

Great Lakes Panel on Aquatic Nuisance Species Meeting Summary

Virtual Meeting | June 14-16, 2021

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

Monday, June 14, 2021

Call to order, introductions, agenda review

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

- Fischer called the meeting to order
- GLP members and observers introduced themselves and a quorum was confirmed
- Fischer reviewed the agenda and there were no changes

GLP Business Items

Eric Fischer, GLP Acting Chair

Ceci Weibert, Acting GLP Coordinator, Great Lakes Commission (GLC)

Approval of November 2020 meeting summary

- The 2020 spring GLP meeting summary, incorporating revisions previously provided by GLP members, was approved

Review of November 2020 action items

- The GLP Executive Committee (ExCom) planned and convened a Spring GLP meeting
- Based on the responses to the genetic biocontrol survey, the ExCom integrated genetic biocontrol into the 2021-2024 GLP work plan as a priority issue and planned a special interest webinar during this meeting
- A new GLP work plan was developed and shared with members in May 2021
- Upcoming Fall GLP meetings under the new workplan will include a placeholder for updates on FWS interjurisdiction projects
- GLP staff have circulated action items and summary of the 2021 Fall GLP meeting, and posted presentations
- GLP staff coordinated with the Great Lakes Fishery Commission on law enforcement priorities in planning for the OIT Symposium
- GLP member feedback on the interjurisdictional invasive plant project has been incorporated into the project work plan
- GLP member feedback on the GLP priorities has been incorporated
- Ongoing action items
 - ExCom to continue to engage with Great Waters Research Collaborative after the Research Coordination Committee (RCC) provided public comments on the Great Lakes Ballast Water Research and Development Plan

- ExCom will continue provide input on and consider solutions for western states to address the used boat hauler pathway through the Aquatic Nuisance Species Task Force (ANSTF)
- GLP staff will schedule a webinar to review new functions, features, and data in the USGS-NAS database in the coming months
- GLP members are encouraged to register for the ANSTF meeting to be held June 28-30

GLP Work Plan update and vote

- The 2021-2024 GLP work plan was approved
- Three priority issues were identified from GLP review process: genetic biocontrol, recreational activities, and organisms in trade
- Work plan projects include the interjurisdictional invasive aquatic plant prioritization and needs assessment as well as plans for a redesigned GLP website
- GLP operations remain largely unchanged from previous work plans, with only the addition of regular interjurisdictional project updates at fall GLP meetings

Committee reports

Francine MacDonald, Organisms in Trade (OIT) ad hoc committee co-chair, Ontario Ministry of Natural Resources and Forestry (MNR)

Doug Jensen, Information/Education Committee (I/EC) chair, Minnesota Sea Grant College Program

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

Ceci Weibert, Acting GLP Coordinator

- OIT Ad Hoc Committee
 - Funding has been secured for OIT Biotic Symposium by the Great Lakes Sea Grant Network from NOAA
 - The symposium has been jointly planned with input and involvement from GLFC LAW committee, focusing on improving coordination between AIS managers and law enforcement
 - A survey was distributed for enforcement and policy perspectives on OIT; results determined the focus for each of the three days: 1) Law enforcement and managers coordination, 2) Knowledge and tools, and 3) Communication and response tools
 - The next area of work will be identifying and engaging with industry representatives to gauge interest and to inform a future symposium focused on industry
- Information/Education Committee
 - Developed recommended actions for the GLP to improve prevention via recreational boating pathway prevention
 - Will work with the Policy Coordination Committee to plan a workshop to identify and prioritize locations for establishing recreational boating outreach and inspection efforts
 - The *Great Lakes Aquatic Invaders* booklet will be used as the basis for developing a new GLP website per the GLP work plan and will be led by the I/EC
 - Several I/EC members will be involved with interjurisdictional recreation boater pathway meeting with Tim Campbell, a work group will convene on June 22nd and August 4th; working with graduate student on recreational boating pathway literature search

- Policy Coordination Committee
 - Former chair David Nisbet has stepped down as committee chair
 - If members of this committee are interested in serving as chair, please contact the ExCom and GLP coordinator
- Research Coordination Committee
 - The RCC submitted public comments to the Great Water Research collaborative on their Great Lakes Ballast Water Research and Development Plan
 - Key recommendations: Current plan is too extensive; focus on a smaller number of items and on ones that make the biggest difference to the Great Lakes basin and/or are unique to the Great Lakes; and to recognize there is international community working on ballast water as well that may be working on some of the same research questions
 - The formal comments as submitted will be distributed to GLP membership
 - A subgroup of committee members will convene as a recreational user working group to continue to make progress on priority actions identified in the GLP priorities document

Priority Species List

Lindsay Chadderton, RCC chair

- The RCC, in conjunction with Alisha Davidson as a TNC contractor, developed a process to prioritize established AIS based on certain criteria
 - Criteria are based on Great Lakes Aquatic Nuisance Species Information System (GLANSIS) Risk Assessments (environmental impact, social cultural impact, distribution, and uncertainty), and inclusion of GLANSIS Watchlist Species
 - Conflict of interest species (i.e., species that management agencies or with recreational or commercial value) were excluded regardless of above criteria; generally, these were salmonids.
- A list of priority established AIS was produced as a result of this effort
- Next steps are to refine the list of species to exclude conflict of interest species and determine why some high-risk species do not appear to be receiving adequate management funding, and provide recommendations (e.g., funding, priority species)

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

Lindsay Chadderton, RCC chair

- An initial set of invasive aquatic plant species to be considered for inclusion in this project has been developed and will be reviewed by RCC members
 - These species were identified using the same criteria and process established by the RCC for the priority established species list and inclusion of NOAA GLANSIS watchlist species
- A managers' survey to better ascertain what factors are impeding management is also in development
- The RCC and project team will consider using GLANSIS as a clearinghouse for the aquatic plant control methodology developed as part of this project

Programmatic Updates

GLANSIS

Rochelle Sturtevant, GLANSIS Program Manager, Michigan Sea Grant Extension

- As older species risk assessments are updated, NOAA-GLANSIS has been removing/retiring species that score lower on updated assessments
 - Four species will be retired (*Atherina boyeri*, *Oncorhynchus keta*, *Benthophilus stellatus*, *Cottus gobio*)
 - Chum salmon is one of the removed species that was introduced to the Great Lakes with other salmonids and failed to establish
 - Other three removed species (*Atherina boyeri*, *Benthophilus stellatus*, *Cottus gobio*) were ballast-mediated species, due to new ballast management structures these will now be removed
 - One species has been changed to cryptogenic status
- Nine new species have been added to the GLANSIS database
- Reptiles and amphibians will soon be added to the GLANSIS database
 - If anyone is aware of additional species to consider, please reach out to Rochelle
- NOAA-GLANSIS has released four new publications: [Review and Secondary Analysis of Competition-Related Impacts of Nonindigenous Aquatic Plants in the Laurentian Great Lakes](#), a gap analysis technical memo, 161-d 2020 Update to “An Impact Assessment of Great Lakes Aquatic Nonindigenous Species”, and 169-d 2020 Update to “A Risk Assessment of Potential Great Lakes Aquatic Invaders”
- [Great Lakes Aquatic Habitat Framework \(GLAHF\)](#) is up and running with downloadable ecological data (e.g., aquatic invasive species distributions, habitat classification, environmental parameters etc.)
- Risk Assessment clearinghouse
 - Updated GLANSIS OIA/RA and USFWS ERSS risk assessments have been uploaded
 - There is a planned future inclusion of Minnesota Invasive Species Advisory Council assessments
 - Also considering adding Fish Invasiveness Scoring Kit assessments as a global assessment resource
- A video series is in development for positive stories in the fight against invasive species, if you would like to look at draft scripts prior to production contact El Lower (elower@umich.edu)
 - Videos will be available by October 2021
- USGS-NAS is rolling out an additional project to format icon and profiles to link back to actual documentation and where assessments took place to help dig into specifics on impact
 - If members are interested and would use this get in touch with Rochelle (Example: <https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=5>)

ANSTF

Susan Pasko, U.S. Fish and Wildlife Service

- The ANSTF 5-year strategic plan (2020-2025) established six goal areas. Each goal has three objectives, and a subcommittee to establish workplans for each goal area, except for the coordination area which staff address internally
- Pasko provided an update on progress towards goals of Strategic Plan and products/outputs of the standing committees, outlined in her presentation slides and available electronically here ([link to slides](#))

Minnesota AIS Research Center recreational boating model

Nick Phelps, Minnesota Aquatic Invasive Species Research Center

- Phelps presented an update on work for the development of a decision support tool to prioritize AIS prevention action in Minnesota related to the recreational boating pathway
- The model's objective is to use ecoepidemiological models to inform risk-based management activities that will prevent the spread of AIS (model linked here: <https://www.aisexplorer.umn.edu/#!/>)
 - Two outputs of the model: species introduction risk to inform surveillance efforts and prioritization of possible watercraft inspection locations. The species introduction output characterizes the risk of introduction for zebra mussel (representative of widespread and established species) and starry stonewort (representative of localized and emerging). The prioritization for watercraft inspection output characterizes optimal number of stations to inspect 60% of risky boats for zebra mussel, starry stonewort, Eurasian watermilfoil, and spiny water flea
 - These species were picked due to 1) their presence in the boater pathway, 2) are 'listed AIS' in Minnesota and DNR keeps records of location data, and 3) were of interest to local managers.
 - Surveillance tool predicts the likelihood of invasion 8 years into the future, can filter by risk of introduction of counties, and can show outgoing to ingoing connectivity
- Using network models, data analysis showed 1,500 connected lakes, 737 lakes with boater inspection station data
 - Analyzed movement of boats and probability of movement through network analysis between water bodies
 - Generally, the more connected a lake is to other lakes, the more likely a water body is to be infested with zebra mussels or starry stonewort
- It may be possible to develop a model across the Great Lakes basin if other jurisdictions possess compatible data
- Future work may include:
 - 1) adding tribal boundaries to visualization, 2) incorporating environmental suitability, 3) new app for exploring effectiveness/cost of intervention strategies, 4) new app to consider multi-county cooperation for surveillance and watercraft inspection, 5) additional species, 6) more complex boater demographic data and time of day/week/year outputs
- GLP members with further ideas for application or project interest are encouraged to contact Nick Phelps (phelp083@umn.edu)

Research to inform Canadian ballast water regulations

Sarah Bailey, Fisheries and Oceans Canada

- Project outcomes 1) Efficacy of exchange plus treatment for Canadian freshwater ports 2) Efficacy of ballast water treatment for the Great Lakes
- Department of Fisheries and Ocean Canada, used a model to estimate rate of nonindigenous zooplankton under ballast water scenarios and within arrival, survival, and establishment components of the invasion process
- Treatment was defined in a change in organism concentration. In the model DFO used two treatment scenarios 1) 100% of D-2 standards, 2) 50% met D-2, but in some cases reduced concentration
- Evaluated efficacy of exchange plus treatment if all domestic and international shipping used exchange and for different combinations of exchange and treatment of ballast water in all ports, Great Lakes, or freshwater ports
- Proposed regulation was only for ships in freshwater ports, since marine ports continue to use treatment
- The result of treatment seems significantly effective with the effect of exchange and treatment of Great Lakes ports and GLSLR difficult to determine
 - But separating out salinity of ports fresh, brackish, and seawater ports, and analysis of at least one species expected, exchange and treatment produced 5x reduction compared to treatment alone to freshwater ports
- Efficacy of ballast water treatment for the Great Lakes
 - Treating all ballast water discharged by Canadian ships and US ships will produce the lowest establishment rate in the Great Lakes region, with increasing benefit for increasing number of ships using treatment, also dependent upon treatment efficacy
- It was noted in discussion that the data was modelled from zooplankton sampling in the past decade, which may be an overestimate or underestimate (sample size was small for 7 non-indigenous species), and potential for future validation of model with new or future sampling and distribution data

GLRI

Kevin O'Donnell, U.S. Environmental Protection Agency

- GLRI Spring budgeting period
 - Adjustments for GLRI Action Plan III 2020-2024 are currently under final EPA review
- GLNPO is working to clarify programmatic differences between GLRI and GLLCISP to state and federal entities
- The anticipated appropriation for GLRI in federal fiscal year 2022 is \$340 million, although the program is authorized at \$375 million
 - Discussions are underway to increase appropriations under a needs-based approach to allocate funding within GLRI
- State input into the GLRI planning process was requested; states will get initial feedback from their input and priorities this fall

- To identify needs and support further funding for GLRI Focus Area 2 (Invasive Species), it was suggested that the GLP ExCom and membership share the highest AIS priorities with GLNPO to communicate need

Emerging issues and announcements

- GLP/ExCom submitted a formal recommendation to U.S. EPA through the ANSTF asking U.S. EPA to request full funding for GLLCISP in its annual budget request
 - The ExCom will report back to GLP members on discussion of this recommendation following the ANSTF meeting

Public comment period

- No public comments received
- GLP Business Session was adjourned

Informational Session: *Didymo* (*Didymosphenia geminata*)

Welcome and introductory remarks

Lindsay Chadderton, RCC Chair, The Nature Conservancy

- Chadderton called the meeting to order
- The goal of the session is to raise awareness and understanding of *Didymosphenia geminata*, hereafter referred to as didymo, and what drives its invasion

Issue background

Carole-Anne Gillis, Gespe'gewaq Mi'gmaq Resource Council

- Didymo is a diatom that can grow excessively in a mat form, where a veneer of living cells on the surface allows for enhanced thickness and density
 - It is important to be able to distinguish between what is cell division and what is mat production due to the fact that the drivers can be very different for cell presence and mat presence
- This species is native to North America and Northern Europe, yet with increases in prevalence and severity of nuisance growths worldwide, there is debate as to whether didymo can act as an invasive species under certain conditions
- Didymo does not occur in blooms like other algae but rather as an overproduction of stalk material when nutrients (particularly nitrogen and phosphorus) are limited. A conceptual model of growth and associated mat formation was reviewed. The four dynamic states are the initial invasion, growth, removal due to some hydrological disturbances event, and recovery and recolonization following the disturbance.
 - When cell division is possible and nutrients are high, mat formation will not occur. Not much stalk biomass is produced but cell division will increase with increased nutrients
 - Stalk production will occur when nutrients are low
- The habitat window determines whether cells will survive, and this is often driven by pH. Geology-driven water chemistry defines where didymo cells can survive, and nutrient concentrations define whether mat formation occurs within a given ecoregion
- Challenges with validating this model in other regions include:
 - Didymo varies spatially and temporally
 - Difficult to discern which are controlling factors are in a given region
 - Temporal dynamics of controlling factors

- Management challenges associated with didymo include:
 - As a native invader, categorizing the species can be difficult and can inhibit funding
 - Environmental triggers will increase didymo stalk production worldwide
 - Didymo has multiple adverse effects on ecosystem function and trophic dynamics
- Recommendations for didymo presence include following the management recommendation of “Check Clean Dry” to prevent further spread

Updates from the Great Lakes region

St. Marys River Michigan/Ontario

Ashley Moerke, Lake Superior State University

Carole-Anne Gillis, Gespe'gewaq Mi'gmaq Resource Council

Bob Pillsbury, University of Wisconsin Oshkosh

- In 2015, didymo was first reported in the St. Marys River, a 112 km river that connects Lake Superior and Lake Michigan. This event was the first ever find of an extensive bloom and mat density of didymo in Michigan waters
- In the next year, didymo rapidly spread to critical habitats (30 km downstream of main rapids) into the Little Rapids Restoration Site.
 - It was unknown why the didymo population was blooming
 - Due to dredging of the area, it is difficult to re-create the history of the environment. Important to note, that where didymo was first found (River Rapids) is a big area for recreational fishing. Is it possible that it was introduced by anglers?
 - If it was not introduced, it is possible that a changing environment led to the didymo blooms
 - There is a trend in total phosphorous decline in the river and didymo bloom (mat density) increased over time
- The average didymo mat thickness in the region ranges between 2-10 cm
- Given that didymo completely covers the benthos, it is important to understand effects on benthic macroinvertebrates, Drifting insects (fish food) and Fish spawning and fry emergence
- Didymo blooms in the region continue occur in prime spawning habitats
- Didymo biomass in St. Mary Rivers peaks when fish eggs hatch (Salmonids and lake sturgeon). Impacts on survival and mortality are still unknown
- Future didymo research in the St. Marys River will focus on:
 - Does didymo influence the spawning site selection of salmonids?
 - Does didymo effect fry emergence survival?
 - What is the geographic extent of didymo in neighboring waters?
 - Can we predict location of next invasion?
 - What environmental conditions trigger blooms?
 - What combinations of environmental variables (dissolved nutrients, water flow, light) trigger didymo blooms in Michigan?
- In the future, it will be important to understand the Influence of compensating gate regulation on didymo blooms as well as effects of blooms on benthos and drifting insects. Additionally, will summer didymo floating mats create hypoxia issues?

Western Lake Superior/Minnesota

Mark Edlund, Science Museum of Minnesota

- Didymo was first collected in Lake Superior in 1961 in Grand Marais, MN, and was noted in periphyton studies that occurred throughout the lake from 1965 – 1971
- Beginning in the late 2000s, didymo within Lake Superior starts to increase in abundance and gains more attention from media and researchers
- Through opportunistic survey efforts (Thompson & Jensen 2009) of 14 different sites within Lake Superior, didymo was identified at 13. Didymo being found at almost all survey locations and known in the region since the 60s confirmed that didymo is native and can be expected in the lake.
- In 2018, abundant didymo mats were found in the Poplar River. Mats were distinct, located nearly ½ mile from the lake, and not associated with typical didymo communities already found within Lake Superior
- Current projects in the Lake Superior region include:
 - Determine the source of didymo in North Shore streams using molecular genome sequencing to identify and extract single nucleotide polymorphisms
 - Determine genetic diversity, fixation indices, population structure and phylogeographic relatedness of Lake Superior didymo, North Shore stream didymo, and other North American populations
 - A large monitoring effort from 2021-2023 will help understand the distribution, dynamics, and the effects of didymo at stream and nearshore transect sites
 - Monitoring will also include fish surveys (monthly gill netting, deployment of egg mats) to understand the effects of didymo on fish spawning
- The field campaign will leverage earlier work in developing transects to compare periphyton data to data collected back in the 60s to help create a time sequence of the differences within periphyton communities in Lake Superior
- Efforts also include a teaching component through the Science Museum of Minnesota about invasive species and promoting “Clean Drain Dry” AIS control methods

Updates from other states

Pennsylvania

Matthew Shank, Pennsylvania Department of Environmental Protection

- A total of 2,452 didymo observations have been noted in the mid-Atlantic (specifically, New York, Pennsylvania and Maryland) with many occurrences in the Delaware River
- A statewide habitat suitability model was completed using water quality data from the region. Low phosphorus concentrations was found to be the primary driver for dense mats of didymo, and waters with these characteristics are commonly found around hydrologic dams
 - Most habitats within Pennsylvania have marginal suitability for didymo production, with only occasional episodic blooms
- An intensive monitoring effort was made in the Pine Creek Watershed in northern Pennsylvania, to understand the variables associated with mat formation
 - On a watershed scale, didymo cellular distribution is limited to upper reaches of Pine Creek, where median soluble reactive phosphorus (SRP) is 2.7 ug/L
 - At the epicenter of distribution in Pine Creek where SRP was consistently less than 2 micrograms/L, increased frequency and rapidity of short-term changes in stream flow in response to storm events and water temperature were associated with decrease benthic mat formation

- A paleolimnological study was implemented in nine riverine impoundments throughout Pennsylvania, Maryland and New York to help answer the question of whether didymo is native or invasive to the area
 - A messenger operated gravity coring device was used to collect sediment cores and examine didymo presence
 - Out of the nine reservoirs sampled, didymo was found in six of the lakes and absent in three. didymo has been in the region since the early 20th century, but density of cells seems to be increasing throughout time

North Carolina/Tennessee

Justin Murdock, Tennessee Tech University

- No mats of didymo have been observed in North Carolina. In Tennessee, mats are only found below tailwaters, specifically in the Clinch River, Holston River, South Houston, and Watauga River
- The heaviest didymo mats are found near dams and mat presence diminishes further downstream
- Temperature is the most significant factor for determining didymo *cell presence* in the region, followed by pH
 - Temperatures below 16°C and pH below 7.4 create an environment favorable to cell presence
- Turbidity (below 2-3 NTU's) and soluble reactive phosphorus (6-7 µg L⁻¹) are the most significant factors for determining didymo *mat formation* in the region
- The underlying geology of waters where didymo mats are found contain a lot of limestone and therefore a higher pH relative to other regional streams
- Recent research examined if didymo alters food web structure and/or food resource use of macroinvertebrates and fishes
 - Overall abundance of macroinvertebrates did not drastically change between areas of high and low didymo, species seem to just be changing what they are eating
 - Fish have not been limited in food resource in high didymo dense areas, yet didymo was found in stomach contents
 - For trout specifically, stalks increase chironomid midge and oligochaete worm abundance, but the strongest isotopic signatures came from turbellarians and amphipods, which are typically found outside of mats.
- In Tennessee, the gut content of 30 preserved brown trout and many macroinvertebrate samples from 1988 were processed. There was no didymo found in the organisms which may indicate that didymo is not native to the Appalachian region, but more research is still needed

South Dakota

Lisa Kunza, South Dakota School of Mines and Technology

- The presence of didymo cells is not new, concerning, or unexpected, but the abundance of stalk material has been cause for concern
- Didymo has been observed in Grand Teton National Park in several streams with the thickest mat formation in a lake outlet (Phelps Lakes outlet)
 - Mats in the Phelps outlet were about 1cm thick and covered approximately 70% of the stream substrate
 - In the Taggart Lake outlet, didymo mats were much thinner covering less than 30% of stream substrate

- Everywhere where there were cells present in 2008, mats became present in 2015. Something changed environmentally that enhanced mat presence
- Current work has found that didymo mats influence gross primary production with a large increase in ecosystem respiration (the sum of all respiration occurring by the living organisms in a specific ecosystem). When there are mats present, the ecosystem respiration is elevated and extended in time, even in very large systems
- The amount of didymo biofilm is much greater than what is being found in gut contents of macroinvertebrates and are only representing a small portion of mayfly diet

Q&A and Discussion

GLP Members

- Given the apparent importance of geology, flow, water quality, etc. for didymo mat formation, how important do you think the angling pathway is for limiting didymo in waters that don't currently exhibit mats?
 - Angling can still be a pathway of introduction of cells to different water bodies, cleaning/disinfecting gear is our best current preventative method. The distribution of cells into a nutrient poor area (potentially utilized by anglers) may allow pathways for didymo to flourish in the area
 - There is evidence for changing systems where areas that may not be currently suitable, through something like land use change, could easily become suitable
- Didymo seems to be generally a stream and river problem. Should we also monitor/undertake prevention actions for lakes matching the apparent water chemistry requirements?
 - We know didymo can be a lake problem (see Lake Superior as a primary example) and in other parts of the world, didymo is found in large oligotrophic lakes. Therefore, there is reason to consider monitoring, to better understand controlling distribution via inlets, outlets, etc.
- How much of the failure to detect didymo falls on the sampling method that is used?
 - In algal counts of 500-700 cells, it is even easy to miss didymo in these standard counts because there are so many other diatom cells. You have to do a tiered survey of samples and specifically look for didymo
 - We compared traditional microscopy detection with eDNA for the effectiveness of both methods. <http://espace.inrs.ca/id/eprint/6345/1/P003132.pdf>
- Sarah Spaulding discussed that didymo has two morphs, has there been an analysis to determine which has more invasive characteristics? Which one do we have in Lake Superior?
 - Current work has not dived deep into these questions; however, regional geographical shapes within chosen waterbodies have been characterized to distinguish this question
 - A lot of regional differences in shape but without the genetic work behind it, it is difficult to determine if they are separate populations or are they at different growth life-stage patterns

Wednesday, June 16, 2021

Committee reports

Committee chairs

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

Fall meeting plans

GLP Staff

- There is not yet a formal plan for the 2021 Fall GLP meeting due to the COVID-19 U.S./Canadian border closure and mixed state guidelines on travel and meetings
- After extensive discussion, the ExCom has decided to poll GLP members to better understand restrictions related to travel, in-person meetings, vaccination, etc. This poll will be shared in August
 - Based on the results, the ExCom will determine whether to hold a virtual, hybrid, or in-person meeting. The ExCom anticipates making a decision on meeting format at least two months prior to the 2021 fall meeting dates