Notes from 26th Annual Science Vessel Coordination Workshop
February 17, 2022
Virtual Workshop via Zoom

Welcome and Introductions – Review of Workshop Agenda Tom Crane, Great Lakes Commission (GLC) and Mark Burrows, International Joint Commission (IJC)

Both Tom and Mark welcomed attendees to the 2022 workshop of the Great Lakes Association of Science Ships (GLASS). Crane thanked everyone for participating virtually and noted that this was the 26th time this workshop has occurred. Crane and Burrows gave a brief overview of the agenda and communicated logistics for the virtual meeting.

Fleet Assessment, Management & Science Support – Report out from February 16, 2022 virtual fleet meeting – Dennis Donahue, NOAA GLERL/Lake Michigan Field Station

Dennis Donahue provided an overview of the GLASS workshop that occurred on Feb. 16th. Donahue's overview recapped discussion with agency officials involved with assessing the Great Lakes fleet and identifying science support needs. Donahue noted that there were 25 participants and the first session addressed strategic planning initiatives, the two presenters, John Hortness from USGS provided an overview of the Science Forum he submitted to Congress. He discussed recommendations such as autonomous sampling, and not duplicating efforts. Next presenter was Dave Burden from IJC who presented on the Decadal Science Plan. He noted the need for new perspectives and solutions in addressing climate change. He also highlighted the needs for more winter research and training and recruiting the next generation of Great Lakes researchers and scientists. Dave stated that GLRI has been addressing the past and now we need to address current and future threats such as climate change. Following the science planning presentations, the panel engaged in an enlightening discussion regarding current and future winter Limnology sampling efforts. Casey Godwin was the moderator for this session. Dennis thanked Jerry Popiel from the US Coast Guard, Mike McKay from University of Windsor, Peter Esselman from USGS, Steve Rubert from GLERL, Michael Twiss from University of Clarkston. Each one gave a variety of comments regarding winter data collection and research. There was a broad discussion of the importance of both autonomous under ice sampling and non-autonomous (small and large boat platforms) sampling from vessel crews. There was a discussion of what infrastructure is needed if we want to continue and advance winter sampling (such as hover craft, air boats, etc.) There were suggestions to share resources when it comes to those assets and the implementation and deploying/retrieving the AUVs via different platforms. The last session of the day was moderated by Debbie Lee, GLERL, which was an open discussion on the very diverse status of the fleets such as mechanical issues, repowering and alike. There was an overview of several units of FY22 efforts and a recap of last year. There was some discussion on recapitalizing the fleet and room for improvements.

Panel on recruiting, training, and retaining crew and staff: updates and opportunities for collaboration, moderated by Dennis Donahue

Dennis highlights this is one of the most important topics of the day. He noted that the covid environment allowed a lot of people to rethink their career path which led to a mass resignation in many fields. There is more competitiveness now in pay due to this. He also highlighted in addition to pressures on recruitment, they are seeing workers migrate internally upward to management positions

and some even move on to external job opportunities. Kurt Newman provided an overview of USGS efforts surrounding the recruitment and retention of vessel staff. The USGS has a standing relationship with SUNY Martine Institute and has recruited staff from that program over the past many years. In 2020, there were plans to better streamline the hiring process (e.g. conducting some HR requirements at career fairs) to recruit staff. Due to COVID restraints, there were limited opportunities to interact with students in 2020. They have done some virtual work but hasn't been the same. USGS has broadened their reach by using more traditional job postings. Newman notes they are not doing well in recruiting for MMR's (marine maintenance repairers). The candidates, the students that are on that career path are targeting opportunities to become engineers on much larger vessels. Says it's been difficult to attract them to work for USGS as they can't compete with the level of pay that these graduates are getting elsewhere. Newman said he is hoping that they can implement pathways programs through the government which is a 2-year agreement, and they would be able to hire them without competition. There is a new program called the Bridge program that is geared towards Veterans, which also streamlines the hiring process. Chis Esposito with CPC gives an overview on recruiting in terms of contracting firms. Overall, the company has grown regarding providing services in Great Lakes research. They have a 5-year Task Order Contract with NOAA. Thunder Bay NMS Alpena has a few new hires pending. CPC relies on Indeed, Craigs List, current employees, and CPC website to get the word out about position openings. Hans Sumeran from the Marine Center at Northwest Michigan College discussed the industry focused trainings they offer in acoustics, the development of the Assoc. of Diving Contractors International ROV School, Water quality/Environmental Technician, which is a new program.

Panel on Science and Monitoring: Updates and New Initiatives, moderated by Mark Burrows, IJC

Eric Ostantoswki-US EPA-GLNPO provided an overview of the 2022 plans for the Cooperative Science and Monitoring Initiative (CSMI). Science priorities for each lake are identified by Annex 2 and are then provided to Annex 10, which implements CSMI to help coordinate programs to address science priorities. Each lake receives an intensive field year every 5 years and the IAGLR state of the lake conferences have recently started hosting CSMI reporting. During the project planning process for a CSMI year the group seeks to continue ongoing agency monitoring, enhance ongoing monitoring, and conduct new projects that specifically address priorities. The 2022 CSMI implementation by lake include priority setting-Lake Erie, project planning-Lake Ontario, Field Year-Lake Huron/Lake Superior, Analysis - Lake Michigan/Lake Superior, Results/Reporting-Lake Michigan, Lake Erie, and Lake Ontario. 2022 CSMI priorities include lower food web and larval fish surveys, improving primary production estimates, increasing spatial and temporal coverage for sampling the North Channel, food web contaminants (Hg and PFAS), and groundwater contributions and dynamics. Erin also goes over US and Canadian planned activities as part of the CSMI project. Derek Niles, Orange Force Marine Lt. gave an overview of a project called Smart Great Lakes Initiative and Lakebed 2030 and Crowd Sourced Bathymetry. The initiative has multiple sensors throughout the Great Lakes, near real-time data collection and transmission, data publicly available via portals. Lakebed 2030 is an extension of Seabed 2030 but focused on collecting data in the Great Lakes. This project aims to map via traditional survey means. Crowd Sourced Bathymetry is a collection of bathymetric data by the public or distributed sources, it will "piggy-back" on existing vessel operations in a non-conflict posture. Data collection is system automatically on/off with vessel electronics, logging of all navigation data across the NMEA network, compression and encryption of data, and transmission ashore. John Hortness with USGS, provided an overview of the USGS Science Forum: Data Gaps and Needs Reports. The process occurred virtually but they were able

to get input from many different stakeholders, including NGOS, academic scientists, various government agencies and more. USGS compiled the feedback and submitted it to Congress in July of 2021. Due to a high level of interest, Congress asked USGS to release a public version, which was made available in October 2021. Some of the major findings of the forum included the following: Substantial gaps in overall scientific knowledge, Great Lakes Basin hydrology is poorly characterized, very limited data/information during winter months, coordination is limited by mission constraints and authorities of the various Federal, State, municipal, Tribal and private entities, develop and test enhanced and/or new models, more structured coordination needed across all science and monitoring entities (federal, state, local, university, etc.). Jerry Popiel, USCG, Ninth District provided an overview of USCG Center of Expertise/under-ice research (GLCOE). The GLCOE plans to monitor and asses the freshwater oil spill response technologies and the behavior and effects of oil spills in the Great Lakes, identify and seek to fill gap in Great Lakes oil spill research, conduct research, development, testing and evaluation for freshwater oil spill response equipment, technologies, and techniques to mitigate and respond to oil spills in the Great Lakes, educate and train Federal, State, Tribal and other regional first responders, w and work with academic and private sector response training centers to develop and standardize maritime oil spill response training and techniques for use on the Great Lakes. The analysis resulted in the establishment of Lake Superior State's, Sault Ste. Marie and at NOAA's GLERL in Ann Arbor, MI. The opening ceremony for GLCOE should be in summer 2022. Derek Ager, USEPA-GLNPO gives an overview of the GLRI and what it works to implement by the Regional Working Group. Under the Action Plan III there are 5 focus areas. The first commitment of the focus areas is to assess the overall health of the Great Lakes through GLNPO Monitoring Programs. Another area focused on is identifying cross-cutting science priorities and implement projects. Mapping and modeling nearshore changes is another key priority which will help identify areas that are needing reef restoration.

Updates from the Ontario Ministry of Natural Resources and Forestry (OMNRF), Tim Johnson at Glenora Fisheries Station

Tim Johnson gives some updates on the Ministry, highlighting the various field stations – Thunder Bay, Sault Ste. Marie, Etc. Within the Ministry, there are 2 MNDMNRF Branches which are the fish and wildlife research branch and the science and research branch. The Ministry has 8 vessels >30', Tim highlights each of their vessels: Superior Explorer, the Huron Explorer, the Ekko, the Keenosay, the Erie Explorer, the Ontario Explorer, the Steelcraft, and the Jack Christie (new for 2022). To summarize, the Ontario Great Lakes Fleet consists of 8 vessels on 4 Great Lakes (5 large vessels, 3 medium vessels and numerous small vessels. Two newest vessels are "Ekko" and "Jack Christie" added in 2021. Fisheries centric sampling includes gillnetting and trawling, hydroacoustics, servicing acoustic arrays.

Sail Drone Operations – Lessons learned from 2021 operations in Lake Michigan, Peter Esselman, USGS

Peter gives an overview of USGS' sail drone operations during the 2021 season and lessons learned. The overarching theme that brought Sail Drone to the Great Lakes was the systematic biases surrounding the accuracy of acoustic ships. Vessel noise, surface, "acoustic dead zone" and bottom "acoustic dead zone'' were all metrics that contributed to the biases. The idea of the study is by comparing the noise affected densities from the down directed sensors to the noise removed from the sail drone, so that they can compare the vessel noise. Want to be able to measure at what depth are fish responding to vessel noise. The cost associated with the 2021 campaign is as follows: $2750/day/drone + mobilization,

which covered 3,613 nautical miles, 61 overtakes by 3 vessels over 15 nights, midwater trawls ~40 location. You can see near real time reporting of the cameras and sensors. Every 15 minutes, there is a camera shot that comes through, as well as wave state, wind speed, etc. Some of the lessons learned were that forward velocities tended to be slow or variable, tacks were within 'movement corridor' and ship captains way of unpredictable behavior, in addition, learned that the maximum velocities achieved at 90-degrees to wind. The saildrone pros include: range/endurance/distance covered, surface noise from waves and wakes is low, upper water column is generally very clean, fish tracks are usually well defined, mission portal Nav functions very user friendly, and the SD mission team responsive and flexible. Peter said in addition to the saildrone work, they are trying to work on quantifying the noise propagate of the vessels. Some of the next steps include data analysis comparing SD and vessels ongoing, continued noise profiling of SD and vessels, 50 days of SD effort contracted for L. Superior in 2022, SD planned in lower lakes for 2023, and modeling of bias and final reporting in 2024.

Enhanced Marine Autonomy in Great Lakes science operations: New shared resource ASV Global Co-Worker 8, Travis White, MTU Great Lakes Research Center

Travis shared a brief update on enhanced marine autonomy in the Great Lakes science operations. Thanks to a new partnership with Ocean Infinity and Michigan Tech, says they are now one step closer to receiving an 8-meter AUV for the Great Lakes region. The vessel should be up and running by Spring/Summer 2022. Ocean Infinity is also currently building the first carbon neutral commercial AUV fleet. The C-Worker 8 vehicle is a multi-role work class ASV. It is suitable for a variety of offshore and coastal tasks including subsea positioning, surveying, and environmental monitoring without the need of a ship on station or sea-bed anchoring. The vehicle's redundant power system makes it an ideal solution for shore-based operations while also suitable as a force multiplier to existing conditions. It is designed for up to 7 days endurance and operations using ASV Global's proven ASView control system. Travis said they will be setting up a remote monitoring center at the GLRC and the vessel will be able to be deployed anywhere in the Great Lakes.

Kiyi rebuild/retrofit - shipyard/drydock experiences, Joe Walters USGS

Joe gave an overview of the shipyard/drylock experiences with the Kiyi rebuild in 2021. Joe said they had to replace their hydraulics because it wasn't robust enough to support the vessel. They also had to replace all the piping, and everything associated with the hydrologic system on the Kiyi. The port witch was built in Nova Scotia did not fit the frame. They had to take the witch off and reframe it, as well as restrengthen the support. A four-foot section was attached and welded to the mast. The Kiyi was on the water by June and got the boat out by July 24th. They got out on the water near Port Huron and the brand new electronic system failed. They turned everything off and turned it back on and it worked for a few minutes and then it failed again. They got the Kiyi onto Michigan's port side and had to send the computer mother board back to the company. They sent a new one, but it failed again while the Kiyi was on its way to Sault Ste. Marie. It was tied up at the Coast Guard's base for 4 weeks and they did some work to redirect more heat away from the computer system. They also added a back up computer to the ship. They ran more testing and everything checked out. Joe said they are now ready for the spring.

Vessel operations, logistics, supply chain, shipyard and drydock updates and lessons learned during the pandemic: Vessel operations, logistics, supply chain, shipyard and drydock updates and lessons learned during the pandemic (Moderated by Brandon Bastar):

-D.J. Angus/W.G. Jackson (Christina Catanese and Eric Hecox)

Christina: The mission of the AWRI at GVSU is to integrate research, education, and outreach. They are located near Muskegon Lake. They have two vessels-the D.J. Angus and W.G. Jackson that are used for education and outreach. They offer classes for grades 4th-12th and teach them about water quality issues and collect some samples. They have had nearly 1000 students from 20 schools in 2021. The majority of students are in middle and high school. 1986 is when the Angus was first launched. Visitation has increased since their launch. They did not run any trips in 2020 or the 2021 spring semester due to Covid-19. They developed protocols based on current state, local, GVSU, Coast Guard, and CDC requirements and guidelines.

Eric: Said they followed CDC protocols and adapted trips accordingly. Masks were required indoors, optional outdoors, reduced capacity in lab, more activities conducted outdoors, kept crews separate so that if one crew member got sick, they only had to quarantine one crew and not both. Over the last 2 years they took advantage of a lot of downtime. They completely gutted the D.J. Angus and repainted it in a few months' time span. They got the vessels up and running in September 2021. They had a lot of staff turnover throughout the pandemic. Luckily, they have enough staff to start the 2022 season.

-Blue Heron (Rual Lee)

The Blue Heron is 87 feet long and 2021 was the third trip down to Bay Ship at Sturgeon Bay. Rual said they had good experiences and bad. They had some corrosion on the steel of the ship, which luckily was inexpensive to replace. Overall, they had a good experience at the Bayship shipyard with rebuilding/repairing the ship.

-Status of Neeskay (Maxwell Morgan, UWM)

Maxwell is a Northeast Fisheries Observer. The Neeskay has had 69 years of service, with 59 years as a research vessel. Current fundraising for the new "Maggie" vessel is at $13 million, the goal is $20 million. The new vessel will be bigger for more lab space to conduct more research. It will be 121 feet long compared to 71 feet long for the Neeskay. The Neeskay is mostly a day boat. The new boat will be more versatile. The new boat will have ROV options as well as hydrographic sampling.

-Update on new UW vessel - new NOAA SWATH vessel (Beau Braymer)

Beau works with GLERL on vessels and gave an update on the new NOAA SWATH vessel. A SWATH is a twin-hull ship design that minimizes hull volume in the surface of the sea. The bulk of the displacement necessary to keep the ship afloat is located beneath the waves, where it is less affected by wave action. As wave excitation drops exponentially with depth. The boat was acquired from the Navy. It was designed as a remote sensing platform. The cruising speed is around 18 kts, with a survey speed of 7 kts. The vessel passed all the checks and made it up its way through the Hudson River with a cruising speed of 15 to 17 knots depending on the sea state.

Closing Remarks: Tom Crane and Mark Burrows thank everyone for their insightful and well-prepared discussions.