SAV BMP Expert Panel Proposal Discussion

HGIT Spring 2018 Meeting

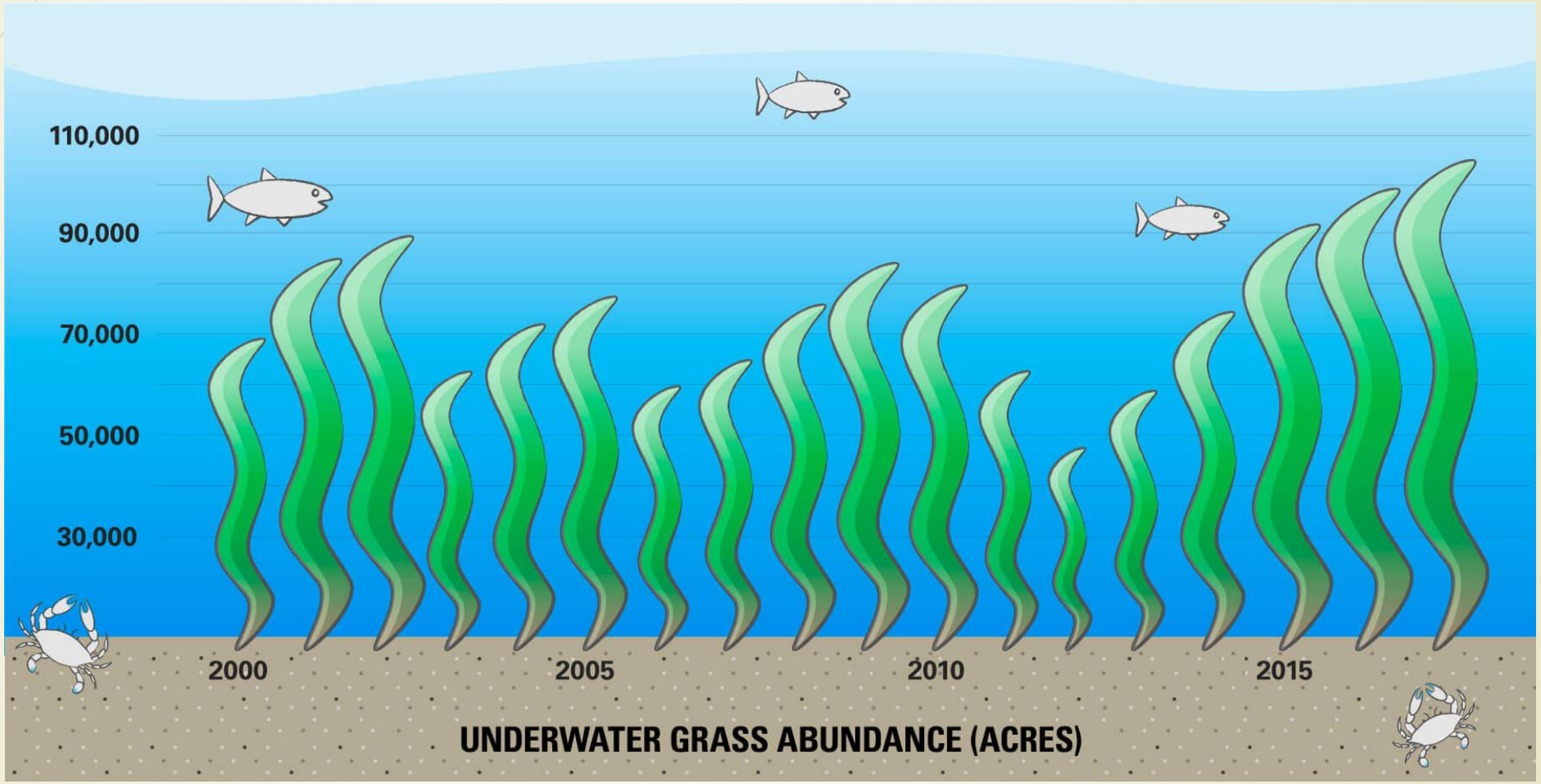
Smithsonian Environmental Research Center

June 19, 2018

Purpose of Discussion

- Gain HGIT's feedback on convening a SAV best management practice (BMP) expert panel
  - evaluate SAV's effectiveness to reduce nutrients and sediments
  - application in the Chesapeake Bay TMDL water quality model if feasible
- Present and discuss the rationale, objectives and next steps that will guide the SAV Workgroup and future BMP Expert Panel

Why now?



Recent increases in SAV may facilitate further reductions in nutrients and sediment

Why now?

- TMDL Mid-Point Assessment
  - Opportunities for new BMPs, innovative technologies, programs, etc.
- Take-away from SAV Workgroup/Budget and Finance Workgroup Dialogue Sessions
  - From an investment perspective, investors want to know what SAV provides as a return
- Interest in ecosystem services & co-benefits
- Oyster BMP Expert Panel update

“As a result of the EPA opinion that sequestered nitrogen and phosphorus is legal for in-water best management practices…”

Oyster BMP Expert Panel Update

February 1, 2018

Oysterrecovery.org

Existing examples of in-situ BMPs

- Floating wetlands
- Anacostia River Trash Trap Program
- Baltimore Water Wheel Trash Interceptor

Epa.gov

Baltimorewaterfront.com

Pbs.org

- Physically located within the water body
- Documented as achieving water quality improvements through pollutant reductions after they have entered water column

Why bother?

- Recent increases in SAV may facilitate reductions in nutrients and sediment
- Incentive vs. Nuisance
  - With increases in SAV acreage come increased management issues and restrictions
- Prioritize benefits of SAV to local jurisdictions
  - In addition to water clarity attainment and achieving SAV "goal"
  - Promote SAV as a "good thing"

SAV Can Improve Water Quality

- 40 years of scientific research and data
- Documented reductions in nitrogen, phosphorus and sediments

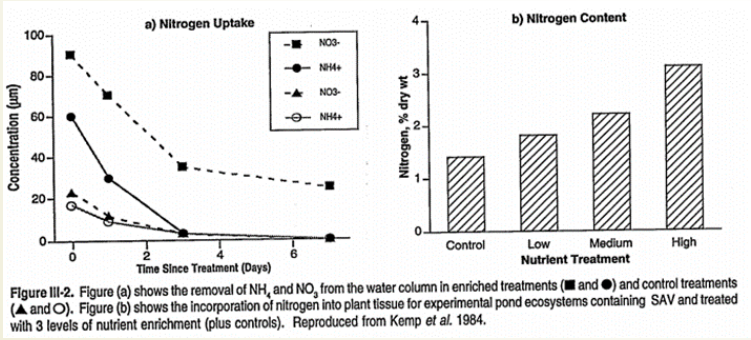


Figure III-2. Figure (a) shows the removal of NH_4 and NO_3 from the water column in enriched treatments (■ and ●) and control treatments (▲ and ○). Figure (b) shows the incorporation of nitrogen into plant tissue for experimental pond ecosystems containing SAV and treated with 3 levels of nutrient enrichment (plus controls). Reproduced from Kemp *et al.* 1984.

Table 2. Estimated influence of submersed vascular plants on nitrogen budget for 'restored' plant communities in upper Chesapeake Bay[a]

N-sources or sinks	N-fluxes (10^6 kg N yr^{-1})	(% of input)	Source
Nitrogen inputs[b]			
Point discharges	19.2	24	Boynton et al. (1995)
Diffuse loads	55.2	68	Boynton et al. (1995)
Atmospheric deposits	6.2	8	Boynton et al. (1995)
Total input	80.6	100	
Plant nitrogen sinks			
Assimilation[c]	12.1	15	Kemp et al. (1984
Denitrification[d]	1.7	2	Caffrey & Kemp (1992)
Sediment N trapping[e]	22.4	28	Ward et al. (1984)
Total plant sink	36.2	45	

[a]Upper main-stem Bay defined as that region above latitude 38° N excluding major tributaries. Area of this region is 3.9×10^9 m^2, and potential habitat of submersed plant communities 'restored' to historical levels would cover 0.56×10^9 m^2 (Kemp et al. 1999, 2004)

[b]Data taken directly from Table 3 in Boynton et al. (1995) for 'Maryland Mainstem'

[c]Assumes an estimated annual primary production rate of 360 g C m^{-2} yr^{-1} (Kemp et al. 1984) and a tissue C:N molar ratio of 19 (Caffrey & Kemp 1990)

[d]Plant 'enhancement' of sediment denitrification taken as difference between rates measured in vegetated and unvegetated sediments (1.8 mmol N m^{-2} d^{-1}, Caffrey & Kemp 1990, 1992) for a 4 mo growing season

[e]Based on plant-enhanced sedimentation of 0.2 cm mo^{-1} for a 4 mo growing season, with sediment dry bulk density of 1 g cm^{-3} and N content of 0.5 % dry wt (Ward et al. 1984)

Scientific and Policy Gaps

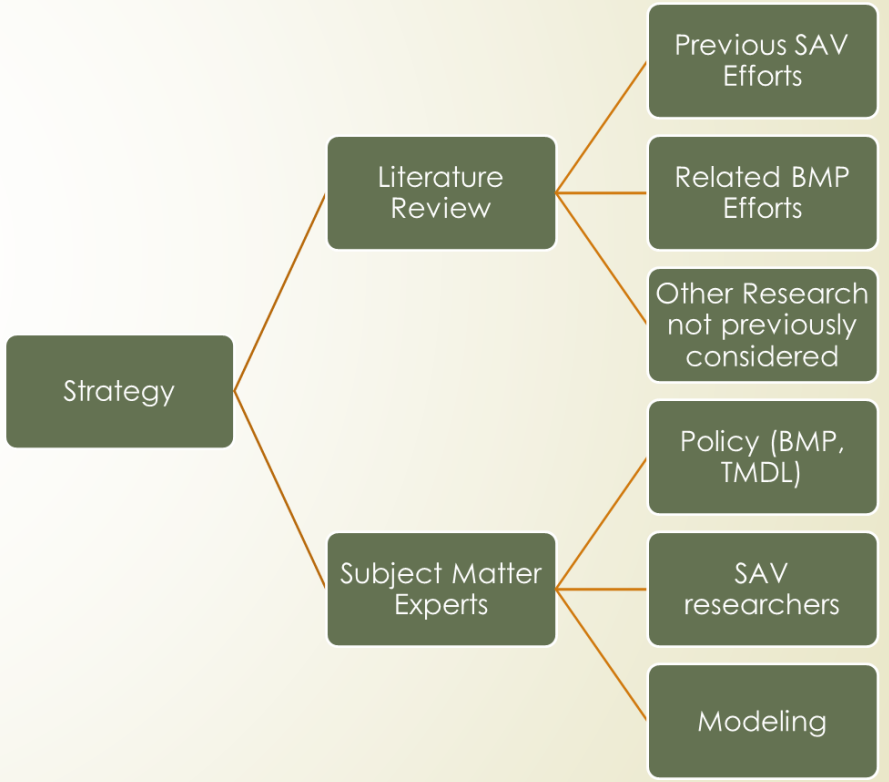
- Positive Feedback Mechanisms
  - Internal ecological processes, such as seasonal nutrient retention in SAV beds, may also play an important, complementary role
  - If SAV increasingly retain nitrogen and phosphorus as they recover, they could potentially limit regional phytoplankton production, thereby decreasing the magnitude of seasonal bottom-water hypoxia
- New research by Gurbisz and Palinkas
  - quantifying seasonal N and P retention rates in Chesapeake Bay SAV beds through both particle trapping and plant assimilation
  - deriving relationships between nutrient retention, plant species characteristics, and SAV patch size and configuration
  - estimate N and P retention in all upper Bay SAV beds and compare this quantity to growing season N and P loads to make inferences about the relative importance of SAV as a seasonal nutrient sink
- Currently, the simulation models only coarsely parameterize SAV-enhanced sediment trapping
  - calibrated with data that precede recent SAV resurgences

Goals of the SAV BMP Expert Panel

- Identify any unintended consequences of promoting SAV as a BMP
- Reach a consensus on acceptable nutrient reduction estimates for SAV processes
- Establish a methodology and process to update these estimates as new science becomes available
- Establish BMP crediting and verification guidelines for their use in the Chesapeake Bay TMDL model

Next Steps

- SAV Workgroup Discussion
- Follow the CBP's BMP Review Protocol
  - Formal request to HGIT
    - Clear and concise definition of how SAV reduces nitrogen, phosphorus and sediment
    - Reference available science/data on removal efficiencies
  - Review by HGIT and WQGIT
  - Coordinate the convening of an Expert Panel

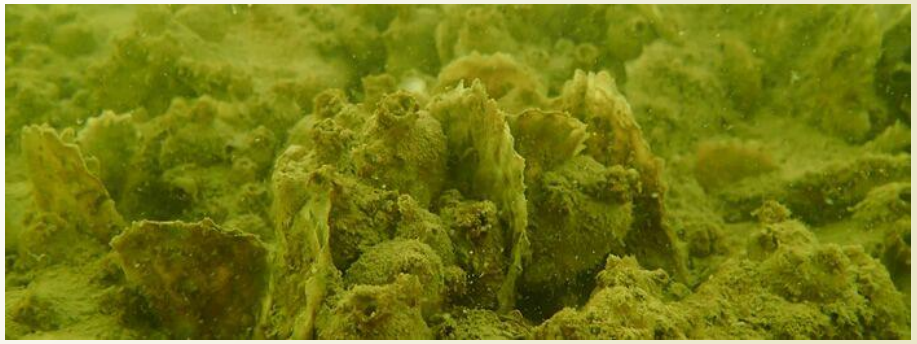


Questions?

Extra Slides

Question posed by the Oyster BMP Expert Panel

- "Can in-situ, permanent removal of sediment, nitrogen, and phosphorus pollutants from the estuarine water column via oyster filtration be recognized and credited as pollutant removal under the Clean Water Act?"



Response from EPA Region 3's Office of Regional Counsel and CBPO

- The use of term "credited" is assumed to mean the acceptance of a BMP, treatment or technology to count toward achievement of a jurisdiction's pollutant reduction goals
- The use of term "credited" was not assumed by EPA to refer to water quality offsets or trading
- EPA recognizes that the Oyster BMP Expert Panel has concluded there is scientific and technical support for in-situ oyster filtration, in the form of aquaculture or oyster reef restoration, as a Partnership-approved BMP that results in the permanent removal of pollutants— nitrogen, phosphorus, and sediment—from the water column
- EPA sees nothing in the Clean Water Act or its implementing regulations that would prevent a Partnership-approved BMP from qualifying for nitrogen, phosphorus or sediment pollutant reductions simply because it is physically located within the water column

Appendix A

Recognizing Pollutant Reductions Via In-situ Oyster Filtration Under the Clean Water Act

The Chesapeake Bay Program Partnership's (Partnership) Oyster BMP Expert Panel posed the question "Can in-situ, permanent removal of sediment, nitrogen, and phosphorus pollutants from the estuarine water column via oyster filtration be recognized and credited as pollutant removal under the Clean Water Act?". The U.S. Environmental Protection Agency[1] (EPA) prepared the following response to this specific question.

The use of term "credited" in this context is assumed by EPA to mean the acceptance of a certain best management practice (BMP), treatment or technology to count toward achievement of a Chesapeake Bay watershed jurisdiction's pollutant reduction goals based on application through the Chesapeake Bay Program Partnership's suite of modeling tools. The use of term "credited" was not assumed by EPA to refer to water quality offsets or trading.

EPA recognizes that the Oyster BMP Expert Panel has concluded in its first report, approved by the Partnership in December 2016, and will possibly further conclude in forthcoming panel reports, that there is scientific and technical support for in-situ oyster filtration, in the form of aquaculture or oyster reef restoration, as a Partnership-approved BMP that results in the permanent removal of pollutants—nitrogen, phosphorus, and sediment—from the water column. EPA further assumed that this involves native oyster species only and does not contemplate introduction of non-native oyster species.

Having established those assumptions, EPA sees nothing in the Clean Water Act or its implementing regulations that would prevent a Partnership-approved BMP from qualifying for nitrogen, phosphorus or sediment pollutant reductions simply because it is physically located within the water column instead of outside the water column. EPA notes that there are at least a few existing examples of in-situ BMPs that have been documented as achieving water quality improvements through pollutant reductions and are recognized as accepted BMPs. These BMPs include the floating wetland BMP already approved by the Partnership[2], as well as the Anacostia River Trash Trap Program and Baltimore Water Wheel Trash Interceptor, both of which are described in EPA's December 2016 Aquatic Trash Prevention National Great Practices Compendium[3]. All of these BMPs are physically located within the water body and are recognized as achieving pollutant reductions.

[1] Prepared by the U.S. Environmental Protection Agency Region 3's Office of Regional Counsel and Chesapeake Bay Program Office, in consultation with the Agency's Office of General Counsel, and provided to the Chesapeake Bay Program Partnership's Oyster BMP Expert Panel on January 4, 2018.
[2] https://www.chesapeakebay.net/who/group/bmp_expert_panels
[3] https://www.epa.gov/sites/production/files/2017-02/documents/aquatic_trash_prevention_national_great_practices_compendium_december_2016.pdf

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