03/13/2024 – SAV Workgroup Winter Meeting

MEETING: SAV Workgroup Winter Meeting
DATE/TIME: 03/13/2024, 1:00 - 5:00 ET

WELCOME AND INTRODUCTIONS

Presenter: Brooke Landry (Workgroup Chair)

- Roll Call

ASSESSING SAV AND BLUE CARBON IN CB FROM HIGH RESOLUTION SATELLITE: CBP/EPA FUNDED PROJECT UPDATE

Presenter: Victoria Hill (Old Dominion University)

- Awarded funds from EPA to use Planet (a commercial satellite company) to map SAV in the mesohaline section of the Chesapeake Bay.
- Planet operates over 200 small satellites with 8 spectral bands, 3-meter ground resolution, radiometrically calibrated, and takes daily coverage.
- Research Questions:
    - Can satellite remote sensing augment aerial surveys?
    - Can we generate quantitative data for blue carbon estimates and biogeochemical modeling?
- 3 Sites: Eastern Shore (polyhaline), Severn River (mesohaline), Susquehanna Flats (oligohaline).
- Produced seasonal maps of seagrass presence.
    - Once maps are created, can calculate leaf area index and then estimate carbon.
- Annual carbon cycling
    - Eastern Shore: about 3Gg
    - Severn River (mesohaline species): about 0.08Gg
    - Susquehanna Flats: about 3Gg
- Seems like error could be about 20%, which is on par with ocean color satellite.
- Conclusions:
    - Planet satellites provide sufficient spatial and temporal coverage to assess Chesapeake Bay SAV.
    - Eelgrass abundance on Eastern Shore shows low seasonal variation and slow expansion.
    - Mesohaline SAV in Severn River shows more seasonal variation and 2x more biomass than eelgrass
    - Oligohaline SAV in Susquehanna Flats shows extreme seasonal variation.

Comments/Questions:

- **Matt Robinson**: You're mapping *Zannichellia* with this method, but it hasn't been captured by aerial surveys in the past. Can you provide feedback on the kind of coverage you're seeing and if this could help reach the SAV Bay Program goal?
    - **Victoria Hill**: I think we could probably provide monthly maps of *Zannichellia* growing in spring into the summer. We provide a spring/summer/fall estimate of the areas.
    - **Dick Zimmerman**: Although we can see and map the *Zannichellia*, they're a relatively small fraction of the total area.

- **Matt Robinson**: Could you highlight some of the challenges you've experienced using this technology?
    - **Victoria Hill**: Cloud cover, turbidity, and the tidal state have been a few challenges. Since there are 2 – 3 passes per day, if one pass isn't good, the others should make up for it.
- **Dave Wilcox**: Aerial surveys miss sparser beds in the Severn River at high tide, how does your method get around that?
    - **Victoria Hill**: I look at images of the same area during high tide and low tide and it looks like I'm seeing the same number of grasses.
- **Dave Wilcox**: Have you quantified how much you're missing due to high tide because you won't be able to pick up lower density beds at 3m resolution?
    - **Victoria Hill**: We compared how many planet pixels pick up grass in the aerial polygons and the difference is about 60%. The planet area was about 60% of the polygon area.
- **Brooke Landry**: The satellite imagery will be compared to the VIMS aerial imagery, but we need more ground data all around. To get to the point about the different densities, we can back calculate and mimic how VIMS hand delineates a SAV bed, but in an automated fashion.
- **Lew Linker**: In the Susquehanna Flats, does part of the diminishment of the above ground freshwater biomass get translocated to the below ground biomass?
    - **Victoria Hill**: I don't know if some of the carbon is buried over the winter or if it is all exported in the above ground biomass.
    - **Dick Zimmerman**: We don't know what fraction of the population grows back from belowground roots and rhizomes in the sediment or what represents seedling recruitment.
    - **Lew Linker**: I think it's worth looking into the translocation of shoots to roots or the above ground biomass to the rhizomes.
- **Cassie Gurbisz**: Can you tell if it's lyngbya or actual grass being mapped in the Susquehanna Flats during winter?
    - **Victoria Hill**: We just know that it's something submerged and green.
- **Tish Robertson** (*in chat*): Victoria, you mentioned a prediction error rate of 20%. Do we have an idea what the error rate is for the estimates from the aerial surveys?
    - **Brooke Landry**: I'm not sure off the top of my head.
    - **Peter Tango** (*in chat*): As long as uncertainty is stated, then it's useful in estimating any measure we are tracking. It is less useful to not be able to quantify the uncertainty.
    - **Dick Zimmerman**: That's the RMS uncertainty from image to image. It's fairly consistent with NASA's Ocean Color Program in terms of chlorophyll concentrations in the open ocean. What we're seeing is what you would expect from satellite remote sensing data.

CHESAPEAKE BAY MODEL – SHALLOW WATER HABITAT IMPROVEMENTS

Presenter: Lew Linker (USGS/CBP)

- With respect to modeling in the Chesapeake Bay we are moving to a spatial scale in area depth that's more appropriate for shallow water representation.

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- With the Phase 7 model we are aiming for a full assessment of SAV and shallow water quality in all 92 Chesapeake Bay segments.
- Phase 6 has a 1km x 1km scale and about 2m in depth. The phase 7 Main Bay Model has a clearer and finer representation.
- The whole model will be fully operational for the Bay Program in December 2025 and then it'll go into a year of review.
- Using the Corsica River as a test bed for the Main Tributary Model we can learn how to deal with shallow water processes for the first time.
- 2 approaches can be used to estimate SAV.
    - Light based model (Phase 6) that looks at attenuation of light from inert suspended solids, water, color, epiphytes, or dissolved organic material.
    - Structural Equation Model (Phase 7) takes long-term data sources to build mechanistic understanding of SAV in 4 different habitats of the Bay. It's more detailed than the light attenuation model.
- Conclusions:
    - The Phase 7 Main Bay Model and Multiple Tributary Models will provide CBP substantial improvements in scale (area and depth).
    - The Phase 7 Dynamic Watershed Model will provide loads to shallow waters at a finer resolution.
    - The Phase 7 Model Suite needs to be assembled to assess the degree of improvements.
    - There are 2 possible candidates for estimating SAV area and clarity water quality standard.

Comments/Questions:

- **Cassie Gurbisz:** This dynamic model isn't going to be incorporated with the Phase 7 model, right? That's just sort of, if there's enough light, we can assume the SAV will grow and/or the water clarity standards attained?
    - **Lew Linker:** We will look at the light attenuation model with the new scale in Phase 7 to see if there are improvements to the light attenuation model and see how it compares to the structural equation model.
    - **Cassie Gurbisz**: But this model doesn't grow SAV? It just says there's enough light for SAV to grow?
    - **Lew Linker:** This model does grow SAV in the sense that it's a carbon-based model. It is highly mechanistic, but it doesn't have sensitivity to salinity and temperature like the structural equation model.
- **Doug Myers**: When the aboveground biomass senesces and if it goes all the way through the food chain it would create emissions, but if it goes down to the deep channel and decomposes, could you consider that sequestered?
    - **Lew Linker**: The benefits for a healthy tidal freshwater SAV community outweighs the about 0.1mg/L deep channel hit from the senescence of things like all of the communities. Once it's down there for all intent and purpose it's done.

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GIT FUNDED PROJECT UPDATE: PROTECTING CHESAPEAKE BAY SAV GIVEN CHANGING HYDROLOGIC CONDITIONS: PRIORITY SAV AREA AND IDENTIFICATION AND SOLUTIONS DEVELOPMENT: 2023 GITFUNDED PROJECT

Presenter: Bob Murphy & Cole Blasko (Tetra Tech)

- SAV Bed Prioritization
  - Identified 7 criteria.
  - Weighted each criteria.
  - Assembled beds scoring >0.9.
  - Final beds identified to encompass geographic spread.
- Criteria Weight: Bed size (10%), Maturity (10%), Bed density (15%), Species richness/diversity (10%), Sensitive/rare species (10%), Habitat value (35%), Representativeness (10%).
- Looked at over 1100 SAV beds and identified 12 priority beds using the criteria (Susquehanna Flats, Tangier Sound, Potomac River, etc.).
- Next steps are to better understand which BMPs are going to be main drivers of SAV health directly related to conservation and restoration using a machine learning model will be.
  - Modeled response: Species richness, rare/sensitive species, bed size, and bed density.
  - Input Data: BMP data, land use data, discharge data, tides, shorelines.

Comments/Questions:

- **Jonathan Watson** (*in chat*): Bob - I think the value of SAV as habitat for anadromous fish (striped bass, alosines) is really as juvenile rearing habitat - did you give that habitat function any weight?
  - **Bob Murphy:** It was juvenile striped bass and spawning area for shad/herring/striped bass, and blue crab settlement.
  - **Cole Blasko:** Part of the habitat data we used included spatial extent of nursery and spawning areas.
- **Brooke Landry**: The exercise of prioritizing the SAV beds does not give those beds any special relevance to the CBP world of managing and protecting.
- **Matt Robinson** (*in chat*): Dave - This group has done some great work through the GIT funding program by working with Cindy Palinkas and her lab at Horn Point on impacts of living shorelines on SAV. That research has found that there aren't any real impacts on SAV, and if it is supplanted, it comes back. I would check that out. https://www.sciencedirect.com/science/article/abs/pii/S0925857423000538
  - **Jonathan Watson** (*in chat*): Matt - the state/feds permit several acres of SAV fill each year for living shorelines (including for those targeted for TMDL reductions). The Palinkas study didn't address that issue - was looking more at the response of the remaining SAV adjacent to those projects.
  - **Matt Robinson** (*in chat*): Jonathan - Obviously the Palinkas study didn't take into effect larger jurisdictional scale implementation of living shorelines. It might be worth looking at loss due to LS construction vs loss from not restoring shorelines which could cause

scouring and harm to bottom habitat. It also might be worth looking into whether, at a very large scale, sediment trapping by LSs help bottom habitat.

- **Cassie Gurbisz**: With the models it sounds like you're only looking at 12 beds. How are you replicating it statistically?
    - **Bob Murphy**: We're not. It's going to be a correlation analysis.

SAV WORKGROUP UPDATES

Presenter: Brooke Landry (MD DNR)

- SAV numbers were up in 2022 by 13%, which is 42% of the SAV goal.
- CBP Strategy Review System
    - SRS process ran October 2023 – March 2024.
    - The updated Management Strategy and Workplan will be available soon.
    - The SAV WG made a request to Management Board **"We ask that the MB endorse the necessity of establishing a Shallow Water Habitat Sentinel Site Program and guide the CBP to take the necessary steps to do so"**.
        - Step 1: Conduct a STAC Workshop to determine where to place the Sentinel Sites and what parameters to include. It will also identify which CBP Workgroups and Goal Teams would be included in the effort.
        - Step 2: Request GIT or other funding to develop protocols for each parameter to be measured, a QAPP for the program, data portal options, and to identify potential and sustainable funding sources for the program.
        - Step 3: Secure long-term funding for the Shallow Water Habitat Sentinel Site Program.
        - Step 4: Implement the Shallow Water Habitat Sentinel Site Program as a CBP and partner effort.
- 2024 Call for STAC Workshop Proposals
    - Funding will be announced at the end of March.
    - Submitted the Shallow Water Habitats Sentinel Site Program for a STAC Workshop.
- 2024 GIT Funding Proposals are due to the Habitat GIT Chairs on April 8th and should include the 7 criteria below. Will submit the Shallow Water Habitats Sentinel Site Program to GIT Funding.
    - Brief description of project, including key tasks
    - Targeted audience/user base
    - GIT priorities that will be addressed through project funding and implementation; (i.e., How does it tie into the HGIT Management Strategy and/or Workgroup priorities?)
    - Identification of (any) cross-GIT application(s)
    - Intended results.
    - Projected budget
    - What other funding sources have been pursued for the project (if any)
- 2022 GIT Funded Projects
    - Protecting Chesapeake Bay SAV Given Changing Hydrologic Conditions: Priority SAV Area Identification and Solutions Development

        - This project will identify high-priority SAV areas within the Chesapeake Bay Watershed and determine which BMPs could be most effective in protecting those areas from loss during high-flow events/years.
        - Contracted to Tetra Tech
    - Advancing Social Marketing Through Two Pilot Programs
        - This project will develop pilot programs for existing community-based social marketing (CBSM) campaigns that have been developed over the past few years, SAV being one.
        - Contracted to OpinionWorks
        - Lead: Communications Workgroup
- SAV Watchers
    - There are 4 SAV Watcher Trainer Certifications events planned for 2024 at Marshy Point Nature Center, Havre de Grace Maritime Museum, Accokeek Foundation at Port Tabacco, and ShoreRivers. Update since meeting: there will only be three. The event at ShoreRivers was canceled.
    - Try to expand this effort to VA in 2024.
    - The data from this effort are sent to VIMS to support the ground truthing process.
    - Switched to ArcGIS Survey 123 for SAV Watchers.
- SAV Sentinel Site Program
    - Sites to be installed and monitored in 2024 – Severn River, Susquehanna Flats, Smith Island, Marshy Creek, Dundee Creek, St. Mary's sites, VIMS, CBNERR sites
- PSC Report and Recommendations
    - **RFP #1:** Support effort to develop automated methods that mimic historic SAV bed delineation methods for aerial imagery. Will also support effort to map *Zannichellia palustris* with satellite imagery throughout mesohaline as proof-of-concept for satellite data use. **This RFP was awarded to Old Dominion University.**
    - **RFP #2:** Support long-term funding for the Chesapeake Bay SAV Watcher Program. This RFP is being developed and will be posted later this fall.
- NOAA Funding Opportunity
    - **Proposal 1**: Infrastructure and Capacity Building for Transformation Submerged Aquatic Vegetation Restoration in the Mid-Atlantic United States
        - Build SAV processing centers & SAV nurseries, create educational materials, and develop SAV restoration training program to increase capacity. Restore America's Estuaries will be the lead agency and there are 17 partners in total from North Carolina to New Jersey.
    - **Proposal 2**: Helping Eelgrass Adapt to Temperature
        - This project will conduct common garden experiments with eelgrass from North Carolina to Maine. Facilitating the migration of more heat tolerant eelgrass plants northward.
    - Funding announcement likely in June
- 2024 Coastal & Estuarine Summit hosted by Restore America's Estuaries is October 6th–10th in DC.

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- East Coast SAV Collaborative: https://www.eastcoastsavcollaborative.com/
    - Next Meeting – April 26th on SAV and Aquaculture.

SAV SCIENCE NEEDS REVIEW

Presenter: Brooke Landry

- The STAR team maintains a list of science needs for all the workgroups in the CBP found here: https://star.chesapeakebay.net/Need/ScientificNeeds
- Having a list of science and research needs helps with funding and can inform student projects.
- Created a Google Form with the current SAV WG science needs asking workgroup members to rank them high, medium, or low priority.
- Based on the results, Brooke ranked the science needs. They can be found on here on slide 50.

Questions/Comments:

- What's the reality of getting beyond the top 5 science needs?
    - We only really have GIT funding to work on these internally and it's chosen by what seems most relevant at the time and has the best management implications.
    - A lot of the work gets done based on individuals getting grants.

BEYOND 2025 AND SHALLOW WATER HABITAT SMALL TEAM UPDATE

Presenter: Brooke Landry

- The Beyond 2025 Steering Committee created five "Small Groups" to form recommendations around cross-cutting, high-level topics.
    - Climate, Healthy Watersheds, Clean Water, People, and Shallow Water Habitats (SWH).
- SWH Vision: Healthy and sustainable shallow water habitats that support resources, communities, and economies that are resilient to long-term changes in watershed conditions.
- SWH Scope: Edges and Nearshore Waters of 3 Ecological Zones: Non-tidal Fresh, Tidal Fresh, and Tidal Estuarine. This includes the rivers and streams that flow to the waters of the Chesapeake Bay and the nearshore habitats where plants and animals live, and people interact with the water.
- 5 recommendations of the SWHSG
    - Prioritize system-scale shallow water habitat restoration that provides social, economic, and ecological benefits while also providing resilience and connectivity under changing land-use and climate conditions.
    - Improve understanding of connectivity and habitat function under changing conditions by expanding Chesapeake Bay and watershed monitoring and modeling to include continuous shallow water habitats.
    - Implement a process for climate adaptation in shallow water habitats that integrates adaptation science and community engagement elements.
    - Strengthen the connection between people and shallow water habitats by communicating the importance of these ecosystems and their socio-economic benefits to stakeholders.

- Balance the accountability, resources, and effort in an equitable way across the outcomes. Manage shallow water habitats as an interconnected ecosystem that leverages collaboration among the Bay Program partnership and organization structure by minimizing rigid bureaucracy without sacrificing inclusivity and adjusting outcomes and funding accordingly.

- Beyond 2025 Recommendation Schedule:
  - March – April 2024: Steering committee meetings to review and adopt the first draft of recommendations.
  - June – July 2024: Public feedback solicited.
  - July – August 2024: Revise and affirm the recommendations.
  - September – October 2024: Seek approval from Management Board and Principal Staff Committee.
  - October – December 2024: Present and request approval from the Executive Council.

PARTICIPANTS (41):

In-person (12):

Greg Brennan (SCC)	**Jeff Coogan** (CMA)	**Brooke Landry** (MD DNR)
Stephanie Hall (MD DNR)	**Doug Myers** (CBF)	**Julie Luecke** (CBF)
Bob Murphy (Tetra Tech)	**Cassie Gurbisz** (St. Marys)	**Kaitlin Scowen** (MD DNR)
Nancy Rybicki (USGS)	**Chris Guy** (USFWS)	**Dede Lawal** (CRC)

Online (29):

Becky Golden (MD DNR)	**Kayla Clauson** (DNREC)	**Richard Zimmerman** (ODU)	**Gabriella Vailati** (DNREC)	**Lisa Ham** (HdG MMEC)
Paige Hobaugh (Tetra Tech)	**Megan Fitzgerald** (EPA)	**Mike Johnson** (MRC)	**David Wilcox** (VIMS)	**Erin Shields** (VIMS)
Jonathan Watson (NOAA)	**Victoria Hill** (ODU)	**Erin Reilly** (VIMS)	**Elle Bassett** (ARF)	**Elizabeth Lacey** (Stockton University)
Cole Blasko (Tetra Tech)	**David Obrien** (NOAA)	**John Sandkuhler** (NWA)	**Mark Lewandowski** (MD DNR)	**Becky Swerida** (MD DNR)
Lew Linker (USGS)	**Tish Robertson** (DEQ)	**Matt Robinson** (EPA)	**Peter Tango** (CBP/USGS)	**Sally Hornor** (MRA)
Cathy Wazniak (MD DNR)	**Joseph Morino** (DEQ)	**Sheila Saia** (Tetra Tech)	**Kathy Phillips** (AC)	