

New Methods for Early Detection and Public Education at Deep Creek Lake



Nicholas Coleman
Master's Student
Chesapeake Biological Laboratory

Julie Bortz
Natural Resource
Biologist
Maryland DNR



Samara Nehemiah
PhD Student
Chesapeake Biological Laboratory

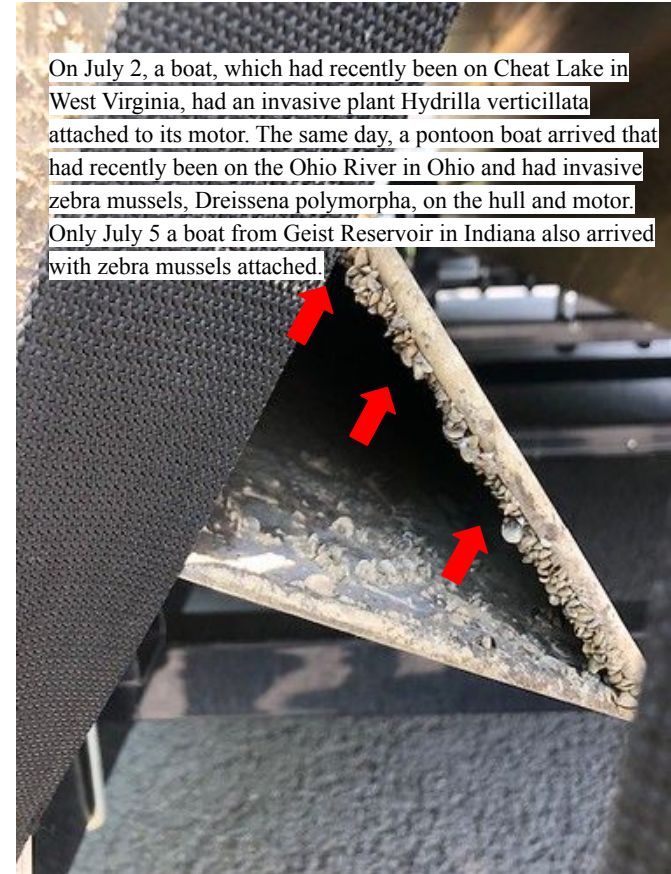
Deep Creek Lake Maryland

- Largest lake in Maryland
 - Covers approximately 3,990 acres and has 69 miles of shoreline
- Receives approximately 1 million visitors annually
- Successfully managed by the Maryland Department of Natural Resources
 - No imminent threats to biodiversity



Management Challenges

- Proactive monitoring is imperative for continued management success
- Given the abundance of visitors Deep Creek Lake receives annually, aquatic invasive species are one of the largest threats to sustainability
- Many of which are coming from adjacent water bodies that are infected
- MDNR has successfully engaged residential lake users but struggles to reach out of state visitors



Major Invasive Species Threats

Invasive Species at Deep Creek:

1. **Hydrilla** (*Hydrilla verticillata*)
2. Curly Pondweed (*Potamogeton crispus*)
3. Eurasian Watermilfoil (*Myriophyllum spicatum*)
4. Virile Crayfish (*Orconectes virilis*)
5. Japanese Mystery Snail (*Cipangopaludina japonica*)

Potential Invasive Species:

1. **Zebra Mussel** (*Dreissena polymorpha*)
2. Quagga Mussel (*Dreissena bugensis*)
3. Brazilian Waterweed (*Egeria densa*)
4. Giant Salvinia (*Salvinia molesta*)
5. Bighead Carp (*Hypophthalmichthys nobilis*)

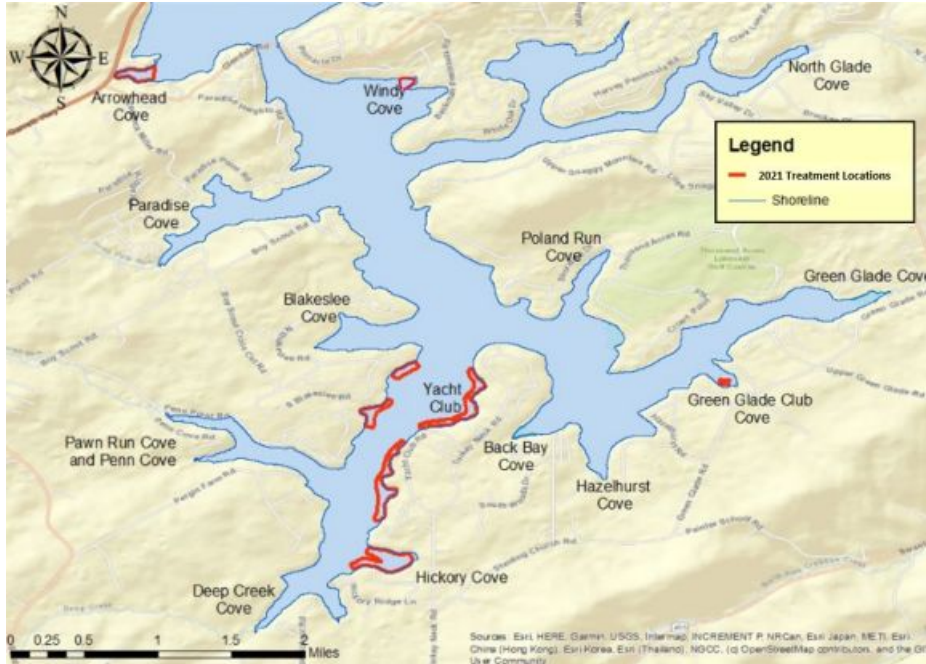


https://www.wfsb.com/news/invasive-plant-thats-already-impacting-businesses-can-produce-neurotoxin-deadly-to-bald-eagles/article_0024262c-1a38-11ec-a895-cfdacc9a7f2a.html



https://www.coloradopolitics.com/legislature/state-declares-colorado-waters-free-of-quagga-and-zebra-mussels/article_6e1a8738-600b-11eb-b00d-2fdc5087975b.html

Management Challenges: Early Detection of Hydrilla



Map of 2021 Hydrilla Treatment Areas, MDNR

- Management Priorities:
 - Identify invasives early
 - Prevent further spread
- Challenges:
 - Difficult to detect SAV
 - Control of SAV is expensive
 - Limited staff, resources
- Effectively manage against invasives given small budget

Solutions: Educational Outreach

- Targeted outreach has been a successful strategy to engage recreationalist
- Out of state visitors could be identified from sportsman's license databases (Fouts et al. 2017) and sent surveys inquiring about invasive species prevention practices
- Colorado Parks and Wildlife (CPW) manages the Watercraft Inspection and Decontamination (WID) national database that records boat registration and owner
 - Currently MDNR uses Deep Creek Lake Launch Stewardship Program
 - Records boat owners zip code and where the boat was launched last



Solutions: eDNA for Early Detection of Invasives



Photo: fingerlakesinvasives.org

- Can identify hydrilla at species level
- More reliable than visual surveys for hydrilla (Matsushashi et al. 2016)
 - Successful detection in Maryland (Gantz et al. 2018)
 - May track abundance (Matsushashi et al. 2016; Gantz et al. 2018)
- New protocols for rusty crayfish (Martinez et al. 2020; Dougherty et al. 2016)
- High-throughput sequencing (HTS) monitors spread of zebra/quagga mussel (Marshall and Stepien 2019)

Solutions: Drone use for Early Detection

- Great candidate for Unmanned Aerial Vehicles (UAV)
 - Water clarity
 - Low cost and time (Lønborg et al. 2021)
- Eurasian watermilfoil detected with >75% accuracy in Canadian Lakes (Brooks 2020)
- UAV accurately identified small patches of water hyacinth (Bolch et al. 2021)

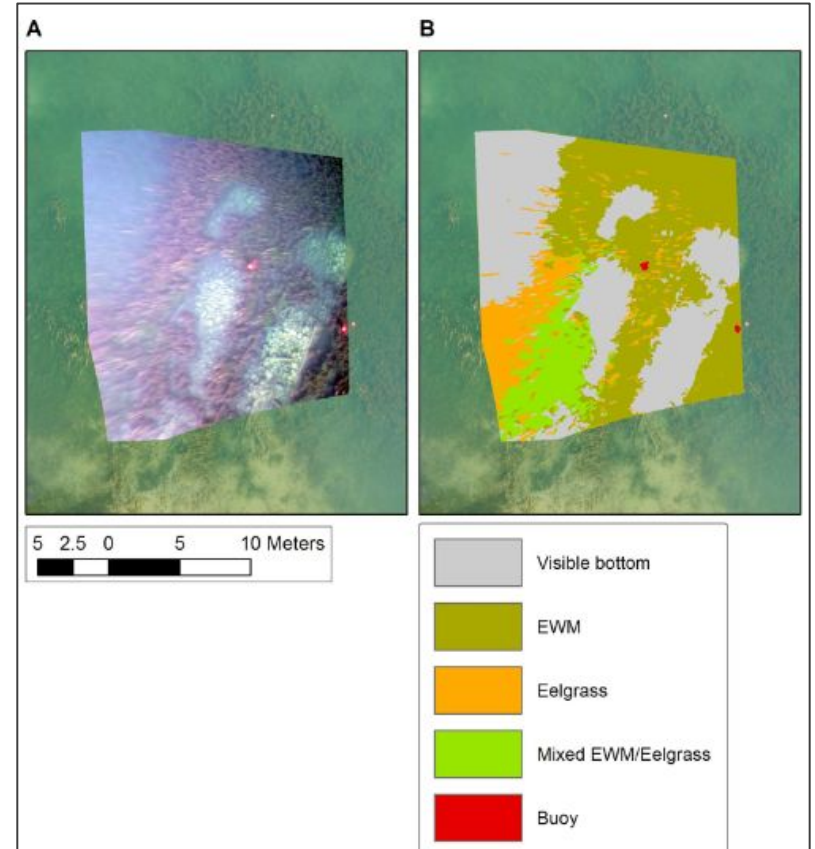


Figure 3.22 from Brooks 2020



Future Management Considerations

- Currently well managed by MDNR
- Major Management Concerns:
 - early detection
 - education
- Need effective management with limited budget, staff
- Best management against invasives is regional management