SOLM22 PROPOSED SESSIONS

GLRI Project Highlights within the Lake Michigan Basin from 2017-2021

Chairs TBD

The Great Lake Restoration Initiative (GLRI) is a critical component and source of funding for protection, restoration and enhancement projects within the Great Lakes basin. GLRI was launched in 2010 to provide additional resources to make progress toward the most critical long-term goals for this important ecosystem. The GLRI Action Plans I, II, and III identify specific focus areas that prioritize ecosystem problems to be targeted with GLRI resources and measures of progress to track actions implemented under the GLRI. There have been hundreds of GLRI projects within the Lake Michigan basin since 2010. Multiple partners have collaborated over the years to identify and prioritize critical project types and areas that would benefit from protection and restoration efforts. This session provides a highlight of GLRI projects throughout the basin and shares success stories, measures of progress tracking, socio-economic benefits and fish and wildlife response to removal of toxic substances, water quality improvements, AIS control and habitat restoration.

Taking Action to Protect and Restore Lake Michigan: Partnerships, Programs, and Progress

Chaired by Elizabeth Hinchey Malloy, US EPA Great Lakes National Program Office, hinchey.elizabeth@epa.gov; Matt Preisser, Michigan Department of Environment, Great Lakes, and Energy, PREISSERM@michigan.gov; Stacy Hron, Wisconsin Department of Natural Resources; Michael Spinar, Indiana Department of Environmental Management

The pillars of lakewide action and management under the Great Lakes Water Quality Agreement and the Great Lakes Restoration Initiative are effective partnerships. There are a diversity of partners across the Lake Michigan basin that are actively implementing programs and projects to protect and restore the Lake Michigan's water quality and ecosystem health. This session highlights results of successful partnerships and programs currently being implemented to address threats and restore and improve conditions of the Lake Michigan basin ecosystem.

Accelerating Great Lakes Collaborations

Chaired by Timothy Havens, Michigan Technological University, thavens@mtu.edu; Hans VanSumeren, Northwestern Michigan College, hvansumeren@nmc.edu

It goes without saying that the Great Lakes is the most significant freshwater resource on the planet, comprising more than 20% of the world's surface freshwater. However, it is also widely accepted that the Great Lakes are on the brink of ecological catastrophe, with significant impacts to Great Lakes health coming from toxic chemicals, waste overloading, shoreline and wetlands degradation, climate change, harmful algal blooms, and invasive species, to name a few. While the Lakes are vast, they are also vulnerable. Given their importance to the region and to the US and Canada as a whole, collaborations must be forged that can rally the resources, collect the necessary wide-ranging data, perform the analyses, and inform forward-looking policy decisions that ensure the strong and continued health of the Great Lakes. In this session, we invite presentations and discussion from organizations, institutions, researchers, industry, policymakers, innovators, venture capitalists, funding agencies, and others on wide-ranging, impactful collaborations on the Great Lakes: existing, proposed, and future. Topics include, but are not limited to reports on existing collaborations, citizen

science, public-private partnerships, ways to build large, impactful teams, proposed and future ideas for collaborative / cooperative bodies, etc.

Overview of Lake Michigan CSMI activities in 2020 (and 2021)

Chaired by Paris Collingsworth, pcolling@purdue.edu, and Carolyn Foley, cfoley@purdue.edu, Illinois - Indiana Sea Grant and Purdue University,

The binational Cooperative Science and Monitoring Initiative (CSMI) under Annex 10 (Science Annex) of the Great Lakes Water Quality Agreement coordinates agency science and monitoring in support of management of the Great Lakes ecosystem. The process includes enhanced monitoring and science-based field activities which are conducted in one Great Lake per year and tied to the information needs identified by the Lake Partnerships. Due to the logistical difficulties related to the COVID-19 pandemic, the Lake Michigan field activities, originally scheduled for 2020, were spread out over the summers of 2020 and 2021. Nevertheless, the Lake Michigan CSMI investigations led by federal agencies and partners addressed key knowledge gaps among four broad themes including nutrient and food web dynamics in a changing ecosystem, contaminants and bacteria, watershed and tributary connections to Lake Michigan water quality, and methods for connecting science with stakeholders. This session will feature talks related to Lake Michigan-centric CSMI activities conducted during 2020 and 2021. Highlights from reporting and outreach efforts on other lakes will also be discussed, and the session will conclude with discussion of next steps and additional outcomes that could result from the Lake Michigan effort.

Public Policy and the Impact on Lake Michigan

Chairs TBD

This session will focus on public policy from the local to the federal level and how that policy shapes research and action around Lake Michigan issues.

Lake Michigan Literacy and Education

Chaired by Kristin TePas, Illinois-Indiana Sea Grant, University of Illinois, ktepas@illinois.edu; Ginny Carlton, Wisconsin Sea Grant, University of Wisconsin, glcarlton@aqua.wisc.edu

Long term sustainability of Lake Michigan's critical ecosystems, as well as resiliency of residents and communities in Lake Michigan's basin, rely on translating scientific research in ways necessary to build an environmentally literate public. A Lake Michigan literate person (1) understands the characteristics, functioning and value of Lake Michigan; (2) communicates accurately about Lake Michigan's influence on systems and people in and beyond its watershed; and (3) makes informed and responsible decisions regarding Lake Michigan and the resources of its watershed. Presentations in this session will help to answer the following questions: How are we educating stakeholders of all ages about the current state of Lake Michigan? What are the characteristics of successful initiatives to improve Lake Michigan literacy with K-12 students, formal and nonformal educators, or adult learners? What strategies are being used to reduce or overcome barriers and challenges to improving Lake Michigan literacy? How can we ensure future education efforts reach traditionally underserved and underrepresented populations?

Case Studies in Engaging Lake Michigan Communities

Chaired by Pat Charlebois, charlebo@illinois.edu, and Carolyn Foley, cfoley@purdue.edu, Illinois-Indiana Sea Grant

Stakeholder engagement is a key component of effective research outcomes, e.g., improving ecosystem health, increasing community resiliency, enhancing quality of life. Many funding agencies require stakeholder engagement as part of their award structure, and, around Lake Michigan, a wide variety of organizations are available to partner with research teams. Connecting with these organizations can lead to effective and earnest partnership with relevant stakeholders, and improved outcomes for all. This session will feature a suite of case studies where researchers, managers, planners, community members, and more worked together to achieve common goals. We expect to feature talks from Sea Grant programs, non-profit organizations, and community leaders, but are open to additional talks that fit the session theme. Finally, we expect to highlight funding opportunities available to support continued work that benefits Lake Michigan's community stakeholders.

Coastal Storms, Water Levels, and Shoreline Impacts

Chairs TBD

The Laurentian Great Lakes are influenced by a variety of midlatitude weather systems, from extratropical cyclones to localized convective storms, as well as variations in climate that result in large swings in lake level. Combined with their immense size, the Great Lakes are prone to large waves, strong currents, significant coastal erosion, and other hydrodynamic hazards that affect boaters, beachgoers, shoreline communities, and coastal ecosystems. In this session, we explore the myriad impacts of weather and climate on Great Lakes coastal hazards, from timescales ranging from rip currents and meteotsunamis to long-term changes in water level, coastal erosion, and shoreline habitat.

Harmful Algal Blooms: Public Health, Beach Management and Emerging Issues

Chairs TBD

As the frequency, magnitude, and duration of harmful algal blooms apparently increase throughout the Great Lakes Basin, so does the impact on public health, beach management, and research. We welcome a wide range of presentations to discuss these impacts in Lake Michigan.

Lake Michigan Coastal and Beach Monitoring

Chaired by Kevin Strychar, Annis Water Resources Institute - Grand Valley State University strychak@gvsu.edu

In pursuit of healthy beaches and coastal ecosystems, this session examines different technologies, methodologies, and public health initiatives to examine the environmental health and safety of Lake Michigan. We explore and report to what extent annual and routine survey and research activity outcomes are existing gaps and positive and negative narratives. Discussing the future of our environmental ecosystems, beaches, and coastline activities are priorities as they relate to climate change, increased tourism, and environmental health and public safety.

Great Lakes Beach Association

Chaired by Shannon Briggs, EGLE BRIGGSS4@michigan.gov

The Great Lakes offer a great collection of diverse beaches which play a key role in the recreational life of many Canadians and Americans. However, they are in need preservation and care. The purpose of the session is to present scientific, technical and management information about the health of Great Lakes beaches and their management.

Lake Michigan's Coastal Dunes

Chairs TBD

This session welcomes presentations on the geomorphological and ecological dynamics of Lake Michigan's coastal dunes, as well as data needs, monitoring efforts and technologies.

Dangerous Currents in the Great Lakes

Chairs TBD

Dangerous currents are the greatest surf zone hazard and a prevalent threat to all beachgoers in the Great Lakes. Swimming directly against currents, along piers or breakwalls can be deadly. Dangerous currents can pull a swimmer away from the shore. Attempting to rescue others without a flotation device can result in drowning. This session invites topics related to observations, modeling, and forecasting/warning for dangerous currents in the Great Lakes. We also encourage topics that mitigate coastal hazard and enhance community hazard resilience like development of risk communication strategies or social marketing campaigns for at-risk groups; deployment of beach safety kits; promotion of public awareness and community response; and developing a community of practice to maximize our collective knowledge, resources, and actions to end drowning in the Great Lakes.

Areas of Concern

Chairs TBD

To respond to the remediation needs of the most severely affected sites around the Great Lakes, in 1987 the U.S.-Canada Great Lakes Water Quality Agreement established Areas of Concern. Areas of Concern (AOCs) are locations where environmental conditions resulting from human activities—officially termed as beneficial use impairments—locally prevent certain uses of the lakes. This session seeks to provide updates and catalyze research and restoration actions within Lake Michigan's AOCs and neighboring communities.

Current Methods and Trends for Emerging and Legacy Pollutants in the Lake Michigan Basin

Chaired by Gord Paterson, Michigan Technological University, gpaterso@mtu.edu; Brandon Gerig, Northern Michigan University, bgerig@nmu.edu

Lake Michigan was the subject of one of the most focused pollutant studies conducted across the Great Lakes basin under the Lake Michigan Mass Balance Project (LMMBP) completed in 1994 and 1995. Since the LMMBP, new sampling

techniques and analytical methodologies have progressed to permit the characterization and quantification of many novel pollutants and greatly improved detection capabilities. This session welcomes presentations that discuss new techniques for identifying and quantifying emerging pollutants such as perfluorinated compounds, current use pesticides and microplastics in Lake Michigan and its tributaries. Long-term monitoring studies and results demonstrating trends and patterns in such emerging pollutants and legacy persistent organic pollutants and Hg are also encouraged.

Aquatic Invasive Species

Chairs TBD

This session will provide the opportunity to present new research on non-native species that have become established in Lake Michigan and monitoring and citizen science-based initiatives for their detection and prevention of their spread. Additional presentations discussing novel and existing technologies for the detection and management of invasive species are also recommended.

Declining *Mysis* in Lake Michigan?

Chaired by James Watkins, Cornell University, jmw237@cornell.edu

Monitoring from several agencies have identified the recent continued decline of the opposum shrimp (*Mysis diluviana*) in Lake Michigan since 2016. This is an important prey for both benthic and pelagic fish. The species undergoes diel vertical migration that makes it an important connection of benthic and pelagic habitats. The utilization of the benthic habitat and potential omission from net-based sampling is an active research topic. We welcome contributions that update the current status of Mysis and understanding of the potential ramifications on fish.

Habitat Heterogeneity in Lake Michigan: Implications for Food Webs, Fish and Fisheries

Chaired by Tomas Hook, Purdue University, thook@purdue.edu; Carl Ruetz, Grand Valley State University, ruetzc@gvsu.edu

Lake Michigan is a spatially diverse system of habitat types supporting food webs, fish assemblages and fisheries. Habitat differences in abiotic conditions, productivity and prey availability may strongly influence community and population dynamics. Moreover, movement of organisms and connectivity among habitats can influence the performance of fish populations and the functioning of food webs. For this session, we invite presentations focusing on Lake Michigan habitats and how they support food webs, fish and fisheries. We encourage presentations exploring the roles of diverse habitats—including pelagic, benthic, nearshore zones, offshore regions, embayments (Green Bay, Traverse Bay), river mouths, plumes, coastal wetlands, and tributaries—and habitat heterogeneity.

Fisheries

Chairs TBD

This session will feature talks that focus on the status and management of Lake Michigan's fisheries.

Lakebed 2030 - Mapping the Great Lakes

Chaired by Hans VanSumeren, Northwestern Michigan College, hvansumeren@nmc.edu; Tim Kearns, Great Lakes Observing Systems, tim@glos.org

Lakebed 2030 is a coalition of industry, academic, third sector and government bodies. Working with a strategically focused coalition, established and emerging technologies can bring the necessary talent to execute the mission of building a comprehensive map of the Great Lakes. Investment is required for developing a massive public campaign, growing the coalition, executing exploration, disseminating data and stimulating innovation to support the Great Lakes New Blue Economy. This session explores new approaches, technologies, and advancements in building a comprehensive Great Lakes map.

Smart Ships on the Great Lakes

Chaired by Travis White, Michigan Technological University, tmwhite@mtu.edu; Hans VanSumeren, Northwestern Michigan College, hvansumeren@nmc.edu

Technology in Autonomous Surface Vessels (ASVs) and Underwater Vehicles (AUVs) have significantly matured in recent years and these systems have become readily available "off-the-shelf" tools for performing science, moving freight, and recreational boating. The number of products and types of vehicles continues to grow, but similar to the automotive and trucking industry's terrestrial autonomous vehicles and the aviation industry's aerials systems, there is much to do in development and testing, policy- and standards-making, and technology evaluation. Key challenges including risk mitigation, system compliance verification and certification, COLREGS compliance, and overall safety. For example, scenarios such as interaction with fully crewed vessels and recreational vessels in congested ports must be fully investigated. In this session, we seek to identify and address opportunities to apply autonomous technologies to improve how and what we do in the Great Lakes. This includes adoption of technologies and identification of navigational and operational obstacles, while working towards solutions and innovations that enable more efficient and cost effect autonomous systems to support resource management, scientific discovery, and navigation. In this session, we invite scientists, policy makers, resource managers, innovators, navigators, and educators to present and discuss changes to the state of autonomous technologies and operations in marine environments, where technology and policy lags that of air and ground operations. Topics include, but are not limited to, autonomous systems, autonomy algorithms, sensing, Smart Ships policy, standards for Smart Ships, certification, applications, workforce development, and education.

Transitions Energy and Transportation Infrastructure on Lake Michigan

Chaired by Ana Dryeson, adyreson@mtu.edu, and John Lenters, jdlenter@mtu.edu, Michigan Technological University

Energy and transportation infrastructures in and around Lake Michigan are changing, as global drivers create interest in marine electric vehicles, marine renewable energy generation, autonomous marine vessels, and offshore wind on the Great Lakes. These developments open new interdisciplinary research areas to understand the environmental impacts and economic opportunities of major infrastructure transitions. For example, coal and nuclear power plants, which often rely on water for cooling, now face economic competition from renewable energy sources. Lake Michigan is a cooling

source for some thermoelectric power plants, and could be a site for marine renewable energy generation or offshore wind power plants. Lake Michigan is a major transportation corridor where the development of smart ships or marine hybrid or electric vehicles could have significant economic impacts. This session welcomes abstracts in research, policy, and workforce development in engineered systems in Lake Michigan or ecosystem science to understand the operation and environmental impact of those engineered systems. Topics may include energy planning and policy affecting Lake Michigan, research on conventional and renewable water-dependent energy generation, the development of smart ships and marine electric vehicles, and other infrastructure transitions that rely on Lake Michigan or affect Lake Michigan.

General Contributions

Chaired by Paris Collingsworth, Illinois - Indiana Sea Grant and Purdue University, pcolling@purdue.edu, and Hans VanSumeren, Northwestern Michigan College, hvansumeren@nmc.edu

For presentations or posters that don't fit within any of the other proposed sessions, please consider submitting your presentation here. Submissions will be reviewed and may be combined with other sessions, a new session created, or give the presenter the opportunity to present in a General Contributions session. All topics and presentations are welcome and will be reviewed.