

9:00 am Call to Order

- Background: in 2017/2018 MD received funding for protection/restoration for lakes
 - 67 projects planned for state lakes (herbicide treatments, algal blooms...)
- Received funding from the Mid-Atlantic Panel on Aquatic Invasive Species
 - Originally for Maryland, but expanded for a regional event

9:20am North American Lake Management Society - Region 3: State of the Union

- Background:
 - 117 million lakes across the world; shoreline long enough to go around the equator 200 times
- Lakes are widely under threat from a range of issues:
 - In early 2000s, a study was put together to analyze global lake basin management
 - Issues have shifted in the past 20 years from the study
 - Climate change and harmful algal blooms are most important
- Lessons Learned:
 - Lakes are facing similar threats throughout the world, and it is important to work together
 - Integrated lake / watershed management approaches are growing in importance
 - Preventive actions are key - restoration is challenging and expensive
 - Climate change is complicating the basin management approaches
- National Lakes Assessment - in US
 - 2007
 - Mid-atlantic lakes are south of the glacial lakes, reservoirs are dominant lake type
 - <40% of lakes are fair - poor
 - 2012:
 - Focused on threats: nutrient pollution, algal toxins,
 - Detailed trends on lakes in most disturbed conditions
- Global Trends:
 - AIS increasing bc so many linkages between lakes
 - Lakes are more affected by warming air than oceans or lands
 - Lake ice cover is decreasing
 - Stratification of lakes is lasting longer - longer growing season
 - Changes in food web dynamics
 - Precipitation trends are changing - including increasing rain intensity
 - North east region is changing most with respect to this
 - Creates more sedimentation / nutrient pollution
 - Harmful algal blooms:
- Opportunities for Action:
 - Building resilience in lake ecosystems - focus on sediment and nutrient management; acknowledge climate change as a major driver
 - Protect and restore riparian areas and shorelines
 - Adaptive management and planning techniques

- Prevent and control invasive species: **are there opportunities for regional AIS management and prevention?**
- North American Lake Management Society:
 - 40 year partnership that helps to coordinate regional efforts
- Global Lake Ecological Observatory Network
 - Collecting lake data worldwide

9:45am Overview of AIS in MD (Campbell)

- Quagga Mussels:
 - First observed in US in 1989
 - Outcompete native mussels (similar to Zebra)
 - Larger than Zebra, and more adaptive than zebra
- Lake Impacts:
 - Disrupt food web - consumption of plankton, and do not eat harmful algae (which accumulate)
 - Increase water clarity - increase rooted plant growth
 - Native mussels are endangered directly by smothering, and outcompeting
- Other Impacts:
 - Negative recreational impacts
 - Shoreline fouling
 - Impact/ hinder lake infrastructure
 - Contaminant watercraft and gear
- Currently not in MD
- In 2 locations in PA:
 - Blue Hole Quarry
 - Bainbridge quarry
- Bainbridge Quarry:
 - Active in the late 1800s; 1980s-2010s used for scuba
 - 2015 - purchased by Lancaster county solid waste authority
 - Two sides of the quarry are connected, 29 acres, 130' max depth
 - All over land fed
- Interest by SRBC to use quarry as discharge source - but needed to conduct aquifer test to assess impacts on local wells
 - During the test, realized that quagga mussels would be discharged into Susquehanna river
 - No Quaggas in the susquehanna
- Eradication efforts
 - Used biologically active form of copper - EarthTec OZ
 - Self dispersing, does not hurt other aquatic life
 - Applications over 37 days w/ goal to maintain concentrations
 - No lasting copper levels bc biologically active and utilized by other organisms
- Challenges:
 - Realized stratification created mixing problems
 - 3 applications that targeted each 3 zones of the stratification

- Mortality Studies:
 - 100% mortality of all caged mussels by day 40
 - Post treatment sampling - all veligers dead
 - No fish kills
 - Copper levels back to normal
- Proceed aquifer test in fall 2017 and it was approved for low flow mitigation
- 2018 sampling:
 - No veligers, lots of other benthic life
- Future MOnitoring:
 - Spring 2019 sampling and eDNA
 - Stormwater testing, monitoring for algal blooms
- Discussions:
 - Any consideration of native mussel stocking?
 - Yes - we wanted to make sure that Quaggas are completely eradicated before making those efforts
 - Have the diving operations been shut down?
 - Yes - ended in 2013
 - Status of Blue Hole Quarry mussels?
 - Not sure - very small water body that is isolated. Still used at scuba center
 - Is the Susquehanna outlet still open?
 - Yes - helps to maintain water level
 - Will the eDNA be up stream?
 - Yes - up and downstream
 - Why did you pick this copper treatment?
 - We didn't get any bids for other methods - I know that potash is increasing and could be important.
 - Contractor: We worked closely with the chemicals to calculate the correct concentrations and problem solve with treatments to help target the stratification.
 - How long will you monitor?
 - Many years into the future - we don't want any to repopulation
 - What was the follow up monitoring like?
 - We did some plankton tows with boats, and general lake sampling for mussels. We did preserved and unpreserved to tell what was living and dead.
 - Did you see a spike in the copper concentrations because it wasn't mixing as you expected?
 - Contractor: no we planned for two applications, so the concentrations never got to a concerning level.
 - Any similar monitoring in the other SRBC lakes?
 - No
 - Has this treatment been successful for zebra mussels?
 - Yes - this has been approved for all invasive mussels

- Due to the limestone nature, were you worried about creating more habitat downstreams?
 - Yes, but we didn't see it
- Was this tested on crayfish?
 - Not sure

10:05am Lake Champlain and Lake George AIS inspection Programs (Holmlund)

- Theme: this program utilized a large amount of data to expand from one lake to a regional effort
- Adirondack Park: 6 million acres in upstate New York; 50% constitutionally protected
 - 140,000 residents
 - Around 3,000 lakes and ponds
- Invasive Species in the region:
 - Adirondacks relatively uninvaded compared to surrounding water bodies
 - Biggest Threats - Champlain, George, great lakes, finger lakes
 - Key species: eurasian watermilfoil, water chestnut, zebra mussels, spiny waterflea
- Building a Database:
 - Started with paper collection, but is now a table based survey
 - Uniform platform for all boat steward programs throughout the state
 - Wireless uploads
 - Worked with the public to highlight "where did you last use this boat"
 - Additional observational data - boat type, inspection results
 - Spread by word of mouth that other lakes in the region (including private lakes) wanted to have a similar program
 - Tracking of any invasives seen as "saves" - try to track where that boat came from
- Tracking:
 - Track top 3 potential vectors
 - Create single-lake AIS vector map
 - Shows where boats came from and where they're going
 - Produce final full network map for all waterbodies in the region
 - Helps to inform where to target efforts and decontamination (try to interrupt largest linkages)
 - Per year and multi-year analysis
- Value of multiple lakes in a system allowed to create a pattern of conductivity within the Adirondacks park
 - Highlight sources
 - Resulted in a white paper that formed the basis for a regional effort for prevention
 - Widespread impacts for community members and state agencies
 - Resulted in additional support for park and revised transport laws in NY
- New York State Transport Law
 - Applies to any boat launch accessing public waters in New York

- No person can launch without taking reasonable precautions to prevent the spread of AIS
 - Cleaning, draining, drying
- Has been expanded to include any boat launch - not just into public waters
 - Had widespread positive public perceptions before attempting to expand - allowed this legislation to move forward with little/no push back
- Penalties: warnings and then tickets
- Enforcement? This is still being addressed - working with DEC to help expand enforcement
- **Lesson Learned: starting with robust data leads to development of tools and eventually to regulatory teeth.**
- Outcomes:
 - Almost 200,000 people educated
 - 98,000 boat inspections
 - Focusing on environmental education and business outreach
 - Large partnerships throughout Adirondacks park - important to streamline messaging and to have the same protocols

10:45 Fisheries Management in Delaware Lakes and Ponds (Steiger)

- Blairs Pond: managed for fisheries only
 - 28.5 acres, managed for hydrilla from 2000-2016
 - Source not interested to be involved in management
 - By 2012, hydrilla outcompeted most other species and the full pond was treated
 - After getting rid of hydrilla, green algae infestation
 - Negative impacts for fisheries - numbers of fish drop dramatically after hydrilla is eradicated (decrease in habitat)
- Outcomes: eradication may not be the best action depending on the use of the ponds
 - Applications of herbicide often have negative impacts on game species populations
- Discussions:
 - If you are going to use an invasive plant management system, have you decided what your thresholds will be?
 - We aren't managing anything in this way yet - we don't have a management plan yet, this is just a suggestion as to a way we could move forward. We are currently managing only for plant cover with no info on native, invasive etc. The percent coverage is based on what the literature says is best for largemouth bass because that is what we're managing for right now.
 - Are those plant cover percentages for the littoral or whole pond?
 - Generally the littoral zone, but most of these ponds are so shallow that the whole pond is littoral
 - Do you feel like you have support for implementing an invasive plant management technique?

- It's easier to go out to manage something when people complain because budget and personnel is limited.
- What was veg like before hydrilla?
 - It was mostly coontail; the first treatment killed anything that would have competed with hydrilla so now it is hydrilla dominated.
- Did you find any beneficial SAV established or reestablished?
 - There wasn't a survey, but visually we did not see anything. Without doing rake drags, though, it would be hard to know what's going on on the bottom.
- Any information on the fish population in the source pond?
 - No - it is very small (1 - 2 acre) and they are not interested to collaborate with the state.
- Transplanting native plants?
 - We are interested and have discussed but no resources at this time; water quality not good enough to establish other plant populations esp in the summer
- Do you measure the concentrations of floridone?
 - Yes - 80 pbb, 50 pbb - numbers in presentations.
 - They are partial treatments - it was applied in the upper portion and with the high flush rate, it moves through and out quickly
- Could any artificial habitats help with the fish?
 - Yes, but it is so shallow so we can only build so much up before they present boat risk.
- Were you seeing drops in DO that could've explained fish die offs?
 - We didn't see any fish kills, but it could happen.

11:05 Pymatuning State Park Hydrilla Management (Decker)

- Hydrilla in Pymatuning:
 - Discovered in 2010; significant expansion in 2014
 - Managed it in recreational areas
- Project Goals:
 - Limit the extent to undetectable levels of negative ecological and recreational impacts
 - Limit the probability of hydrilla population being a source for other areas
- Tools:
 - Boat Inspections:
 - Good trends for boater awareness; clean-drain-dry practices
 - Wash and Disposal stations:
 - Resources for boaters to clean and dispose of any AIS
 - Outreach via plant identification program and social media outreach
- Monitoring:
 - Tuber bank monitoring for long term trends
 - September rake survey

- Operational impacts survey - generally from property owners; dam outflow limitation
- 2018 Suppression Plan:
 - Focused to limit spread to northern part of reservoir and addressing recreational access areas
 - Various treatment zones
 - Trying to understand downstream impacts (involving additional partners)
- Results:
 - Able to limit extent and expansion in the suppression zones
 - Large budget, due to large visitor spending
 - Continuing strategy into 2019
- Statewide Context:
 - Preventing new infestations and eradication efforts is a high priority throughout PA
 - 13 state parks and 26 counties have hydrilla
- Discussions:
 - What happened in 2014 that caused the large expansion?
 - Not that i'm aware of, but it's possible that the seasonal conditions were more ideal
 - How far downstream from the dam are you surveying / controlling?
 - Unfortunately the park boundary is very close to the dam, but we are trying to work with partners to survey from Pymatuning to the next reservoir. No hydrilla there yet

11:30 Pennsylvania Lake Management Society (Decker)

- Formed in 1989, and affiliated with North American Lake Management Society
- Statewide board of directors representing managers; 6 regional directors
- Membership ~150 - related to conference attendance
- Services to PA:
 - Annual conference / workshops
 - Offer aquatic herbicide applicator credits for PA and surrounding states
 - Technical assistance via C-SAW
 - PA Lake awareness month
 - Governors Invasive species council of PA
 - General awareness / awards (newsletters, factsheets...)

11:40 Volunteer Lake Monitoring (Norman)

- Pocono Lake Ecological Observatory Network - PLEON
 - A lake monitoring program focused on educating the public on water quality and lake management
 - Started in 2017
 - WHY: lakes are important economic resource in the Pocono region; many lakes are private - community associations are responsible for management and

preservation strategies; these programs are run by volunteers so PLEON is trying to support these groups

- Goals:
 - Empower the public to better understand and manage their freshwater
 - Create a community of scientists, students and educators working to protect PA's lakes
 - Collect and communicate ecological data to help inform lake management
- Components:
 - Education - free workshops put on for the public that feature scientist who are active on lake research; goals to facilitation interactions between the public and limnologists
 - Monitoring - work with lake associations and develop customized monitoring plans; written and in-person reporting
 - Citizen Science Volunteer Lake Monitoring (newest component - 2018 was first year)
 - Aiming to understand spatial and temporal trends
 - Via: secchi depth, temp, water color, particles, woody debris, water samples (TP, TN, chlorophyll, cyanotoxins), surface scum
 - Working with individuals and families that live on particular lakes
 - Provide lake monitoring kits and training
 - Release a visual report of trends - generally mapping of trends
- Status: since 2017
 - Monitoring 13 lakes, with 5 lake associations, in 3 counties
- Next Steps:
 - Make dataset publicly available
 - Include harmful algal blooms and AIS response strategies
 - Increase capacity for in-house sample analysis
 - Grow the citizen science component
- What has worked well?
 - Focusing on personal interactions
 - Flexibility of monitoring program design - incorporate what they have already been doing
 - Q&A session with scientists and managers
 - Community approach
- Lessons Learned:
 - Lake associations are political bodies and manage interactions as such
 - Remain a source of information - not recommendations
 - Some people need to be convinced that lake monitoring is important
 - Lake associations have real world constraints (respecting small budgets and limited resources)
 - Maintaining trust - property values are linked to this data and so the data specifics should be confidential
- Discussion:
 - What about water bodies that don't have associations?

- We don't work on that level often, but we could on an individual level via the citizen science component
- Are any of these organizations organized at the state level?
 - Not really - just on the community scale
- What is the main concern of the participants?
 - Interest to maintain water quality and protecting their investments. Sometimes people are noticing changes over time and are trying to quantify that. There are some specific concerns related to macrophytes.
- Are there any local groups that have asked for the data that the associations have been willing to share (i.e schools)?
 - We do have some lakes involved in university studies - we make sure that the association is always involved in the process. So far, they have been welcoming to research.

1:00 Voluntary Boat Inspections at the Deep Creek Lake Launch Steward Program (Metheny)

- Deep Creek Lake: manmade lake in MD; 65 miles of shoreline, max depth of 72'
 - Owned by MD DNR
- Launch Steward Program:
 - Started after Hydrilla was found in 2013
 - All voluntary inspections - most agree to participate
- Results:
 - Fishing boats have lower rates of organic material discovers - could be related to higher levels of AIS education with fisherman
 - BUT fishing boats did have the highest level of refusals
 - Produce map of where boats are coming from
 - Most non-DCL origin points have invasive species
 - Species found:
 - Zebra mussels, hydrilla,
- Efforts to prevent AIS:
 - 2016 law that makes it illegal to launch a boat at a public access point without cleaning beforehand
 - If AIS is found, boats will be denied entry to DCL until washing (within 10 days)
- Discussions:
 - Are the time frames included in the legislation?
 - No that is a DCL specific timeline

1:15 Assessing the risk of future aquatic invasive species establishment in a changing world (Stahlman)

- Climate change will affect how invasive species management is approached
 - Temperature, precipitation, extreme climate event increases
- Invasive species will respond differently than native species
 - New mechanisms of introductions - storms, flooding, high winds

- Biotic resistance can be affected by temperatures - making susceptible to invasion
- Expanding ranges, due to mild winters increasing survival and longer growing seasons
- Altered impacts of invasive sp - increasing or decreasing impacts based on new conditions (ex: hydrilla growth rates will increase with heightened CO2 levels)
- Control strategies may not be effective in new conditions - rethinking or adopting more extreme control methods may be necessary
 - Management will need to adapt to include climate into their control measures
- Current PA research is based on 2011 studies using CliMatch, USFWS, and Wisconsin climate change forecasting
- **Goal: How will species behave in altered climate scenarios AND Which species will emerge as invasive?** Current results focusing on which species to be concerned with moving into the future.
 - Risk assessments differ based on groups of species
 - Climate is good match for most
 - Species selected from external datasets and selected by
 - Species not already present
 - Not intentionally stocked or hybrid
 - 118 total species analyzed
- Utilized USFWS Risk Assessment Mapping Program (RAMP)
 - Runs in ArcGIS
 - 16 climate variables
 - Including current and future climate scenarios (2050, 2070)
 - Identified and removed outliers of unverified records
 - Program produces score of risk of invasion based on climate parameters
- Limitations:
 - Distributions changes are difficult to relate to climate bc they may not have time to spread
 - Rates of spread depend heavily on species traits
 - **Provides a first “filter”**
 - Somewhat subjective
- Next Steps
 - Updating PA state management plan to include climatic factors
 - Discuss a vector based invasive species plan
- Discussion:
 - How far into the future?
 - The program goes to 2070 - the mid date is 2050.
 - When will you run Hydrilla?
 - It's already been run - you can find that on USFWS website
 - Does this model update as climate models are changing?
 - They should already be included in this process.
 - Native resilience could be an interesting counterpoint to this project.

1:35 The Science on AIS Compliance (Rudberg)

- Existing solutions to AIS are costly and not scalable
- Prevention is much more economically beneficial than eradication
- Marketing has limits: Clean, Drain, Dry only goes so far
 - What are the barriers to acting?
 - Give them tools! Empower them!
- Goals of Project:
 - Empower day boaters (boat not in lake more than 5 days)
 - Iterative design process with multiple agencies
 - Include tools that meet boater needs for investments:
 - Blower, vacuum, brush, lights, reach tool (underneath), drain plug wrench, remote connectivity
 - Registering use within station - tells managers that the tank is full or if something is damaged
 - MyCD3station.com
- Pilot Project Results:
 - Highest uses: 14,000 - well marked, high traffic area
 - Follow up surveys: included on uses, ease of use, and violation rates
 - Violation rates went down with installation of CD3
 - Low operations and maintenance costs
 - No vandalism - marketing w/ American Flag
- Next Steps:
 - Developing trailer, outpost and off the grid options
- Discussions:
 - Uses increased over a person inspection?
 - Yes - some normative expectations from community pressure
 - Would you ever charge with this?
 - I don't want that to happen - we want to utilize social pressures
 - What does the unit cost?
 - ~28k for full machine on trailer w/ solar panel
 - Opportunity to enter data at these station?
 - We could include that - checking in, lake at last - BUT having a screen would potentially increase vandalism. Working to connect with bluetooth that you could get access to the data.

2:00 Herbicide Management as part of an Integrated Control Strategy (Richardson)

- Integrated Aquatic plant management:
 - Monitoring and surveys for invasive weeds and non-target populations
 - Planning and decision making: review monitoring to coordinate research or data collection
 - Implementation of management
- Case Studies:
 - Tar River Reservoir:
 - Manmade, no species of particular interest - BUT in Tar river has rare sp.

- Hydrilla was found in 2003 - treated with fluridone
 - Successful in depleting tuber bank and biomass after 4 years
- Integration of ultra-low grass carp stocking in 2013
 - Saved a lot of money when the hydrilla biomass was low
- Eno River:
 - High recreational value, has a population of Roanoke bass (game species of concern)
 - Hydrilla infestation in early 90s in impoundments, mainstem in 2005
 - Decision making process:
 - Prevention not feasible bc already infested
 - Hand weeding not realistic for high infestation rates
 - Mechanical rates - not good for the free flowing system
 - Benthic barriers - not reliable for the river
 - Triploid grass carp - not able to track in the river
 - No host specific biocontrol
 - Herbicides - last resort!
 - Developed Hydrilla management task force to make decisions
 - Collect research to inform management (impacts to native plants, non-plants, grass carp tagging)
 - Baseline surveys
 - Pilot Study: control hydrilla and not harm any non-target species
 - Herbicide drip to correlate with flow
 - Good success with decreasing hydrilla and not harming native plant sp or fish sp.
 - Next Steps:
 - Treatment has been moved upstream
- Lake Gaston:
 - Large reservoir on Roanoke River - up to 3,000 acres of hydrilla
 - Goal - decrease hydrilla volume, but have some veg to remain for fish habitat
 - Historic management was inconsistent so a Technical Advisory Group was formed in 2005
 - Formal management started in 2006
 - Grass carp stocking and herbicide treatment
 - Monitoring would inform management decisions for subsequent years
 - Results:
 - No impacts on game fish populations
 - Low hydrilla levels - tubers have declined in all areas
 - Aquatic veg is maintained
 - Current management necessary
- Discussion:
 - Do grass carp prefer hydrilla?

- Yes, but they also eat most other vegetation too. If they are good or bad depends on goals.
- Did you have outreach to the landowners on the river?
 - Most of that land was state park, but there was a public meeting, flyers and events to inform. Most concerns related to safety, and the advisory group made a good effort to inform the public,
- Have you done any nitrogen monitoring?
 - Nutrient release after management is important to consider. We try to manage them when they are small so there isn't a lot of N going back into the system. As far as nutrients in the water column, we are not doing intensive monitoring.
- Were all the grass carp triploid?
 - Yes - we are only allow to stock triploid by law.

2:20 Harmful Algal Blooms: Understanding the need for Management (Bishop)

- Environmental changes are selecting for more noxious, aggressive types of algae - esp. Cyanobacteria
 - More CO₂, UV light increases, salinity, temp increases
 - Habitat degradation - selecting for generalists
- Harmful algal blooms are happening at every scale
 - Biggest issue are related to the wide range of toxins that are produced
- Toxin production is hard to measure consistently
 - Production is intermittent
 - Hard to measure
 - New toxin classes are still being identified - and no way to detect
- Exposure Routes:
 - Many ways that toxins enter the body: accumulation in food crops and food webs, drinking/eating, physical contact, **aerosolization (airborne particles)**
 - Inhalation hazard is important and often not considered in management actions
- Approaches to Management:
 - Is closing the lake enough?
 - It is important to acknowledge the risk outside of the water resource -
 - Close areas adjacent to affected to waters
 - Treatment can also be important -
 - Toxin is diluted in the water so total exposure goes down
 - No hot spot accumulation
 - Risk of not treating can result in more toxin produced, bioaccumulation
 - Risks to fish and wildlife
 - Discussions:
 - In places with recurrent problems, what are people doing about it?
 - There are a lot of different management products that can mitigate toxins - do what you can to prevent it, but it should be treated once it starts.
 - Is anything being done to inform the communities? Evacuations?

- People haven't really been involved on that scale yet.

3:00 Zebra Mussel Protection in Baltimore Reservoirs (Howells)

- City of Baltimore manages water source reservoirs
- Reservoir watersheds:
 - Loch Raven, Prettyboy, Liberty, Conowingo intake
 - Agreement with TU to maintain a minimum flow from Prettyboy
- Management Actions:
 - 1990s detection of zebra mussel in NY prompted Baltimore to evaluate mussel control options
 - 1992: modified permitting access to water bodies
 - City reservoir use only affidavit
 - No gas-powered motors
 - No boats longer than 18 feet
 - Moratorium could be enacted at anytime
 - Zebra mussel free certified live bait
 - 1992 monitoring program established (April to November)
 - 1993: zebra mussel control facilities at intakes for each reservoir
 - 2008: watershed ranger program
 - 2010: vulnerability assessment to review current control methods
 - Current: public outreach to build awareness
- Management facilities:
 - Monitoring stations at boat ramps and intake locations
 - Control facilities inject potassium permanganate to control veligers OR thermal controls
- Vulnerability Assessment:
 - Low infestation risk for Prettyboy and Liberty
 - Moderate risk for Lock Raven
 - Agreed that the boating regulations were a good route
 - Recommended Zequanox for emergencies
- Current Conditions:
 - 2013: cluster found at intake of Conowingo
 - Not currently found in any of the reservoirs
- Discussion:
 - Are divers allowed in these reservoirs?
 - Not currently. Just for inspections or constructions. We have agreements with emergency dive teams, so they know about the regulations and cleaning stations. Recreational diving is not allowed bc drinking water source.
 - Was there push back about the boating restrictions?
 - We did initially, especially bc the number is limited per year. After asking for reservoir only agreement, permits haven't been in such high demand.

3:20 Overview of AIS Issues in Maryland (Naylor)

- Many AIS eventually become the norm and people may like them (trout)
- Invasives have been a problem for a long time through history
- Overview:
 - Mute Swan
 - Water Chestnut
 - Zebra Mussel
 - Hydrilla
- Responses start increasing
 - 2015: Illegal to launch a vessel at a public access site without cleaning it
 - 2017: specifically aiming to restore and protect state owned states
 - 2018: Money is allocated for protection and restoration
- Emerging Threats:
 - Frogbit
 - Water hyacinth
- Responses are often slow because legally vague
 - No clear path to eradication
- Comprehensive regulations should be passed that allows responses to be faster and funding is needed for people to actually do the work

3:40 Managing Multi-Purpose Lakes and Ponds in Columbia, MD (McCoy)

- Columbia Association is the HOA in Columbia, MD (planned community)
 - Own the open space - private property designated for public use
 - Includes 3 lakes, 41 ponds, and 34 miles of stream valley
 - Originally designed as sediment traps and converted to stormwater ponds
 - Recreational amenities (fishing, hiking, wildlife watching, non-motorized boating, camps)
- Condition of the lakes: eutrophic since 1980s
 - Suffer from excessive plant growth, excessive nutrients/sediments
 - Invasives: hydrilla, water primrose, parrotfeather, water milfoil....
- Monitoring:
 - Flow, sediment, bacteria, algal species and density, conductivity, total phosphorus
- Management Activities:
 - Vegetation control: w/ paddle wheel motors
 - Sediment management: dredging, sediment management plan development
 - Watershed management activities:
 - Columbia watershed management plan: rain gardens, stream restoration projects, bioretention facilities
- Discussion:
 - When the lakes were converted from stormwater facilities to lake - was there a plan for the change in usage?
 - Instead of removing sediment traps, they just converted them to lakes.
 - That infrastructure was designed 20-30 years ago, so it is capacity limited.

- New stormwater treatment is being build - we are potentially treating things before it goes to the lakes.
- Who does the monitoring?
 - Columbia does most of the monitoring. TP is shipped out for validation.

4:00 Sustainable Lake and Pond Management Practices (Allen)

- Assessing the Situation:
 - Data collection to get a picture of the baseline
 - Techniques for management will be build from there
 - Ex: water quality testing, aquatic plant mapping, biological surveys, surface mapping, sediment analysis...etc.
- Management Approaches:
 - Nutrient Management - reduce over-fertilization of lawns, prevent geese from swimming, removing trash/organic materials from shorelines
 - There are eco-friendly products that can help solve nurtiend problems (Phoslock, Alum, Biochar)
 - Mechanical Harvesting: area selected control of veg
 - Areas where herbicides are not approved
 - Hydro-raking and sediment removal:
 - Removal of rooted veg and unconsolidated bottom sediments
 - Stormwater BMP Inspections and Repairs: ensure that they are functioning as designed
 - Aeration: increases circulation which can mitigate some causes of poor water quality
 - Submerged systems, floating fountains, nanobubble technology
 - Buffer management: can help decrease erosion and increase habitat
 - Planting native species
 - Erosion control solutions: planting, coconut fiber logs, SOX system
 - Biological augmentation: beneficial bacteria and microbial communities
 - Aquatic weed and algal control, invasive species control
 - Drinking water reservoir management - esp. Cyanobacteria management, fish kill management
 - Fisheries management: habitat, stocking, trophy fishery programs
 - Mosquito management: via natural management methods
 - Regulatory compliance and permitting

4:30 USGS NAS Database (Pfungsten)

- Looking for feedback on what is useful for managers/state/local agencies to tailor this tool to your needs
- Non-Indigenous Aquatic Species Database:
 - Started in the 90s to track NAS on a national scale
 - Large data aggregation of NAS - from many sources (including historical)
 - Tracks 1200+ taxa, data ranging from 1790-2019
 - *potential introduction pathways and population status

- Invasive Species Spreading:
 - Intentional or accidental
 - Boats, fishing, ballast, fish stocking, pet releases, bait, escapes from aquaculture
- Negative Impacts of AIS:
 - predation/ competition, alteration of habitats, increase/introduce diseases or parasites, hybridization, recreation impacts
- NAS Alert System:
 - Provide a framework for rapid dissemination of new invasions
 - Notifies registered users of new sightings
 - Part of national early detection / rapid response system
 - New feature: risk mapping
 - Short term risk assessment of specific species based on location and how species will move actively and passively
 - Made for each new alert
- Discussion:
 - Mid-Atlantic Viewer is available
 - Have you thought about tracking any genetic material/eDNA info?
 - That is something that will be mentioned in the profile for each species, and eventually we will want to track that. This is something that we should review again.
 - Has anyone heard much about the AVM (avian disease)?
 - About half. But it has been a while since it's been on the radar (7-8 years).
 - It is not just on hydrilla - other aquatic plants too.
 - Has it been looked at on native plants? Problems with locations only having invasives where it has been found.
 - Susan Wilde is studying it at UGA
 - Concerns that this is happening in other locations but people aren't making that connection yet - or climate factors that are keeping it south of North Carolina
 - Interesting to look at interaction factors associated with invasive species.

Adjourn