qc.ca

Wisconsin
No update provided.

Contact: Amy Kretlow, Wisconsin DNR, 920-838-2597, Amy.Kretlow@Wisconsin.gov

Regional/Binational

International Joint Commission
No update provided.

Contact: John Wilson, International Joint Commission, 519-257-6700, John.Wilson@ijc.org

Great Lakes Fishery Commission
No update provided.

Marc Gaden, Great Lakes Fishery Commission, 734-662-3209 x14, marc@glfc.org

Great Lakes Commission
No update provided.

Contact: Erika Jensen, Great Lakes Commission, 734-971-9135, ejensen@glc.org

Canadian Federal

Fisheries and Oceans Canada
No update provided.

Contact: Becky Cudmore, Fisheries and Oceans Canada, 905-336-4474, becky.cudmore@dfo-mpo.gc.ca

Transport Canada
No update provided.

Contact: Vacant

LOCAL COMMUNITIES

United States
No update provided.

Contact: Vacant

Canada
No update provided.

Contact: Vacant

Environmental/User Groups

The Nature Conservancy
No update provided.

Contact: Lindsay Chadderton, The Nature Conservancy, 574-631-4992, lchadderton@tnc.org

Ontario Federation of Anglers and Hunters
The OFAH/ISAP continues to deliver programs focused on education/outreach, prevention, monitoring, control, and management.

2023 Snapshot:

- We are currently hiring 20 'Hit Squad' staff to deliver invasive species content across the province out of partner organizations. Highlights for their workplans include efforts on Clean, Drain, Dry, invasive species removal efforts, signage creation, amongst others.
- The recreational boater pathway remains a priority. With new boater regulations in Ontario in 2022, the ISAP prioritized efforts to promote Clean, Drain, Dry and its Water Steward Program. This includes social media campaigns, water steward training events, and attending boat launches in the 2023 summer months.
- For the fifth year, the ISAP will be participating in the Great Lakes Regional AIS Landing Blitz. Since 2019, the ISAP has been delivering boater engagement events in person as well as digitally through social media campaigns. In 2022, the ISAP reached 383 people in-person as well as 188,617 people through social media, which also achieved 18,802 engagements.
- Moving into its third year in 2023, the ISAP is working with over 200 volunteers through our Mysterysnail Management and Removal Program. Since 2021, volunteers have removed over 685,000 Chinese and banded mysterysnails from local waters, representing hundreds of volunteer hours.
- The ISAP will be continuing with the annual monitoring and surveillance for water soldier (*Stratiotes aloides*) on the Trent-Severn Waterway to inform the large-scale herbicide treatment in the fall of 2023. Program staff also conducted monitoring and surveillance on Red Horse Lake to assess the efficacy of the 2020-2022 treatments and will coordinate the treatment required in 2023, if necessary.
- The ISAP engaged with school groups across the province throughout the fall and winter to deliver curriculum-based invasive species education in the form of presentations (both in-person and virtual) focused on AIS, including Asian carps. In total, our Education Laison visited 47 schools, over 1500 students ranging from Kindergarten to High School.

Contact: Brook Schryer, Ontario Federation of Anglers and Hunters, 705-748-6324 ext. 227, brook_schryer@ofah.org

National Wildlife Federation
No update provided.

Contact: Marc Smith, National Wildlife Federation, 734-887-7116, msmith@nwf.org

Tribal Authorities

Great Lakes Indian Fish & Wildlife Commission
No update provided.

Contact: Miles Falck, Great Lakes Indian Fish & Wildlife Commission, 715-682-2124, miles@glifwc.org

Chippewa Ottawa Resource Authority
No update provided.

Contact: Mike Langendorf, Chippewa Ottawa Resource Authority, 906-632-0043, mlangendorf@chippewaottawa.org

PRIVATE/COMMERCIAL

Lake Carriers' Association
No update provided.

Contact: Debra DiCianna, Lake Carriers' Association, 440-333-9994, dicianna@lcaships.com

University/Research

Great Lakes Sea Grant Network-Research and Extension
No update provided.

Contact: Rochelle Sturtevant, NOAA Great Lakes Sea Grant Network, 734-741-2287, Rochelle.Sturtevant@noaa.gov

Minnesota Aquatic Invasive Species Research Center
No update provided.

Contact: Nick Phelps Minnesota Aquatic Invasive Species Research Center, 612-624-7450 phelp083@umn.edu

Invasive Species Centre

Since the last meeting, the ISC has continued to work on education and outreach work surrounding Asian carps. We completed influencer marketing campaigns, an e-mail marketing campaign, and ran advertisements on fishing forums and magazines. We also developed a partnership with popular fishing app, FishBrain where we create content, develop campaigns, and write blog posts. Another exciting project is our work with Fishn' Canada, a popular TV show, podcast, and social media channel for anglers. We sent out a survey to anglers to get a better understanding of their level of knowledge and learn where they like to get their angling information so we can use this to run more targeted campaigns in the future. We hosted an information session for anglers to ask experts from the U.S. and Canada on the status of Grass Carp, and hosted a webinar on Grass Carp Egg Sampling.

The ISC continues to work on zooplankton diagnostics where we analyze water samples for presence or absence of invasive mussel veligers and spiny water flea in in-land lakes across Ontario. In addition to this work, we completed the second year of our volunteer-based sampling program, IsampleON, where Lake Associations collect samples that they will then send to our lab to be tested for presence or absence of veligers. This sampling program also had volunteers collect eDNA samples to be analyzed.

Other notable work includes:

- Supporting work on the new regulations surrounding the boating pathway and working with Ontario partners to raise awareness about this new initiative in the province.
- Continuing our work on Organisms in Trade through our Don't Let It Loose program focusing on raising awareness about the impacts of releasing pets.
- Continuing to work with many partners to develop a Phragmites framework for Ontario through our Green Shovels program.
- Continuing to work on European Water Chestnut rapid response in the Welland River

Lastly, the International Conference on Aquatic Invasive Species, ICAIS 2024, is set to be held May 12 – 16, 2024 in Halifax, Nova Scotia, Canada. The conference is co-hosted by Dalhousie University – Halifax, Nova Scotia and Nova Scotia's Department of Fisheries and Aquaculture, with the support of Canada's Invasive Species Centre, the ICAIS Secretariat. The call for abstracts is now open.

Contact: Rebecca D'Orazio, Invasive Species Centre, rdorazio@invasivespeciescentre.ca

At-Large

Doug Jensen- Minnesota DNR
No update provided

Contact: Doug Jensen, Minnesota DNR, 218-590-7164, doug.jensen@state.mn.us

Great Lakes Saint Lawrence Seaway Development Corporation

New GLS Administrator Appointed
Adam Tindall-Schlicht was appointed by President Biden on November 6, 2022 to serve as the 11th Administrator of the Great Lakes-St. Lawrence Seaway Development Corporation (GLS**).**
Administrator Tindall-Schlicht was most recently the Director of Port Milwaukee, 2018 – 2022. During this period, he was also appointed by Wisconsin Governor Evers as both a Commissioner of the Southeastern Wisconsin Regional Planning Commission in 2020 and a member of the Board of Directors of the Great Lakes Protection Fund in 2022. He previously served as President of the Wisconsin Commercial Ports Association. Administrator Tindall-Schlicht returns to GLS where he worked from 2010 to 2018 in both Washington, D.C. and Cleveland, Ohio, on marine transportation, international marketing, and Great Lakes Seaway System shipping.
He holds a bachelor's degree in political science from the University of Wisconsin-Madison and a master's degree in Public Administration from American University in Washington, D.C. His husband, Aaron, is a critical care and surgical nurse.
A more detailed biography can be found at
https://greatlakes-seaway.com/en/about-us/gls-management/gls-administrator/

New GLS Deputy Administrator Selected
Mr. Anthony (Tony) Fisher began serving as Deputy Administrator, effective March 12, 2023, replacing longtime Deputy Administrator Craig Middlebrook, who retired last year.
Mr. Fisher most recently served as the Maritime Administration's Deputy Associate Administrator for Commercial Sealift. A graduate of the U.S. Merchant Marine Academy and Naval War College, he gained operational seagoing experience sailing aboard container, roll-on/roll-off, break bulk, and tanker vessels. He later worked as a vessel chartering broker with Pacific Cargoes Inc. and International Services Corp. In 2005, Mr. Fisher joined the U.S. Government as a Senior Transportation Contracting Officer, and later Congressional Liaison, for the U.S. Agency for International Development.
He proudly serves as a Strategic Sealift Officer in the Navy Reserve and maintains an active merchant mariner's license.

Ballast Water Working Group, 2022 Report
GLS is pleased to provide a summary of the Ballast Water Working Group (BWWG) Joint Ballast Management Exam Results for 2022.
Background

The Great Lakes BWWG was formed in January 2006, with the mission to harmonize ballast water management efforts between Canada and the United States. The Joint Ballast Management Exam Program was established to conduct detailed vessel inspections of all vessels entering the Seaway from outside the exclusive economic zone (EEZ) of both countries, to enforce binational ballast water management regulations for the Seaway and Great Lakes. Inspections include reviews of ships' records and personnel, as well as comprehensive ballast tank sampling for the required minimum salinity (30 ppt) or the presence of mud, which would suggest that a satisfactory management practice was not employed.

A Letter of Retention (LOR) is issued for ballast water tanks that are found non-compliant with U.S. ballast water regulations, or which are carrying a product other than ballast water (e.g., sewage[1], potable or cooling water), and for which the vessel chooses to retain the contents on-board, in lieu of another management option. When the vessel departs the St. Lawrence Seaway and the Great-Lakes Basin system, outbound compliance is verified, and if the identified ballast water tanks are found in compliance with the issued Letters of Retention, the letters are rescinded.

2022 Ballast Water Working Group Results

The complete report, "2022 Summary of Great Lakes Seaway Ballast Water Working Group," was released in February 2023 and includes detailed information about the inspection procedures. It is available at:

https://greatlakes-seaway.com/en/2022_bw_rpt_en/

Summary

- 100% of ballast tanks entering the Great Lakes system were assessed via sampling or administrative review[2].
- Total tanks during 2022 capable of carrying ballast water – 10239.
    - Total tanks physically sampled – 10205 (99.7%).
    - Total tanks evaluated by administrative review – 34 (.3%).
    - Total tanks with a satisfactory ballast water exchange – 9942 (97.1%)
    - Total tanks issued a Letter of Retention (LOR) – 297 (2.9%)

The 297 tanks issued an LOR were associated with 72 vessel transits.

- 50 tanks were found with low salinity (<30 ppt)
- 247 tanks were cited due to improper reporting, carriage of liquids (other than ballast water) or because they were not accessible for testing.

The protocol put in place due to the Covid-19 pandemic provides that tanks having a sounding pipe inside the accommodations would not be tested. In 2022, there were no untested tanks due to this protocol.

Vessels that carry technical water (i.e., fresh water NOT intended for ballasting, drinking, washing, bathing, showering, use in the vessel's hospital, handling, preparing, or cooking food, and cleaning food storage and preparation areas, utensils, and equipment) must keep records on water consumption. These records must be made available to inspectors during the vessel's outbound voyage

[1] In many areas of the Great Lakes Basin, vessels are now restricted from discharging sewage, causing vessel operators to temporarily use ballast tanks as sewage holding tanks. These tanks are issued a Letter of Retention.

[2] Administrative review means an evaluation of a tank where sampling could not be performed, or the tank was not being used as a ballast tank at the time of the review. This review includes an examination of vessel documents and interviews with vessel officers.

The aggressive enforcement of current regulations combined with comprehensive ballast tank review procedures, have produced a high compliance rate within industry and have proven an effective means of managing ballast against nonindigenous species introductions to the Great Lakes Seaway system.[3]

In addition to reporting the 2022 BWWG results, the Appendix provides a review of the history of ballast water regulations aimed at eliminating the influx of aquatic nonindigenous species to the Great Lakes, 1989-2021.

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Wildlife Forever
No update provided

Contact: Dane Huinker, Conservation Program Manager, 763-253-0222, dhuinker@wildlifeforever.org

Wisconsin Sea Grant
No update provided

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Alliance for the Great Lakes
No update provided

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Université du Québec à Chicoutimi
No update provided

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3 See "Ricciardi, A. & MacIsaac, H. J. (2022). Vector control reduces the rate of species invasion in the world's largest freshwater ecosystem. Conservation Letters, e12866. https://doi.org/10.1111/conl.12866."