DEPARTMENT OF NATURAL RESOURCES

Minnesota Statewide AIS Advisory Committee (SAISAC)

December 1, 2022 Meeting Minutes
Teams Online Meeting

Members Present: Beto Garcia, Charlie Brandt, Holly Bushman (Kalbus), Kate Hagsten, Mike Sorensen, Pat Brown, Shelly Binsfeld, Ryan Wersal, Will Bement
Members Absent: Chris DuBose, Michaela Kofoed, KoriiRay Northrup, Chris Magnotto, Maggie Stahley, Bruce Babcock
Ex-officio Members Present: Meg Duhr
Ex-officio Members Absent: Nicole Lalum, Amy McGovern
DNR Staff Present: Heidi Wolf, Tina Fitzgerald, Doug Jensen, Chris Jurek, Nicole Kovar
Guests: *Dan Larkin, Raining White, Jacob Grandia*

Chair H. Bushman called the meeting to order at 10:07AM.

Motion to approve agenda: First by W. Bement, second by M. Sorensen.

Motion to approve Meeting Minutes from November 3, 2022: First by C. Brandt, second by K. Hagsten.

Meeting Summary:

- The Committee listened to a series of presentations about starry stonewort phenology, ecology, spread and management from a panel of experts.
- The Committee learned about the recent Behavior Change for AIS Prevention Pilot Projects funded by the DNR.
- Voting for Chair and Vice-Chair was postponed to the January 2023 meeting.

Starry Stonewort Expert Panel Presentations and Discussions

Members were provided with copies of the Power Point slides for all presentations after the meeting. The notes below provide summaries of the presentations and detailed discussions with the presenters.

Starry stonewort spread, ecology and phenology

Dr. Dan Larkin, Associate Professor and Extension Specialist with the Dept. of Fisheries, Wildlife, and Conservation Biology and Interim Co-Director of the Minnesota Aquatic Invasive Species Research Center

- Background
    - Algae is an ecology term. Algae can be found in different parts of a phylogenetic tree.
    - Starry stonewort is a green algae, closely related to land and vascular plants.
    - It is native to Europe and Asia, first found in America in the 1970s.
    - Known North American populations are dioecious (this may be changing).
    - It spreads by fragments and bulbils, with boater movement the presumed driver of spread.

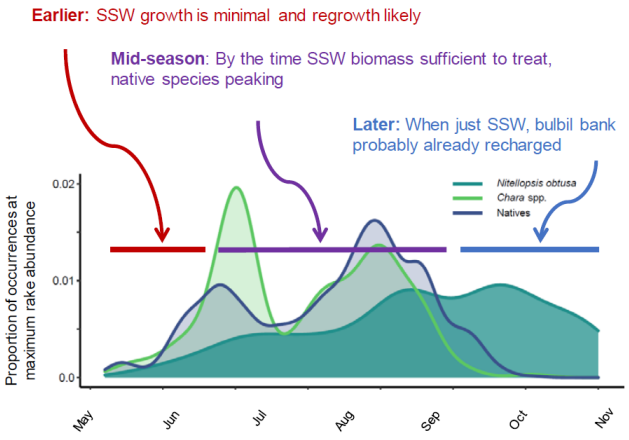
- It is rare in its native range, but invasive in North America. There are many examples of this for other species too.

- Spread
  - It is increasing in North America, with Minnesota as the western frontier. Minnesota has a north-central cluster and central cluster.
  - Where is it going to end up? Depends on regional risk (climate), lake-level risk (water chemistry and overland survival), and within-lake risk (habitat suitability).
  - Regional (climate): Potential distribution based on climate model is more expansive than current distribution. But just because climate is right, doesn't mean waterbodies are right.
  - Lake-level:
    - Chemistry of invaded lakes: High pH, high conductivity, and wide trophic state ranges. Partnered with New York to identify the environmental conditions of invaded lakes, then identified which Minnesota and Wisconsin lakes overlapped. Risk increases with lake productivity and water hardness (environmental predictors).
      - Developed a regional risk model. Consensus with actual patterns of invasions (model is independent of known locations). Shows high potential for further spread in Minnesota and regional differences in risk.
    - Overland transport – can it survive? A desiccation tolerance experiment found that bulbils are viable for less than 4 hours and fragments are viable for 2-72 hours with a strong size effect (smaller clumps dry faster). This is consistent with clustering of current populations.
      - Results mean that reasonable effort will prevent spread. Risk is from non-compliance and conductions that retain moisture.
  - Within-lake distribution: Information can guide search effort, impact assessment, and management.
    - Species occupancy (which areas get invaded) detection (probability of finding it) model.
    - A lot of point-intercept data to work with from Minnesota and Wisconsin, including environmental variables (depth, fetch, density, accesses, etc.).
    - Model found low detectability (only found in 1/3 rake tosses), which adds a lot of uncertainty. Detectability goes down with more plants, especially Characeae.
    - Occupancy is higher when closer to accesses and with more accesses. A real association, not just artifact of accesses being easy to search.
    - Generates heat maps that can be used to target search efforts (adaptive sampling). This will be used on new MAISRC funded project with the Leech Lake Band on starry stonewort surveillance and impacts on wild rice.

- Impacts
  - Ecological impacts (interactions with natives): high uncertainty, not enough research, and anecdotal reports of severe impacts. Established permanent sampling plots sampled annually to examine rates of local spread, impacts on natives in 2017 (time sequence sampling). Added 3 lakes in 2018 with larger samples (space for time substitution). More starry stonewort is associated with decreases in native macrophytes abundance and diversity. Time sequence sampling plots show increases of starry stonewort and decreases in native plant species richness over 3 years in Lake Koronis, but Moose Lake was a mixed outcome. But, in year 4 we see a pull-back from starry stonewort

dominance and signs of recovery of native plants. A lot of inter-annual variability – what we see in one summer will be different than what we see in the next.

- Phenology (seasonal growth variability): Temporal overlaps with native macrophytes?
  - Two years of sampling two lakes separated by 250km (Koronis and Moose) found inter-annual variability and geographic similarity – differences are seasonal, not latitudinal. Found high spacial and temporal variability in bulbil density – seeing decrease in bulbils (due to sprouting) in the spring and increased production in the fall.
  - Distinctly later phenology than common native macrophytes and other invasives – new temporal niche in Minnesota lakes.
- Thus, a control conundrum – when to treat for effectiveness with minimal collateral damage?



- What can we do?
  - Starry Trek event. Early detection is key using local knowledge and risk models. High participation. They have found small infestations – control of which can be highly effective with hand pulling.

Discussion

- **R. Wersal** asks, when and if he will have to deal with starry stonewort down south? Water quality is low and very low light. **D. Larkin** says it might be too eutrophic. Models disagreed on southern Minnesota.
- **M. Sorensen** asks, if we start finding female plants, will we start finding seeds? Will that impact spread with smaller seeds? Or will spread remain with bulbils? **D. Larkin** says the majority of spread will remain asexual, but it does increase the risk. What about ducks – that is more on the table with that.
- **C. Jurek** asks about native *Chara sp.* phenology and how that plays a role in starry stonewort control. Observed in Koronis *Chara sp.* taking a hit, but sees rebound in the fall. **D. Larkin** says *Chara sp.* abundance saw two peaks – late mid-June and mid-August. Could be a bias of when surveys are occurring. Or could be the double peak, even without management.

Pesticides – Lab to Field: Developing chemical control recommendations for starry stonewort

Dr. Ryan Wersal, Assistant Professor – Aquatic Plant Ecology and Weed Science with the Department of Biological Sciences at Minnesota State University, Mankato

- Data on harvesting will be coming. Has also done phenology work which supports **D. Larkin's** findings. The "hydrilla of the north."
- Objectives
    - Pesticides screening to identify products and formulations that are efficacious.
    - Non-target aquatic plant sensitivity to select algaecides and herbicide control.
        - Most herbicide controls are done with copper products – chelated. Formulations can matter. Caveat: the data is collected via what coming into the lab. The copper formulations in the field can become important.
        - Testing copper efficacy, non-target efficacy and other pesticides/herbicides that may work to effect photosynthesis.
    - Verify lab scale data on the effectiveness of Diquat for control in small plots.
- Pesticide screening methods
    - Screening studies were conducted in 55L aquaria under lab condition.
    - Starry stonewort was harvested from Lake Koronis, MN and propagated in the lab.
    - 1st trial had three formulations: copper ethanolamine complex, emulsified copper ethanolamine complex, copper ethylenediamine complex. 8 hours exposure time.
    - 2nd trial had herbicides or herbicides mixes: Aquathol-K, Hydrothol 191, Clipper SC, Stingray, Reward, and Aquastrike. 12 hours.
- Pesticide screening results
    - All copper formulations worked equally well. There was not a concentration or combination that completely controlled starry stonewort, which means re-growth will happen and re-treatment will be needed.
    - Herbicides – only Diquat at full label rate and formulations containing Diquat at full label rate controlled starry stonewort.
    - In the field there is spatial and temporal variability, which happens even in small scale studies.
- Small plot Diquat evaluation
    - Studies conducted in Koronis and Medicine lakes that included pre-treatment sampling and un-treated references.
    - Measured biomass and bulbil density – 4 weeks and 8 weeks after treatment.
    - Copper (Cutrine Plus) or Diquat (Reward) was applied by a licensed applicator to the plots in Koronis. Water samples were collected at the time of application and a series of hours (1,3,6,24,48) after treatment (HAT).
- Small plot results
    - Copper reduced aboveground biomass by 96% at 8 weeks after treatment (WAT).
    - Diquat plots had no reductions in aboveground biomass during either sampling time.
        - Estimated half-life is 2 hours which means a loss of 52% after 1 hours and 98% after 6 hours. Therefore, not enough to be efficacious. Trials used 12 hours of exposure.
        - Koronis littoral area is shallow shelf next to deep drop off, which means rapid off target movement.
    - No treatment reduced bulbil density.
- 2021 field plots

    - By combining products, you can decrease contact time and still get the benefit, e.g. copper alone and copper + Diquat.
    - 4 WAT using copper saw a 78% reduction in above ground biomass – short term nuisance relief. Regrowth had occurred by 8 WAT, but was still lower than non-treated reference plots.
    - Combo plots had a 75% reduction and showed no regrowth in aboveground structures.
    - 82% reduction in bulbil densities by 4 WAT in copper plots, but by 8 WAT bulbil production had recovered.
    - No reduction of bulbils in combo plots, likely due to spatial variability of bulbil production.
- Summary
    - No copper treatment has shown efficacy in reducing bulbil viability. On average in the littoral zone, 4.9 billion bulbils are produced.
    - Copper formulations have been seen to negatively affect bulbils, but this has not been confirmed in sprouting experiments.
    - The ability to recover from treatment via bulbils is cause for concern.
    - To date there is no workable strategies to prevent bulbil formation.
    - The decision to do nothing is still a decision, but must be weighed against the consequences of doing so. For example, **D. Larkin's** results showing reductions in native plants.
    - One treatment a year can provide nuisance relief up to 8 WAT. Likely to need 2 or more treatments for longer-term reductions.
    - Use of phenological timing will be crucial for management plans.

Discussion

- **D. Larkin** says clearly disrupting bulbil production is key. **R. Wersal** says that has always been the holy grail for pesticide manufacturers – something we can synthesize to inhibit it. The Thum lab is going at it at the molecular level, using the genome of starry stonewort and follow through time and what do the gene sequence do, what does that do at the plant scale. Need to know what causes genes to turn on – biomass, bulbil formation, etc.
- **K. Hagsten** asks, how long are bulbils viable in the sediment? **R. Wersal** says 50-80% of the starch is stored there, potential for longevity, but don't know how robust the outer covering is. Likely similar to other tubers/turions, probably 3 to 5 years. Hard to figure out.
- **D. Jensen** says Michigan studies suggests there is an increase in bulbil production after treatment. **R. Wersal** says that is usually a response to disturbance. Hard to say for sure. Once it starts, it keeps producing bulbils.
- **D. Jensen** asks, what is the cost of copper or combination treatments? **R. Wersal** says it is a relative term. The applicator gets better pricing on pesticides. Wouldn't recommend combo treatment because we don't have all the questions answered. Copper is more selective, plus combo would be more expensive.

Monitoring, responding and managing starry stonewort

Chris Jurek, DNR Invasive Species Specialist

- Monitoring starry stonewort since 2015 – new and not much known. Even drilled a hole in the ice and found green plants with bulbils. Bulbils are found any time of year, highest in the fall. Observed matting around 7ft, grows in up to 19ft in Lake Koronis.
- Responding to a new infestation of starry stonewort
    - Get a report and then the DNR confirms its presence before informing partners and posting signage.
    - Typically, lake group will coordinate funding, apply for grant money or no action.
    - Contractors are hired and conduct management.
    - Lake group continues to work with MN DNR and local contractors on management and annual monitoring.
- How to monitor new infestations
    - Delineate / map new infestation to determine extent.
    - Collect pre/post treatment monitoring to assess the effectiveness of control projects.
    - Underwater snorkel or scuba surveys – easiest way if water clarity allows. Measure perimeter and record presence/absence.
- 22 waterbodies in Minnesota are listed as infested, with 15 taking control measures. A majority use hand-pulling for small infestations. Koronis, Turtle, Moose and Medicine are 20 acres or more.
- Management through Invasive Aquatic Plant Management (IAPM) permit process
    - The DNR has issued permits for: suction dredging, DASH (diver assisted suction harvesting), copper, copper / hand-pulling, hand removal via scuba, and mechanical harvesting. No management is also an option.
    - Suction dredging: idea was to remove the sediment and bulbils. Cost was $40K and found it the following year.
    - DASH is promising. Cost was $20K and found it the following year.
    - Copper and hand-pulling has been effective at preventing further spread away from the access.
    - Harvesting is not recommended unless you are in maintenance mode.
- Management considerations
    - Size of infestations, native plant community (don't want to do more harm than good), timing, pesticides used in Minnesota, physical/mechanical removal efforts, and cost/benefit.
    - For example, timing: when the first treatments were starting, lake groups wanted to start in June. That was not any more effective to wait and do 2 treatments in July and August.
- Evaluating management
    - Options include: point intercept surveys (consistent and repeatable), copper monitoring, snorkeling, scuba diving, sediment sampling for bulbils and macroinvertebrates, and biomass measurements.
    - Data collected to evaluate trends over time and to guide future management decisions.
- Small-scale management efforts in Region 3N
    - Grand Lake, W. Lake Sylvia, Pleasant Lake, Carnelian Lake and Rice Lake
    - Small scale management efforts-less than 1 acre
    - Partnership with Blue Water Science, lake associations and other local partners less than an acre – important

    - Methods for monitoring / evaluating success: Point intercept found to be not the best tool with sparse populations. Shifted gears and started collecting biomass measurements for hand removal projects – best tool so far.
    - Biomass removal – over time really reduces the amount in the lake (graphs show reductions in three lakes). Very little maintenance each year.
- Lessons learned for small-scale hand removal of starry stonewort:
    - Minimal non-target effects to native macroalgae and plants.
    - Effective method to remove biomass for sparse populations.
    - Removing all bulbils doing hand removal is challenging and not achievable, because sampling found bulbils 6 inches deep.
    - May cause fragmentation.
    - Small populations can be reduced after 2-3 hand-pulling dives during the growing season.
    - Starry stonewort has not spread within the lakes after five years (Sylvia, Grand and Pleasant).
- Lessons learned with pesticide management using copper:
    - Small scale: Repeated treatments can reduce biomass, slow spread, and prevent surface matting. Doing the first treatment in July typically shows greatest reduction in biomass.
    - Large scale: Concentration and exposure time (CET) never achieved. Biomass reduction observed. Frequency of occurrence remains unchanged or increases. Muskgrass reduced significantly.
- Summary
    - Early detection and response is the most effective tool for limiting the spread.
    - Annual re-growth is likely occurring from bulbils.
    - Annual maintenance necessary to control spread.

Discussion

- **D. Larkin** says you are working on lakes with associations that are well organized, what about in cases where there isn't that capacity? Are there options there? **C. Jurek** says **N. Kovar** will talk about that and other challenges in the northwest region. Lake Carnelian didn't have a lake group, a person stepped up and took care of it, applied for our grant funds, and DNR paid for it. If there is a need, DNR tries to help groups when we can when there is money available, even though we have limited in staff.

Complexities

Nicole Kovar, DNR Invasive Species Specialist

- Don't have a lot of graphs, because of the complexities and considerations. Real hurdles to getting projects accomplished.
- There are 14 water bodies in **N. Kovar's** area, localized. Only 2 lake groups applied for funding, all others don't have one or are not organized with funding mechanism. Beltrami County will take 2 and Cass will take 1.
- Challenges
    - Lack of entity to take ownership. This is very common in northwest Minnesota, where 80% of lakes don't have an organized group and there are a huge number of lakes.

    - Concern about the costs. Even with grant funds, it is not enough. Counties are the only other source, but don't have the budget to cover that. Would need to take money out of something else, like inspectors.
    - Vendor shortage. There were 4 new last year, 4 new this year. Steamboat Bay DASH was done with vendor out of Wisconsin.
    - Staffing and time restrictions – cannot manage projects at all sites currently.
    - Only 2 tools – algaecide and mechanical. And 6 out of 13 are within Leech Lake Band of Ojibwe boundaries – so cannot use algaecides.
- Sometimes doing nothing is not an active decision, it is an unfortunate reality. This is not exclusive to starry stonewort.
- Excited for the Leech Lake Association – first time taking on AIS, will be applying for a grant.
- Big lakes like Winne and Cass – not a lot going on, but maybe in the future.
- **N. Kovar** permitted herself on 4 lakes for hand-pulling, using response money from the DNR.
- Beltrami has applied for Big Turtle Lake.
- 2 permits to Leech Lake Band of Ojibwe for Steamboat Bay and Mississippi sites.
- Even if we get a project going, then run into issue of collecting pre/post data.

Discussion

- **H. Bushman** says, other than lake associations there are SWCDs, counties, sportsmen groups. Attend local meetings and talk about the issues. One Watershed One Plan – there is funding that could be set aside. Leech Lake plan does include AIS. **N. Kovar** says the county AIS programs are within the SWCDs, so we do talk to them. It's the compounding issues… get the money, but then who will take ownership with time restrictions. **C. Jurek** adds that our roles are to provide technical support, not to approach a group to tell them to manage. The partners need to come up with the funding, apply for the permit, etc. we do help, but it takes someone to step up. **N. Kovar** adds we don't have time for it either (project manager) and not traditionally our role. **C. Jurek** says we need partners, as many as we can, to make these successful!
- **N. Kovar** says if there is interest in studying non-managed lakes there are a few to choose from, e.g. Bowen is a small lake.

Diver Assisted Suction Harvesting (DASH) in Leech Lake

Raining White, Invasive Species Specialist/ Crew Lead with the Division of Resource Management for the Leech Lake Band of Ojibwe

- Works closely with **K. Hagsten** and **J. Grandia** (on the call) on this effort.
- Partners: Oak Haven Resort (on the Mississippi) and Anderson's Cove (Leech Lake) as well as DNR, MAISRC, Cass County, and Ron who sold them the DASH.
- Starry stonewort is in the Leech Lake Band of Ojibwe's three biggest waterbodies. Most other waterbodies are at high risk of infestation.
- DASH – Leech Lake (Steamboat Bay) and Mississippi River (between Andrusia and Big Wolf).
- DASH operation:
    - 25ft pontoon, gas powered water pump, and venturi pipe.

    - Intake hose used to collect starry stonewort is 30ft long.
    - Box on deck has two screen system, water returns to lake while starry stonewort is collected and bagged.
    - Not considered dredging, which is important for DNR permit.
    - Divers selectively pulling starry stonewort, 2 staff on boat removing from box and bagging.
    - Added netting around the box to prevent fragmentation.
- Mississippi River
    - **R. White** found this infestation.
    - New resort owners in 2020.
    - It filled the water column between the docks – shoreline to 5ft deep.
    - 8,000lbs removed wet weight.
    - Less abundant near river center due to flow and other natives.
- Leech Lake, Steamboat Bay
    - Discovered in 2021, but estimate it has been there for 5 years.
    - DNR contracted DASH in October 2021 – 82 cubic feet removed – mostly bulbils, not a lot of green mater.
    - Leech Lake Band of Ojibwe utilized DASH in September 2022.
    - It is a large site, 5 ac at least.
    - Creeping into wild rice beds – very big deal to manage it, do something about it.
    - Historically:
        - Shallow bay, organic substrate which creates challenges with DASH.
        - Great bay for Manoomin (wild rice), shallow across the lake 5ft deep across the bay.
        - Manoomin (wild rice) is already declining, AIS is just another issue on top.
        - Starry stonewort is embedded in the rice.
        - Concern it is causing more patchiness in rice bed.
        - When you are in there, you can tell starry stonewort is matting out.
- Conclusions about DASH
    - Liked: no chemicals; targeted; own it – no waiting – local and fast.
    - Challenging: training and gear – time consuming and expensive; weather dependent; need a crew (spotter, operators on top, 2 divers).

Discussion

- **W. Bement** asks, how are you handling ricers going in there and moving canoes to other water bodies? **K. Hagsten** says we have an inspector at the access checking equipment and handing out watch cards. If you get a wild rice permit you also get a watch card. 300 pairs of polarized sunglasses given out. Posted as infested waterbodies. **W. Bement** says it would be helpful to know that for potential use in his area. **R. White** says if we go into the rice, only go in after harvest.
- K. Hagsten says getting vendor status is a rapid response tool. Looking forward to working with MAISRC to see how it is influencing our plant communities. DASH was built for Eurasian watermilfoil. Starry stonewort fragments before it hits the screen – modifications needed. Collective as group we learn more, want to be effective with this tool. Working with DNR to become registered vendor, more time.

- **B. Garcia** asks, does this work require permitting or licensing (beyond Lake Service Provider training)? **K. Hagsten** says you do need an APM (aquatic plant management) permit from the DNR.
- **S. Binsfeld** asks, how you are watching this area on the future? **R. White** says timing and monitoring where we DASH, plots set up to monitor spread. Continued DASH treatment is definitely planed as long as it seems to help. Nailing down timing is huge. **K. Hagsten** adds, as noted in the previous presentations, timing is really hard, between starry stonewort and rice phenology. May set up additional monitoring plots.
- **H. Bushman** says a panel is a great way to talk about a specific species. Many members agree, appreciate hearing from many different directions.

Member Updates:

- **K. Hagsten**: No real update, quiet season, just logistics on things mentioned previously.
- **M. Sorensen**: No update.
- **S. Binsfeld: M. Duhr** is going to present a class about zebra mussels to the Sherburne SWCD AIS Task Force and other lake associations. Something that we've wanted to happen for some months. Trying to get mailings out to all of Lake Orono to get attendance needed for the class. **H. Bushman** asked if the class will be held virtually. **S. Binsfeld** thought so as an option, but probably not recorded due to costs and logistics. It's really hard to find the right room to hold hybrid events. It would be helpful if people would share what facilities would be good fit based on logistics, room size, costs, etc. SWCD held their volunteer diner at brewery in Big Lake which was free and worked out well.
- **R. Wersal:** Working a lot on starry stonewort. Two graduate students finished up this semester.
- **W. Bement**: Rolling into slower time. Some things just finished up: 1) Parks and Rec Program, docks and piers pulled, and quick inspections didn't find anything. 2) Really good fall walleye trapping season; conducted inspections to make sure no AIS got transported. 3) Various applications for funding AIS program are due on January 15, 2023, so putting that together for monitoring and outreach program. Question: If we are able to hire a full-time AIS person, could they attend this meeting? How does that work? **T. Fitzgerald** responded that meetings are open to the public and guests are welcome. Really open to have colleagues listen in.
- **B. Garcia:** Produced an extensive BioBase map of the Wayzata Yacht Club for dredging purposes, but also for aquatic plants using a piloted drone, which was able to go under the docks and boat lifts. Discovered even using a small drone requires cleaning off AIS after use because of Eurasian watermilfoil, zebra mussels and other AIS are in the lake.
- **C. Brandt:** A couple of experiences, mainly three hunting trips to Montana in the fall. Montana has a watercraft tagging program and inspection process that is a lot different than Minnesota. He wondered if that has been discussed in Minnesota? He knows that the Boundary Waters AIS Coalition has been discussing. He was really impressed with how thorough, effective, and accommodating the Montana program was. One example: We were able to have an inspection early Saturday morning. Hours for operation of inspection stations are 6 AM – 8 PM. If Minnesota ever were to implement, hopefully we can learn a lot from Montana where they're doing it really well. **H. Wolf** responded that Adam Doll serves on the Western Regional Panel and works closely with those states. We're aware of those programs, have learned a lot from them, and understand what they're doing. Question we continue to ask is what's applicable to

Minnesota? Because our number of waterbodies is very different. Feedback is appreciated, but if there are specifics on how the inspection program could be improved, we'd be interested in hearing about that. **C. Brandt** responded that if the BWCAW AIS Coalition moves something forward on a smaller scale, Montana would serve as a good starting point.

- **H. Bushman:** Unfortunately, two new Eurasian watermilfoil infestations found in Le Sueur County. Lake Tustin is connected to Francis and Rays, which were already infested, so not a surprise. However, Sunfish Lake was a bit of a surprise because it's not a popular lake. There are other lakes in vicinity that are more popular. For rapid response, a public notice was issued, worked with lake associations, and will follow up next year. For lakes that are not so popular, maybe station five hours of watercraft inspection/year to keep people on their toes. Conversations have been around decontaminations stations. Those that have all of the tools are pricy but would need to decide where to put them based on feasibility (e.g., access size). So, will probably go with Aqua Weed Stick Stations because they are easier to place in different locations, determine if people use them through the tool tracker. If they work, maybe take the next step to larger cleaning systems. Counties and SWCDs that have used them, really like them, gotten good feedback, people are using them, and there has been little damage. A DNR access on Tetonka was closed for improvements: parking lot and decontamination pad so shifted inspections to Sakatah Lake to help out there. Le Sueur County AIS Advisory Committee will be meeting this month. Water Guards, who are contracted to help with inspections, reported that most watercraft inspectors were undergrad and graduate students from Minnesota State and Southwest State. Intercepted a zebra mussel infested watercraft from Lake Minnetonka, which is reassuring that the program is working. No hiccups with inspections last season.
- **M. Duhr**: Relatively quiet at MAISRC. Will launch new projects in January, several which are continuation projects including: 1) Culturing of microalgae in the lab to feed zebra mussels so that they can survive and thrive in the laboratory for the related RNAi interference biocontrol study. This has been a big challenge for zebra mussel research because they are really difficult to propagate in the lab. 2) eDNA sampling scaling up to volunteers across the state by giving them resources and see how it works, how replicable and reliable results will be. 3) Messaging and signage influences boater behavior (social science). 4) Zebra mussel copper control with decision support workshops and monitoring of treatments from last summer in Maxwell Bay. 5) CO2 sound barrier to block movement of invasive carp, will be scaled up using a mini locking system built by the St. Anthony Falls Lab in the MAISRC Lab to more accurately mimic fluid dynamics in field conditions. New: 6) Develop a practical, user-friendly field tools for detecting invasive microbes. 7) Removal of rusty crayfish to protect wild rice beds. 8) Evaluate effects of starry stonewort and management activities on wild rice. 9) Impacts of common carp on climate change looking at carp removal as a climate remediation method. Cori Mattke is doing a lot of administrative work to get these projects ready to start in January. Planning workshops in January and February for watershed managers re: common carp management barriers. Working with Cass and Red Lake areas to plan an AIS mini-conference in summer-fall 2023.

DNR Updates:

- **H. Wolf:** 1) Held a really good meeting with U.S. Geological Survey, U.S. Fish and Wildlife Service, Stop Carp Coalition, Friends of the Mississippi River, and U.S. Army Corps of Engineers to discuss Peter Sorenson's proposal for a barrier on Lock and Dam 5. Discussion included what are the roles of each group, what would each do, federal and environmental permitting requirements, what would need to happen at the dam, evaluation, etc. What are the gaps they would need answered? 2) Discussing with U.S. Geological Survey

who is leading development of a decision-support system to manage invasive carp. 3) Wendy Crowell has been leading development of the annual report, which is under review in the Commissioner's Office. 4) Closing out federal grants. 5) Rule making process is open, getting a lot of comments. An association created a blanket form and getting a ton of those, which are suggesting to pause it, but do not provide any reasons for why not to address jumping worms. Comments will be summarized and submitted to an administrative law judge for review. 5) Met with St. Paul water supply re: use of copper to prevent zebra mussel colonization. Unfortunately, what they propose is not permitted according to label use. Instead, it is proposed that they could treat every couple of weeks, which is within label restrictions and DNR would conduct monitoring downstream for potential impacts. 6) Discussions happening internally with law enforcement to clarify and improve policies. 7) Developing new ads for fishing regulation booklets and using new photos.

- **D. Jensen:** 1) Upper Midwest Invasive Species Conference 2022 in Green Bay was a great success at all levels. Over 500 attended (350 in-person) and good news is that it made a small profit. Preliminary examination of post event evaluations look "glowing" with analysis and interpretation pending. Venue, field trips, plenary speakers, and concurrent sessions went very well. Planning has begun for UMISC 2024 in November in Duluth. 2) Participated in a Tischer Creek Watershed Roadmap to Resiliency earlier this week. He happens to live in the watershed in Duluth (22 yrs, knows watershed, players). It is a multi-faceted project looking the condition of the watershed, features and stressors, and identify ways to mitigate those stressors. It involves aquatic and terrestrial invasive species for which he is providing expertise. Through the development of metrics to measure success, it is hoped that this approach could serve as a model for other watersheds across the state. **M. Duhr** asked about winter workshops. **T. Fitzgerald** replied yes, we will be coordinating workshop development with Adam Doll's inspection program and his team to determine logistics and content. It is likely that a couple of workshops will be in-person and a few will be online. If **M. Duhr,** MAISRC or any committee members have any suggestions for presentations, let us know. We will be assessing the needs and wants of the county AIS coordinators via a survey (what they want to hear about, present about) and format workshops accordingly.
- **T. Fitzgerald:** As previously mentioned, a new ad will be included in the Fishing Regulations booklet for 2023. Every year, the Invasive Species Unit works with the Fish and Wildlife Division to include AIS information that is up to date and accurate. Ad is based on behavior change research conducted since 2017. It includes a pledge, actions, how to take them, reasons for not releasing bait – based on tools and strategies working on for anglers.

Behavior Change Prevention Pilot Projects

Tina Fitzgerald, AIS Prevention Planner, DNR Ecological and Water Resources Division

- Intention-Action Gap: Purpose of prevention is to try to get people to do the right thing. Assuming that more information will change behavior so that they do more does not work. Just because someone knows/intends to do something, doesn't mean they'll always take action. Really need to bridge the gap between intention and action. One way to do that is community based social marketing (CBSM).
- CBSM is a social science approach to foster sustainable environmentally beneficial behaviors over the long term. It reaches beyond traditional information and awareness campaigns by targeting individual behaviors, bridging the gap between intention and action. There are five steps: 1) Select behaviors, 2) Uncover barriers

and benefits, 3) Develop strategies, 4) Pilot strategies, and 5) Implement broadly and evaluation. Based on audiences being addressed, our programming is at various stages in these steps. 2017 was the first CBSM workshop for local managers in Minnesota. This presentation focuses on the Pilot Strategy step, with brief review of the results from the first three steps.

- Surveys: Purpose was to better understand stakeholder's knowledge, attitudes, behaviors, barriers, motivators, and communication preferences specific to the activities they participate in and the AIS prevention actions we need them to adopt.

  Angler Survey re: Use of live bait and boats:
  - 94% agree that preventing the spread is the right thing to do.
  - Unfortunately, 36% have released live bait at some point on a fishing trip. Other studies in Minnesota have shown similar results.
  - Barriers to bait disposal were minimal: 39% concerned about smell, 18% animal activity, 15% don't want to kill live bait.
  - Barriers to cleaning and draining boats: 27% don't have the tools, 25% access too busy.
  - Motivators: They are really motivated by wanting to help prevent the spread of AIS (60-71%), knowing it is illegal to release bait (54%), and disposing of bait in the trash if it was provided on site (75%).
  - Sources for information: Prefer to receive information at boat launches (66%), bait shops (55%) and fishing accesses (48%).

  Shoreline Residents Survey re: Movement of Water-related Equipment:
  - Similar to the angler survey, 96% agree preventing the spread is the right thing to do.
  - Unfortunately, 49% were unaware of the 21-day dry law even though many own docks and lifts.
  - Barriers were the buyer wants it right away (15%) and I want it right away (8%).
  - Motivators: 90% helping prevent the spread of AIS and 68% knowing it is illegal to transport AIS.
  - Sources for information: Prefer to receive information from lake associations/districts (79%) and newsletters (41%).
- Why Pilot? Test, Learn, Adapt – really important step
  - Essential to know if a strategy will work before it is implemented large scale.
  - Allows for a program to be refined until it is effective.
  - Allows other possible methods for carrying out a project to be tested against one another.
  - Demonstrates to leadership/funding sources that the strategy is effective in changing behavior.
- Grant Design and Implementation intended to:
  - Fund quick-start pilot projects.
  - Utilize CBSM work completed by DNR.
  - Focus on high-priority target audiences and associated AIS prevention behaviors.
  - Provide an opportunity to consult with behavior change experts.
  - Launched 2020, received 13 applications, awarded 12, and 11 completed ($60,000 total).
- Steps that Grantees Took:
  - Design own behavior change intervention strategy for a specific audience and AIS prevention behaviors.
  - Deliver the behavior change intervention strategy to the target audience in their local jurisdiction.
  - Gather valuable data about the target audience in their local jurisdiction.
  - Evaluate change in behavior of the target audience.

- Summarize project activities and results to inform future efforts locally and statewide.

Behavior Change Pilots continued

- A Note on Commitments:
  - Commitments are a powerful behavior change tool. When people take action, they see themselves differently (e.g., blood donor, recycler, volunteer, stop invasive species).
  - Different types of commitments: Verbal, Written (e.g., pledge), Public (e.g., newspaper, website).
    - These can be used in layers to form and reinforce commitment.
- A Note on Evaluation:
  - Identify metrics to track and use evaluation tools to track them.
  - Use the results to measure the effectiveness of your public engagement activities.
  - Measure types: Surveys, Observations, Interviews, Focus Groups, and Commitments to track change over time.
- Awarded Grants (11): Well-distributed across state; started in mid-season 2020, most work done in 2021
  - Shoreline Residents – dry water-related equipment for 21 days (2)
  - Boaters and Anglers – clean and drain boats and gear (3)
  - Anglers – dispose of unused live bait in the garbage/compost (6)
- Becker County 21-Day Dry Rebate
  - 750 postcards sent to lakeshore residents; if moving dock or lift, you will get paid up to $400 if you use lake service provider and leave it out of the water 21 days before moving to another waterway.
  - Unfortunately, no reimbursements were requested; started mid-season.
  - However, awareness of the law increased from 51% (2019) to 88% for those receiving postcards (n=16); postcard alone did raise awareness.
  - Moving docks and lifts appears to be a very infrequent activity.
- Le Sueur County 21-Day Dry Training – Small but successful
  - Offered tiers of participation.
  - Partnered with 18 local governments to develop training video (643 views).
  - Produced yard sign, fact sheet (graphics where to look) and shoreline owner training guide.
  - Metrics: 6 people attended training, 11 posted yard signs (commitment), and 1 person dried their equipment for 21 days before selling it.
- Bait Disposal Bins:
  - 5 projects ranging from 4-18 bins (41 total) offering composting or trash.
  - Signage focused on what was accepted and why proper disposal is important.
  - Maintenance was a key component.
- Bait Disposal Bins Metrics:
  - Bait and bait-related material was observed in bins.
  - Contamination was common (trash).
  - Litter outside bins occurred but was less common.
  - 281 commitments gathered (total).
  - Maintenance:
    - Two projects not able to compost due to trash contamination.
    - One project able to compost because volunteers frequently visited bins.

Behavior Change Pilots continued

- Working with Bait Shops:
    - 6 bait shops, 2 events at one shop, and created new materials for proper bait handing.
    - Metrics: 9,000 bait bags distributed; 79 commitments via posters; 27 commitments via events.
    - Survey (N=26) Lake Co: 7% had released bait in the past year, indicating behavior is changing over time; 50% knew proper steps to keep live bait - so more awareness is needed.
- Tools at Public Water Accesses:
    - 3 projects and 12 stations.
    - Metrics: Attached counters tracked 2,168 uses; Anoka observed 18/21 boaters leaving in compliance before station installation; Anoka collected a total of 23 verbal and 71 written commitments via accesses.
- Working with Boaters and Anglers:
    - Ramsey developed a unique "clean-in, clean-out" app with inspection steps and piloted at 7 sites.
        - Used signage to promote.
        - 177 web app users, with 132 check-ins and 45 check-outs; used "clean-in, clean-out" but will change to "check-in, check-out."
        - 88 commitments gathered.
        - Observations (25) and interviews (16) conducted at launch.
    - Crow Wing handed out 250 watercraft cleaning kits at 3 tournaments and high-use accesses.
        - 170 written and 143 verbal commitments gathered.
        - 77% reported releasing bait in their lifetime, but 100% reported they know how to properly dispose of bait (n=31).
- Summary of Results – 11 grantees:
    - Partnered with 6 bait shops, 3 fishing tournaments and 15 lake associations.
    - Installed 41 disposal bins at public water accesses.
    - Installed 12 tool stations at public water accesses.
    - Distributed 250 watercraft cleaning kits.
    - Administered 7 surveys.
    - Conducted 7 observation studies.
    - Created 26 new print and digital tools focused on fostering behavior change.
    - Gathered 751 commitments.
- Grantee Words of Wisdom:
    - "Just go for it. We did a lot of preplanning years and learned way more just by doing it."
    - "Don't underestimate the smell of rotting fishing bait."
    - "this entire project and process was incredibly informative and helpful. We will certainly pull from what we learned on this project and apply it to future initiatives."
    - "North St. Louis has since taken over the bait bin project from Lake County. They've accumulated much more non-bait related trash this year than last."
    - "So far, no problems with bears! I have used the minnow posters at several events this summer and hope to use them more at bait shops in the in the future."

- Lesson Learned:
    - Provided local partners with financial and technical support to try something new.
        - Required staff time and expertise in behavioral science (contractor onboard for that).
    - The "build from scratch" approach generated unique and innovative projects, but was labor and time intensive.
        - Need to identify some resources that could be developed ahead of time to expedite the groundwork.
        - More structure and support is needed for evaluation tasks.
    - Less than $5,000 needed to launch a local pilot.
    - Hosting meetings with all grantees throughout the grant period provided necessary opportunities for idea sharing and problem solving.
- Coming Soon:
    - $15,000 unspent from grants so DNR produced posters based on the Lake County project, stickers based on Comfort Lake Forest Lake project, Attention Angler card based on North St. Louis project, and Attention Shoreline resource based on Le Sueur project. Will be rolling them out. Hoping that partners will do some evaluation after using these materials.
    - More grants focus on organisms in the pet trade will be available.
- Take-Aways:
    - Built capacity for the DNR and local partners to design, implement and evaluate behavior change intervention strategies for AIS prevention.
    - Identified areas that need more support (e.g. evaluation).
    - Generated strategies for large-scale implementation.
    - Established a community practice with the potential to be expanded over time.
        - Pilot reports available: www.dnr.state.mn.us/invasives/ais/prevention/behavior-change

Discussion

- **S. Binsfeld** really liked that it started with just $5,000, worked with local partners who knew their audiences, and just that amount of funding could make such a difference. Often, we need local partners for that accountability, like meeting together to do this, helps local partners make a difference in their area. Could really see how this could benefit a local program. Really liked lessons learned and wisdom, good use of funds; appreciated that it could open doors for future projects. **T. Fitzgerald** responded that it was fun to oversee all these projects and work closely with grantees and contractor to address their needs. **H. Bushman** appreciated the opportunity to do something different. Even to not fully succeed in the project was a learning experience. Encourages anyone to apply for grants.

Elections of Chair and Vice Chair

- Several candidates were suggested, but for various reasons declined, several indicated they would have more time in 2024.Several members had to leave the meeting for other obligations, therefore elections will be postponed to early in the January 26th meeting. **H. Bushman** will lead one more meeting.

Future Meeting Topics and Format

- **T. Fitzgerald**: Will send out topics list, noted that most topics of interest have been covered in 2022. Members will be asked to add to priority topics list if needed. Results will be compiled and sent out as a survey to offer group preference in the next few weeks.
- Topics Identified for January: DNR AIS Communications and AIS prevention and management by tribal governments with **W. Bement** for White Earth Nation.
- Format: Strong desire to provide in-person opportunities for managers to interact, personal interaction is extremely valuable, but may not be possible all the time in our new "normal." An online option will always be available in the future. Survey will be sent out to gauge preferences. Potential to schedule summer field trips too, e.g. to the MAISRC lab.

Adjourned at 2:52 PM

Next Meeting to be held online via Teams from 9 AM to Noon on January 26, 2023. On the agenda for the next meeting will be Chair and Vice Chair elections, DNR AIS communications, management by tribal governments continued by W. Bement, and outcomes of priority topics for discussion at 2023 meetings.