Chesapeake Bay Watershed Freshwater Mussel Partnership *Newsletter* | Issue No. 1

NOVEMBER 2024



Message from the Susquehanna River Basin Commission FWM Partnership Coordinators

Welcome to the FWM Partnership's inaugural *Newsletter!* We plan to use newsletters as a way to keep Partnership members informed about the progress and direction of the Steering Committee and, as they emerge, various work groups. Since the December 2023 Partnership Meeting, the steering committee has met 7 times (approximately monthly from March thru October) to discuss topics such as:

- Bay watershed-wide conservation & restoration priorities;
- Technical resource sharing;
- Nutrient & sediment load reduction crediting in the Chesapeake Bay Partnership framework;
- Education & outreach; and,
- Access to and availability of funding.

Please read on to learn more about the group's activities in 2024 and visit the partnership web page anytime.

WHAT'S INSIDE:

Meet the Steering Committee | 2

FWM Species in the Bay Watershed | 3

Education & Outreach | 4

How to Quantify and Credit Water Quality Benefits | 5

Watershed Agreement Beyond 2025 | 6

2024 FWM Round-up | 7

Get Involved! | 8

THE FWM PARTNERSHIP STEERING COMMITTEE MEMBERS

ANNIE STUPIK | BIOLOGIST, FRESHWATER MUSSEL PROGRAM, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SCOTT HEIDEL | ENVIRONMENTAL GROUP MANAGER, CHESAPEAKE BAY PARTNERSHIP SECTION, PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

ASHLEY HULLINGER | WATER PROGRAM SPECIALIST, CHESAPEAKE BAY PARTNERSHIP SECTION, PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

NEVIN WELTE | MALACOLOGIST, PENNSYLVANIA FISH & BOAT COMMISSION

JOE WOOD | VIRGINIA SENIOR SCIENTIST, CHESAPEAKE BAY FOUNDATION

BRIAN WATSON | STATE MALACOLOGIST, VIRGINIA DEPARTMENT OF WILDLIFE RESOURCES

DANIELLE KREEGER | RESEARCH ASSOCIATE PROFESSOR, DREXEL UNIVERSITY

MIEKO CAMP | PROJECT MANAGER, WATER AND SCIENCE ADMINISTRATION, MARYLAND DEPARTMENT OF THE ENVIRONMENT

MATT ASHTON | NATURAL RESOURCE BIOLOGIST, MARYLAND DEPARTMENT OF NATURAL RESOURCES

KURT CHENG (*) | SENIOR SCIENCE MANAGER, PARTNERSHIP FOR THE DELAWARE ESTUARY

KATHY O'BRIEN (*) | BIOLOGIST, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

JAMIE SHALLENBERGER · TYLER SHENK · ELLYN CAMPBELL | COORDINATION TEAM, SUSQUEHANNA RIVER BASIN COMMISSION

(*) Former member

The steering committee meets by Zoom monthly on the 4th Friday. Here's a sample steering committee meeting agenda.

		Join Zoom N https://us02	Steering Committee Meeting Friday 08/23/2024 Loo e	
		Meeting Ager	nda	
	_	Vo. Start		
1	1.	09:00	Description	
1	2.	09.05	Welcome	
	З.	09:15	Beyond 2025 Comments and Co	
		subgroup	Resume discussion of personal	1
	4.	09:40	vie Partnership. Discuss milert-	
	5.	09:50	Availability of FWM Habitat Suitability Manual	
		10:00	Advised and the second	
			Adjourn	



FRESHWATER MUSSEL SPECIES THAT OCCUR IN THE CHESAPEAKE BAY WATERSHED RANKED ACCORDING TO GLOBAL-SCALE CONSERVATION STATUS AS ASSIGNED BY NATURESERVE



Chesapeake Bay Watershed Jurisdictions and Major River Basins

The NatureServe conservation status system, maintained and presented by NatureServe in cooperation with the Natural Heritage Network, was developed in the United States in the 1980s by The Nature Conservancy (TNC) as a means for ranking or categorizing the relative imperilment of species of organisms, as well as natural ecological communities, on the global, national, or subnational level.

NatureServe uses a 5-point scale from critically imperiled (1) to secure (5).

Note that the species list below is an approximation of native FWM that occur in the Chesapeake Bay Watershed. Each jurisdiction's Natural Heritage Program (NHP) has definitive information about the occurrence and distribution of native organisms.

No.	Scientific	Common	Global	wv	DE	PA	DC	MD	NY	VA
1	Fusconaia masoni	Atlantic pigtoe	G1							x
2	Alasmidonta heterodon	Dwarf Wedgemussel	G1		x	x	x	x	x	x
3	Parvaspina collina	James spinymussel	G1							x
4	Lasmigona subviridis	Green floater	G2				x	x	x	x
5	Elliptio lanceolata	Yellow lance	G2					x		x
6	Elliptio producta	Atlantic spike	G3			x		x		x
7	Alasmidonta varicosa	Brook Floater	G3	x	x	1.15	x	x	x	x
8	Atlanticoncha ochracea	Tidewater Mucket	G3		x		x	x	x	x
9	Lampsilis cariosa	Yellow Lampmussel	G3		x		x	x		x
10	Eliptio angustata	Carolina Lance	G4				x			x
11	Sagittunio nasutus	Eastern Pondmussel	G4		x		x	x		x
12	Alasmidonta marginata	Elktoe	G4	x		x	x		x	x
13	Elliptio fisheriana	Northern Lance	G4	x	x			x		x
14	Alasmidonta undulata	Triangle Floater	G4	x	x		x	x		x
15	Anodonta implicata	Alewife Floater	G5		x		x	x	x	x
16	Strophitus undulatus	Creeper	G5		x		x	x		x
17	Elliptio complanata	Eastern Elliptio	G5	x	x	x	x	x	x	x
18	Pyganodon cataracta	Eastern floater	G5		x	x	x	x	x	x
19	Lampsilis radiata	Eastern Lampmussel	G5		x		x	x		x
20	Utterbackia imbecillis	Paper pondshell	G5				x	x		
21	Lampsilis cardium	Plain Pocketbook	G5	X			X	X		

EDUCATION | OUTREACH

In 2025, the Steering Committee plans to launch a Work Group devoted to Education & Outreach.

FWM are an important, yet often overlooked group of aquatic animals. Across the Bay watershed, there is value in delivering accurate and consistent information and messages about FWM to:

- Evoke sense of wonder and awe about their unique evolutionary adaptations;
- Draw attention to their widespread imperiled status;
- Increase understanding & awareness for the environmental services roles FWM exert as <u>Keystone Species</u> that are both ecosystem engineers and indicators for overall habitat conditions; and,
- Foster consistent, dedicated, and adequate financial and technical resource commitments to monitoring, research, propagation, conservation, and restoration.



Maryland Department of Natural Resources built a mobile FWM propagation trailer that functions both as a traveling hatchery and as part of public outreach activities. Photo shows brood stock mussels collected from the Susquehanna River.

Watershed Alliance of York (WAY)

Members of WAY were invited to the August 2024 steering committee meeting to discuss opportunities for WAY and the FWM Partnership to collaborate and spread messages.

York County, Pennsylvania, located in the lower portion of the Susquehanna River Basin, is among PA's largest contributors of nutrient and sediment loads to the Bay. York County's Susquehanna River tributary streams also include a world-class network of fixed water quality monitoring stations that are operated by Chesapeake Bay Partners. WAY is the face of York County's efforts to expand practices and projects that reduce nutrient & sediment nonpoint source pollution to meet clean water targets for healthy local, regional, and Bay waterway goals. In 2023 and '24, WAY hired biologists to conduct FWM surveys of County streams (see below).



 York County has the ingredients to promote greater awareness about FWM within the Chesapeake Bay Partnership, the scientific/research community, and the broader public.

HOW TO QUANTIFY & CREDIT ECOSYSTEM SERVICES?

Among the first facts many people learn is that FWM are "living filters"... Especially for those who work on compliance with the Chesapeake Bay Total Maximum Daily Load (TMDL) or Municipal Separate Storm Sewer System (MS4) permits, as well as local watershed stewardship, thoughts may pivot to questions about the effects of FWM on water quality. Of keen interest is how much nitrogen (N), phosphorus (P), or suspended sediment (SS) load reduction credit could be attributable to FWM?

Answering questions about pollutant load reduction credit is complex. FWM eat by siphoning, then filtering particles, from the surrounding water; some soluble nutrients may be absorbed. FWM filter and sort particles internally by size; unsuitable matter is ejected as *pseudofeces* before digestion. After digestion, remaining matter and metabolic waste is excreted as feces and urine.

The direct effect of filter feeding is measured in terms of filtration rate (water volume filtered over time) or clearance rate (effective volume of water cleared of particles over time); however, direct measures of filter feeding are not a sufficient basis to define credit for pollution reduction because such measures do not account for by-products that FWM produce and return to the water column. Moreover, indirect effects of FWM related to their status as "ecosystem engineers" may account for substantial N, P, and SS reduction through biogeochemical processes related to: (i) particle transfer from the water column to benthic realm as feces/pseudofeces; (ii) burrowing (bioturbation) into the substrate; (iii) physical habitat alteration due to shells; and, (iv) secondary metabolic actions by bacteria and other organisms.





Demonstration by the Scientific Hub of New Zealand showing the ability of mussels to help clear 2 aquaria of murky water. The tank at left has no mussels and the one at right is packed with living mussels. After 25 minutes, the water with living mussels is notably clearer compared to the "unfiltered" water.

In addition to determining FWM filtration and clearance rates and the direct and indirect fate of water pollutants, other considerations about crediting arise including:

- Is there a threshold for FWM abundance or density at which WQ benefits become discernible?
- What is the distribution, abundance, and density of wild FWM?
- Do all FWM impact WQ the same?
- Are there seasonal or other variations?

There also is debate whether WQ crediting detracts from Conservation & Restoration.

One possible path is to develop credit based on the survival of hatchery-sourced FWM.

CHESAPEAKE WATERSHED AGREEMENT: BEYOND 2025

August 27, 2024

Beyond 2025 Steering Committee

RE: Comments Offered in Chesapeake Bay Watershed Agreement Category

Dear Steering Committee:

Please accept this letter on behalf of the Chesapeake Bay Watershed Region Freshwater Mussel Partnership (hereinafter, "FWM Partnership"; <u>https://www.srbc.gov/our-work/what-we-do/chesapeakebay-freshwater-mussel-partnership lhm]</u>. The FWM Partnership formed in 2023 at the request of leaders in Maryland Department of the Environment and Pennsylvania Department of Environmental Protection for regular dialogue among the region's freshwater mussel (FWM) experts. The FWM Partnership builds from a series of workshops and meetings undertaken jointly by Maryland and National Fish and Wildlife Foundation (2022-2023) as well as the Chesapeake Bay Program's (CBP's) Scientific & Technical Advisory Committee (2020); although, leaders from state and federal FWM programs have met consistently since 2010.

The FWM Partnership is an *ad hoc* group of stakeholders from across the Bay Watershed who are drawn together by a shared enthusiasm for freshwater mussels due to their novel ecological niche; capacity for engaging the public in freshwater portions of the watershed; beneficial roles for water quality and habitat; and, concerns about their widespread population declines. The FWM stakeholder community is an underutilized resource pool in terms of regional collaboration on issues crucial to ecosystem conservation and restoration.

Freshwater mussels occur throughout the Chesapeake Bay Watershed ecosystem where iconic Bay species, like "rockfish," blue crabs, and oysters, are absent. Due mostly to human-caused impacts, FWM are widely considered as among the most threatened group of aquatic organisms in North America. Moreover, FWM are a keystone animal group that enhance habitat, water quality, and biodiversity disproportionate to their often overlooked and seemingly bland presence.

In its <u>2020 STAC Workshop Report</u>, a panel of FWM experts recommended the CBP Partnership adopt the following five initiatives: (i) provide consistent financial support for staff and resources to conduct mussel surveys, monitoring, propagation, conservation, and education; (ii) integrate FWM across various work groups and goal implementation teams; (iii) link public engagement to comprehensive FWM restoration strategies; (iv) actively support FWM scientific research; and, (v) pursue intersections between FWM restoration and nutrient mitigation. The STAC Workshop-endorsed initiatives directly align with the three high-level recommendations and considerations set forth on page 7 in the draft report; "*Actifical path forward for CBP Partnership beyond 2025*", namely to: (1) emphasize rigorous <u>Science</u>; (2) support a holistic approach to <u>Restoration</u> and conservation for the ecosystem's living resources, idal and non-tidal alike; and, (3) embrace Partnerships relevant to all Bay Watershed communities.

One of the most important steps towards expanding and restoring freshwater mussel populations, as identified in the STAC Workshop Report, was public engagement. Inspiring actions through greater engagement is also touted as a key factor for the CBP Partnership's success Beyond 2025. Highlighting the unique and complex life history of FWM, promoting their array of ecosystem services including their roles in nutrient cycling and denitrification, and seeking to better understand the habitat and water quality connections of FWM in the context of water and watershed management practices has tremendous value in the recommitment to the Chesapeake Bay Watershed Agreement. In practice, emphasis as *species of concern* enables freshwater mussels to be incorporated into the Goals and Outcomes of the Bay Watershed

Agreement's framework, such as considering FWM in existing Technical Work Groups, Goal Implementation Teams, Advisory Committees, and the like.

Freshwater mussels represent an important part of the natural heritage, ecology, and biodiversity of the Chesapeake Bay Watershed. FWM are valuable to the ecosystem yet vulnerable to extirpation and ultimately extinction. As the CBP Partnership begins implementation of Beyond 2025 recommendations as agreed to by the Executive Council, we urge the CBP Partnership to recognize freshwater mussels as species (*flural*) of concern when prioritizing conservation and restoration activities of living resources and habitat in non-tidal areas.

Sincerely

The FWM Partnership Steering Committee Members:

Annie Stupik | Biologist, Freshwater Mussel Program, New York State Department of Environmental Conservation

Scott Heidel | Environmental Group Manager, Chesapeake Bay Partnership Section, Pennsylvania Department of Environmental Protection

Ashley Hullinger | Water Pipgram Specialist, Chesapeake Bay Partnership Section, Pennsylvania Department of Environmental Protection

Joe Wood | Virginia Senior Scientist, Chesapeake Bay Foundation

Brian Watson | State Malacologist, Virginia Department of Wildlife Resources

Kurt Cheng | Senior Science Manager, Partnership for the Delaware Estuary

Danielle Kreeger | Research Associate Professor, Drexel University

Mieko Camp | Project Manager, Water and Science Administration, Maryland Department of the Environment

James Shallenberger | Program Manager, Monitoring & Protection, Susquehanna River Basin Commission

In 2022, the Executive Council (EC) of the Chesapeake Bay Program Partnership directed the Principals' Staff Committee (PSC) to recommend a critical path forward to prioritize next steps to meet Goals & Outcomes of the Chesapeake Watershed Agreement Beyond 2025. The FWM Partnership Steering Committee developed and offered the comment letter at left; also available here for consideration by the Beyond 2025 Steering Committee. The Executive Council is scheduled to meet December 10th, 2024, to approve actions recommended by the PSC. Main messages from the FWM Partnership comments include:

- FWM are a keystone animal group that, unlike iconic Bay species, occur throughout the vast, non-tidal portion of the ecosystem;
- Urge the EC to recognize FWM as species of concern;
- By acknowledging FWM as species of concern, the EC creates opportunities within the Chesapeake Watershed Agreement framework to align and prioritize FWM with existing Partnership activities and resources devoted to conservation, restoration, and uplift of the living resources, habitats, and human communities throughout the non-tidal Bay watershed.

FWM COORDINATION TEAM 2024 ROUND-UP

Staff from SRBC (and PADEP) took part in several FWM surveys in the Lower Susquehanna River (MD) and in York County (PA) streams.



To see a mussel survey up close, here's a pair of short videos on YouTube:

https://youtu.be/7P4LEcePJ8Y

https://youtu.be/4DNDSedhV0Y



We set up a technical resource using the <u>free</u> online research assistance service of **Zotero**. Currently, you can gain access to, and add to, a **searchable list of more than 270 published works** in the FWM Partnership Group, citations, and in many cases, .pdf files. To locate this resource: (Step 1) go to <u>Zotero.org/groups/</u> open the page and type "FWM Partnership" in the search bar; (Step 2) scroll the returns until



niversity-School Partnership	
Group Library	
Members	2
Group Туре	Public, Closed Membership
Group Library	Anyone can view, only members can edit
Group Type	Public, Open Membership
Group Library	Anyone can view, only members can edit
ower of Partnership BSPH - JHU	



you reach <u>FWM Partnership</u>; and, click to (Step 3) open our Group page. Within the FWM Partnership Group page, click "Group Library" or any of the hyperlinks for "Recently Added Items" to access all content. Click the links in the upper right corner to register for a new Zotero account, log in to your existing account, or view the current members list.

GET INVOLVED | STAY INVOLVED!

BE ON THE LOOK-OUT FOR A WINTER 2025 (February or March) CHESAPEAKE BAY WATERSHED FRESHWATER MUSSEL PARTNERSHIP VIRTUAL SYMPOSIUM

Presentations & Discussion Topics could include:

- Education & Outreach
 - Developing and delivering appropriate messages/content for target audiences
 - FWM-in-the-Classroom (curricula, aquaria & care protocols, regulatory approvals)
- Ecosystem Benefits | Water Quality Crediting in the CBP Framework
- FWM Habitat Suitability Modeling & Mapping (expand throughout Bay watershed, a pilot project completed by Virginia Dept of Conservation and Recreation)
- Recent launch of the national Collaborative Wildlife Protection and Recovery Initiative FWM Working Group
- National Fish and Wildlife Foundation grant funding for projects tied to FWM
- State Wildlife Action Plan updates (due in 2025)

Share Your News, Stories, & Successes

- What is your 2024 FWM-related experience?
- Have you received a grant?
- Do you have funding or other resources to offer others?
- Did you author or encounter any new FWM publications in 2024?
- Do you have events, activities, or links you'd like to promote on the FWM Partnership web page?
- Show your Mussels! (send FWM photos or video links that we can add to the web page)
- Would you like to contribute content/ideas to a future issue of this Newsletter?

DECENSION DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

DECENSION

The FWM Partnership coordination team from SRBC provides and maintains a web page for the Partnership – check it regularly for News & Announcements and <u>send us your comments</u>. <u>https://www.srbc.gov/our-work/what-we-do/chesapeake-bay-freshwater-mussel-partnership.html</u>

Are you interested in joining or leading a Work Group? Education & Outreach and Ecosystem Benefits groups will form in 2025.

Reach out to tell us what you'd like to see from the Partnership.