

Integrating Freshwater Mussels with Chesapeake Bay Restoration

STAC Workshop, March 5-6, 2020, Annapolis MD



Joe Wood, Chesapeake Bay Foundation (Workshop chair)

Paul Bukaveckas, VCU, Heather Galbraith, USGS, Mary Gattis, Private Consultant, Matthew Gray, (UMCES),
Tom Ihde, MSU/STAC, Danielle Kreeger, Partnership for the Delaware Estuary, Rachel Mair, USFWS,
Shawn McLaughlin, NOAA, Simeon Hahn, NOAA

- Overview of the workshop
- Some basics about freshwater mussels.
- Findings and Recommendations
- Q & A



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Talk outline

•Presenters:

- Dave Strayer (Cary Institute of Ecosystem Studies)
- Carla Atkinson (University of Alabama)
- Danielle Kreeger (Partnership for Delaware Estuary)
- Bob Anderson (USWFS)
- Jeff Cornwell (University of Maryland, Center for Environmental Studies)
- Rachel Mair (USFWS)
- Simeon Hahn (NOAA)

•Attendees

- All watershed States and the District
 - ~20 Local, State and Federal agencies
 - Mussel biologist from throughout the watershed
 - Representation from various GITs, CBP and planning groups
- Initial draft to be completed summer 2020 and shared with working bodies of the partnership



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Presenters and Attendees

*Native
Saline Species*



Blue Mussels
Mytilus edulis



Atlantic Ribbed
Mussels

*Non-native
freshwater*



Zebra and quagga mussels
(*Dreissena*)



Corbicula

*Native
Freshwater Species*



"Freshwater mussels"
(Unionoida)



Fingernail and
pea clams
(Sphaeriidae)



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Which mussels are we talking about?



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What is going on here...



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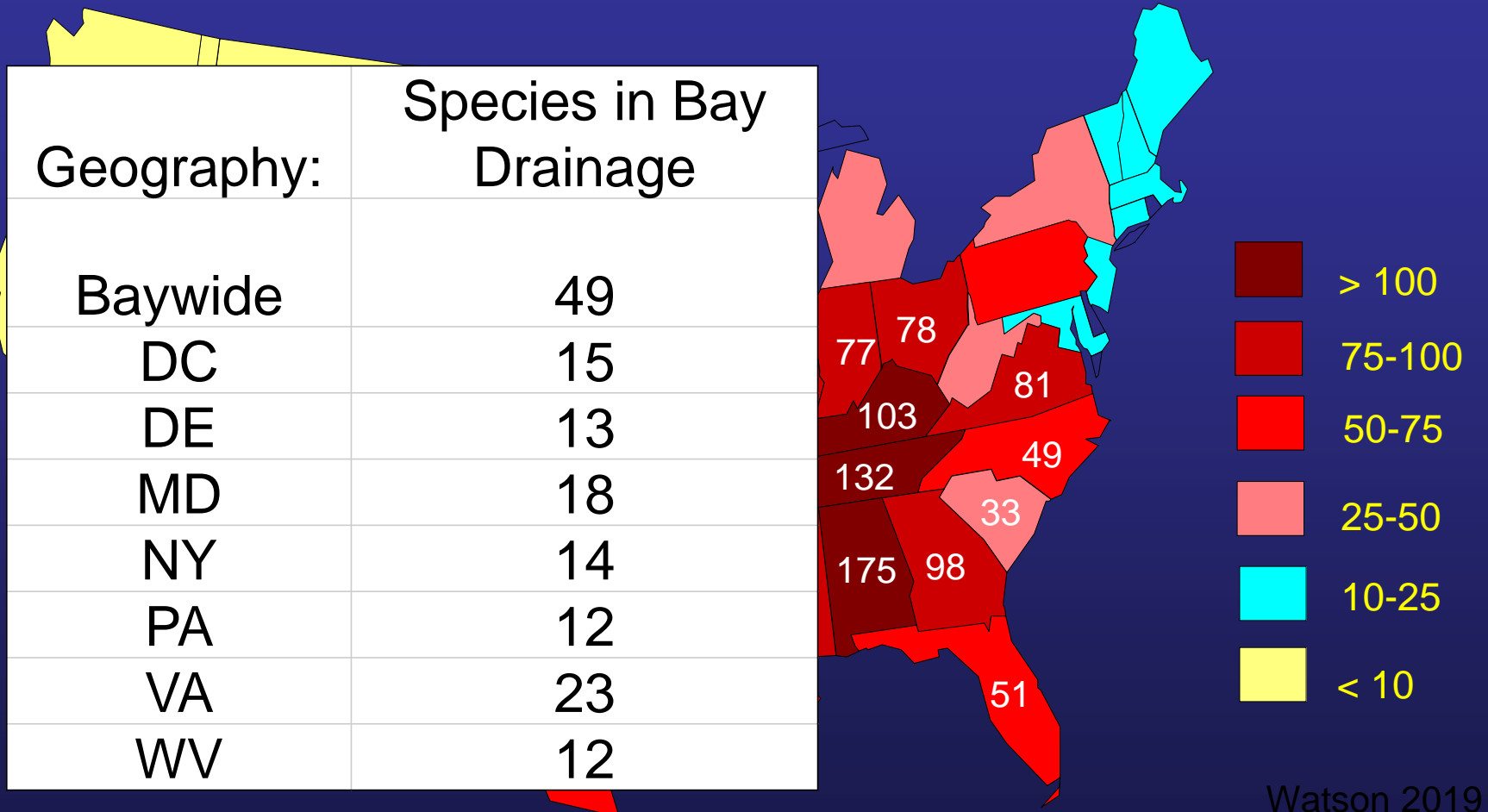
Point #1: Mussels are interesting!



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The lifecycle of a freshwater mussel

Number of mussel species by state;



Point #2:

The Bay Watershed has diverse mussel fauna which is under pressure



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Mussels are severely threatened
Carla Atkinson (University of Alabama)

SPECIAL SERIES

Environment And Energy Collaborative



Nature's 'Brita Filter' Is Dying And Nobody Knows Why

December 6, 2019 · 5:01 AM ET

We do know some reasons why...

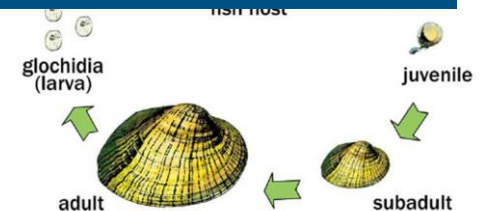


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Enigmatic Die Offs in the news

Point #3:

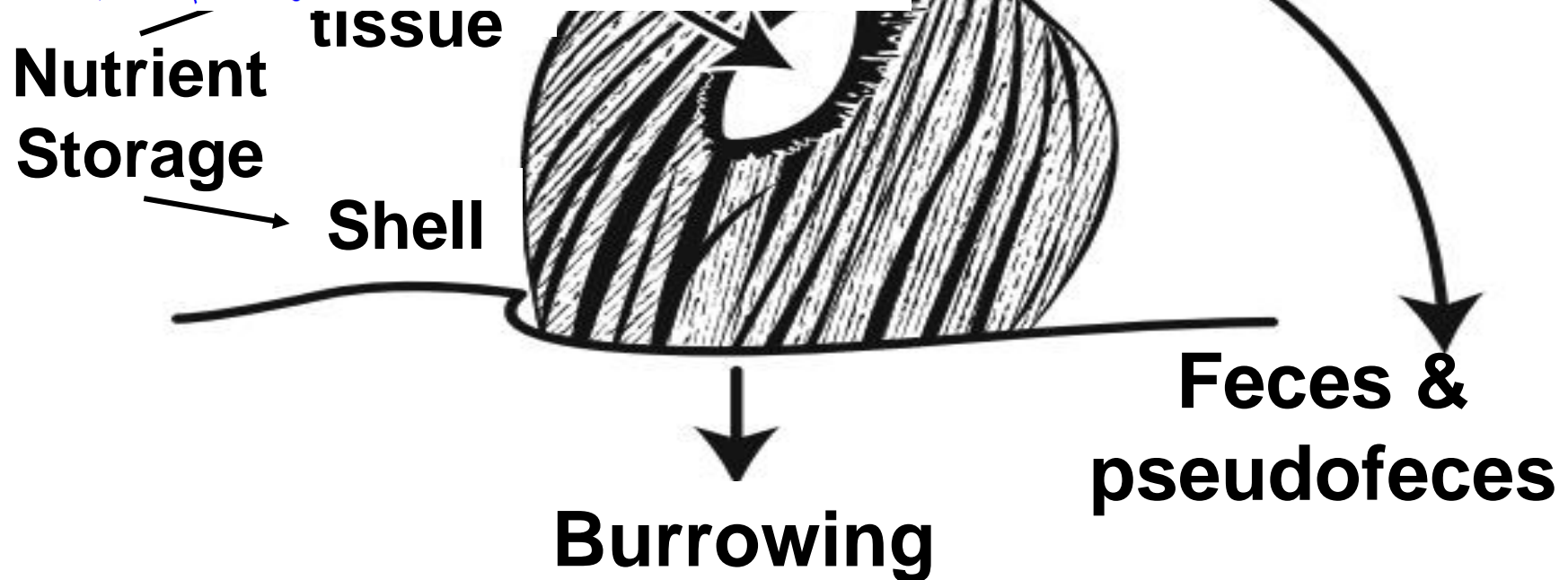
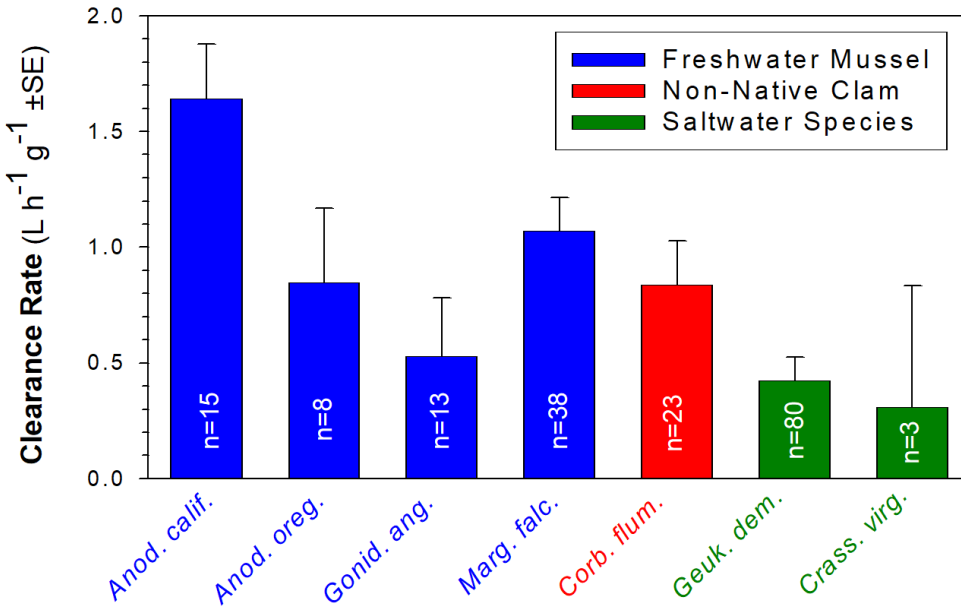
There is overlap between Chesapeake Bay Restoration and Mussels



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Why are mussels struggling?

Freshwater Mussels = Important Functions

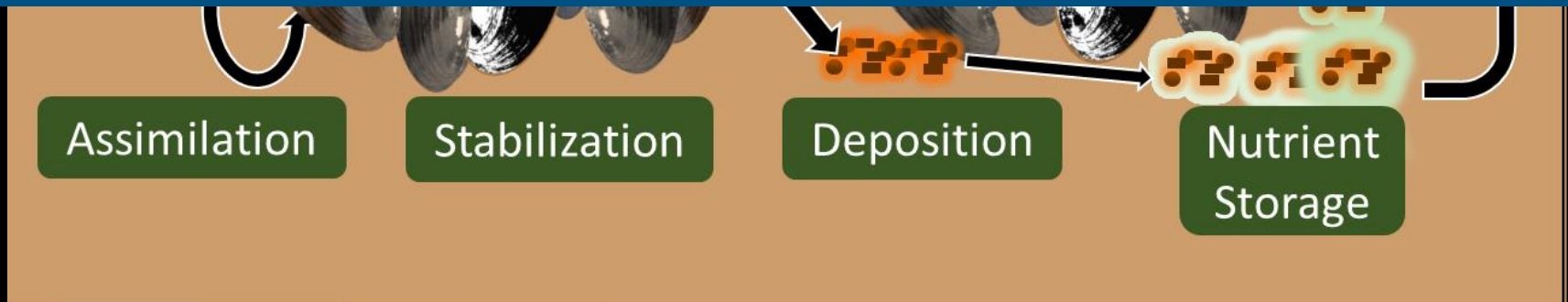


Modified from Vaughn & Hakencamp 2001

Denitrification enhancement has been demonstrated, but is still poorly understood

Point #4:

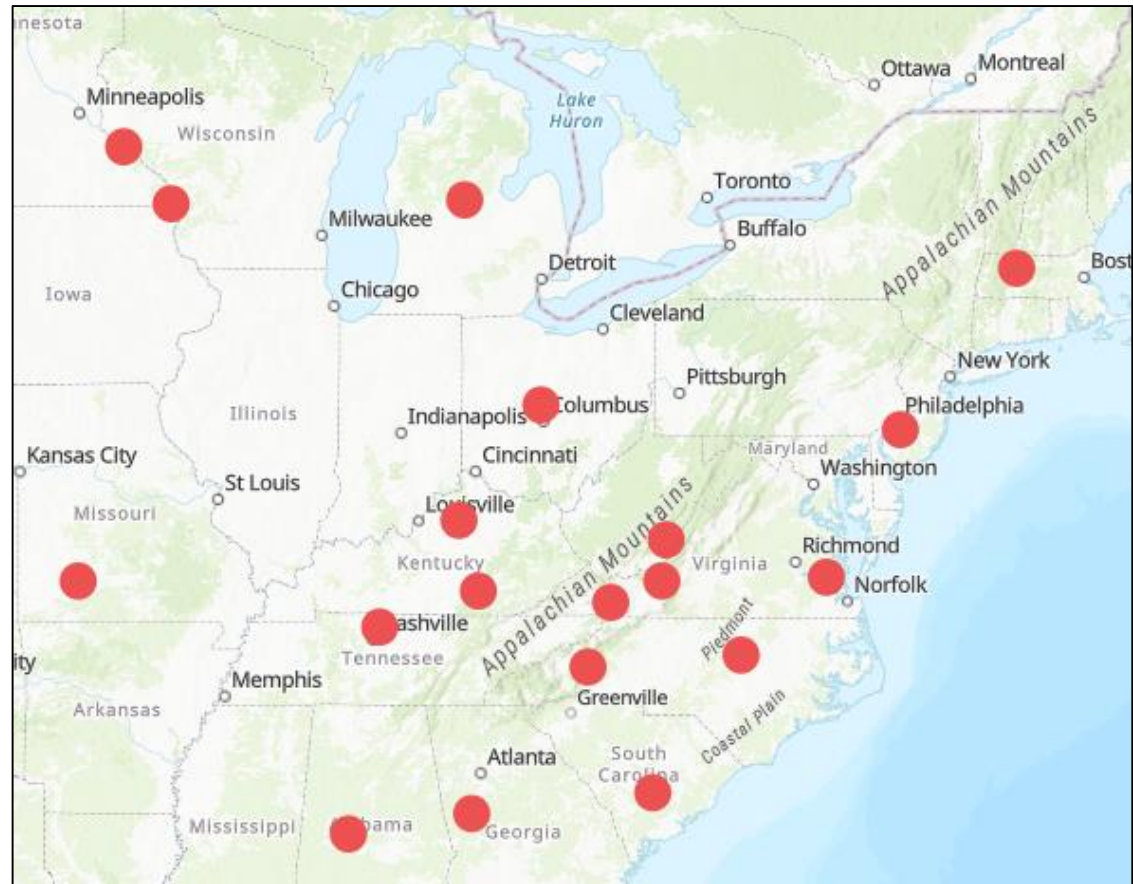
Mussels provide ecosystems services likely comparable to oysters/other filter feeders



Current Propagation Facilities

Funding Agency

- 6 State Agency
- 4 University
- 11 Federal Hatcheries
- 1 Zoo
- 1 NGO



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Mair 2020

Restoration of some species involves a technique using rabbit serum.

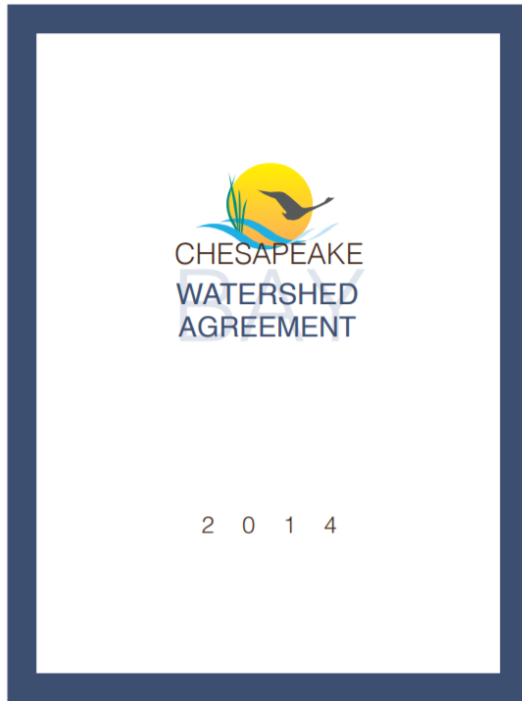


Point #5:
**Mussel propagation has
made significant recent
advancements**



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In Vitro Mussel Propagation



FISHERIES GOAL: Protect, restore and enhance finfish, **shellfish** and other living resources, their habitats and ecological relationships to sustain all fisheries and provide for a balanced ecosystem **in the watershed** and Bay

Workshop Recommendations...



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1. Tell the story of Mussels to in engagement Bay issues in upper watershed

- *The communications workgroup should use Freshwater Mussels to engage local stakeholders in tidal regions of the Watershed*
- *The Citizen Stewardship Goal Implementation Plan for the Chesapeake Monitoring Cooperative should include freshwater mussel conservation expertise and integrate freshwater mussels into citizen science*



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1: Mussels represent a potential engagement tool that the bay partnership should utilize

2. Improve our collective understanding of this resource across the watershed

- *Add specific goals which improve mussel outcomes to the Fish Habitat Outcome 2-year Workplan.*
- *Support and encourage mussel surveys to summarize species distribution, abundance, and trends in population size.*
- *Compile and analyze existing mussel distribution datasets and aggregate into a sharable form*

Mussels currently absent from NFWF Priority Species (Brook Trout, Black Duck, Herring, Oysters, etc.)



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2: We need to better understand mussel communities

3. Improve our understanding of mussel benefits and incorporate when appropriate...

- *Compile and review existing literature reviews on ecosystem services (particularly nitrogen removal) provided by freshwater mussels. Identify information gaps and ways the partnership can address these gaps*
- *Address research needs surrounding co-benefits.*
- *Following data compilation, literature review and addressing critical, knowledge gaps, the partnership should pursue a BMP expert panel.*

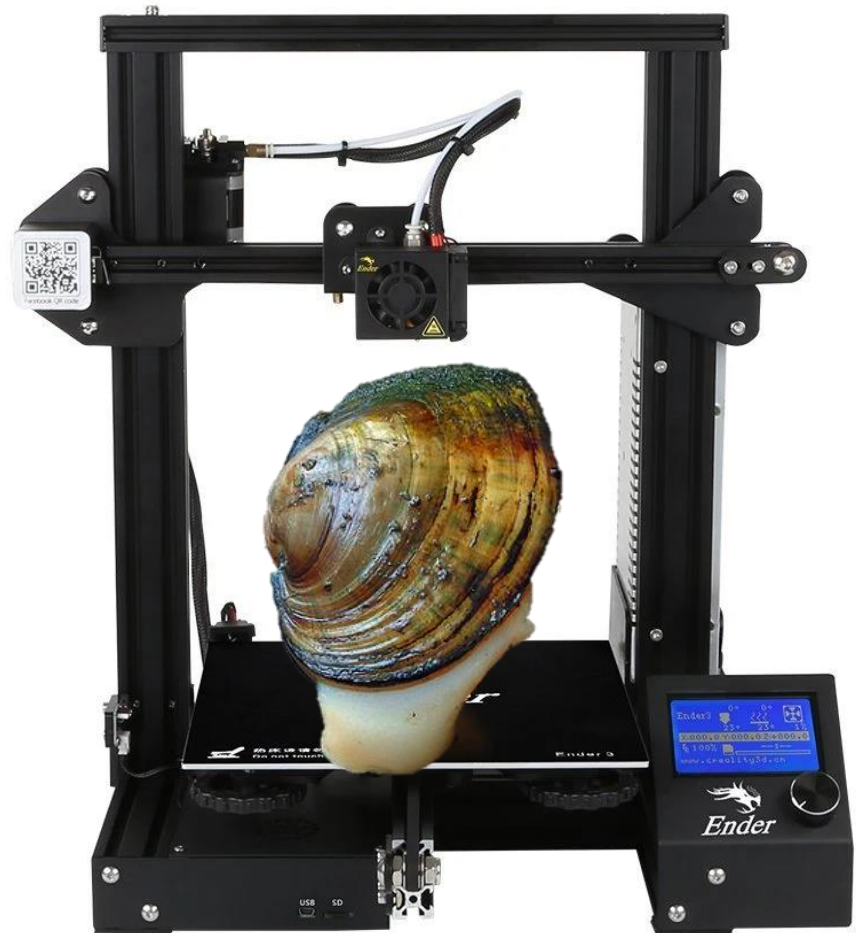


4. Consider the impact of bay restoration on mussels

- *Incorporate mussel factors into relevant outcomes under the Vital Habitats Goal in the 2014 Chesapeake Bay Watershed Agreement, such as Stream Health, Fish Passage, and SAV.*
- *Consider mussels in the context of stream restoration*
- *Estimate cumulative wastewater needs for addressing recently published ammonia criteria throughout the watershed and potential reductions in delivered nitrogen loads that could be achieved through denitrification (which is not required to achieve standards).*
- *Include freshwater mussels as an additional benefit within the co-benefit framework*

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5. Develop shell collections to share



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Questions?