SAV Workgroup Meeting

June 26th, 2018
10:00 am – 5:00 pm
Chesapeake Bay Program Office

Participants

Brooke Landry (MD DNR, SAV WG Chair)
Becky Golden (MD DNR, SAV WG Vice-Chair)
Paige Hobaugh (CRC, SAV Workgroup Staffer)
Margot Cumming (CRC, Habitat GIT Staffer)
Jason Howard (UMCES IAN)
Suzi Spitzer (UMCES IAN)
Rich Batiuk (EPA CBP)
Matt Robinson (DC DOEE)
Russell Ives (ODU)
Elle Bassett (ShoreRivers – Wye and Miles)
Tim Trumbauer (ShoreRivers – Chester)
Magdalene Ngeve (UMD)
Angela Mitchell (Chesapeake Mermaid)
Becky Swerida (MD DNR)
Doug Myers (CBF)
Cassie Gurbisz (St. Mary's College)
Jesse Iliff (South River Federation)
Kristy Beard (NOAA)
John Page Williams (CBF)
Mark Lewandowski (MD DNR)
Sally Hornor (Magothy River Association)
Chris Warton (Tetra Tech)
Dick Zimmerman (ODU)
Victoria Hill (ODU)
Beth Zinecker (USGS)
Collin Breidenbach (Severn River Association)
Mike Naylor (MD DNR)
Cathy Wazniak (MD DNR)
Greg Brennan (Spa Creek Conservancy)

Remote

Amanda Gray (VA DEQ)
Cindy Johnson (VA DEQ)
Dave Wilcox (VIMS)
JJ Orth (VIMS)
Tish Robertson (VA DEQ)
Nancy Rybicki (USGS)
Erin Shields (CBNERR)
Don Weller (SERC)

Below you'll find detailed minutes from the annual SAV Workgroup meeting that took place 6/26/18 at the Chesapeake Bay Program in Annapolis. Any/all errors are the fault of minute-takers and editors, not the presenters. If you encounter an error, please contact Brooke Landry to let her know (brooke.landry@maryland.gov) so that she may make any corrections necessary. Thank you to everyone that took the time to attend either in person or on the phone. Federal, state, academic, and non-profit/advocacy organizations were all well represented.

1. Notes from Rich Batiuk (Rich Baituk)

Rich Batiuk is retiring at the end of the July. He has been an integral part of the Chesapeake Bay Program and the SAV Workgroup for *over thirty years!* Rich provided the morning "keynote" and reminded us of all that we've accomplished and all that we still have to do. Thank you, Rich, for everything you've done to promote SAV

- SAV WG started in the mid-1980s – the oldest functioning CBP Workgroup.
- SAV aerial and ground monitoring surveys are longest running of their kind.
- Consensus from monitoring workshop – Aerial portion of survey is necessary to perform each year.
- Increase efficiency of survey to reduce costs: researchers are working on semi-automation of digital imagery now

- CBP adopted 185,000 SAV restoration goal in 2003, but true bay-wide goal is 192,000 acres and was officially recognized in *Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and chlorophyll a for the Chesapeake Bay and Its Tidal Tributaries - 2017 Technical Addendum*
    - Look at table in Addendum – should we add additional acreages to certain segments? Work towards adopting true baywide goal….

- With 30+ years of SAV/WQ/landuse data, an SAV trends analysis was funded.
    - SAV Synthesis team formed; Postdoc hired (by VIMS) to make sense of data, weave a story.
    - We will be sure that managers, watershed scientists, citizen scientists have access to this information.
    - Segment-specific descriptions are also being completed and will be available soon to support local decision making/trib specific restoration efforts.

2. SAV Workgroup Updates

A. General Announcements (Brooke Landry)

- 2017 SAV: 104,843 Acres of SAV in the Bay in 2017!! 5th consecutive year of increased acreage. 3rd year in a row of record breaking acreage. 1st year ever over 100,000 acres!

- ISBW**:** International Seagrass Biology Workshop 14: Signs of Success – Maryland 2020
    - Bid won by Bill Dennison (UMCES/IAN) and team from various institutions including VIMS, St. Mary's College, and MdDNR
    - Never held in the U.S. before
    - Several-day workshop including scheduled field trips
    - Around September 2020
    - Potentially to be held in downtown Baltimore

B. SAV Financing Strategy (Brooke Landry)

The SAV Workgroup has been working with the CBP Budget & Finance Workgroup (BFWG) to develop a financial strategy/system that would identify funding options for the key actions of the SAV Workplan

- Working to develop "Financial System" – 3 avenues of funding:
    - Full Cost Pricing.
    - Mitigation Banking – Before a company begins construction must restore habitat elsewhere in advance before permit is awarded; proactive measurement.
    - Creation of third party recovery fund or endowment.
- Report forthcoming (a few months from now).
- Who is responsible for implementing it?
    - Discussion of creating new group at CBP for implementing financial strategies that BFWG creates.
- Consensus from discussions: Financial sector really wants to know how much SAV is worth.
    - If we can figure out how much N is sequestered by SAV and put a dollar amount to it, investment is more likely.
- Discussion:
    - Myers: Restoration isn't the most effective method of gaining acreage (expansion under good WQ is), unsure investors understand what they're investing in. What would the investment in a monitoring program be?

- Landry: There was a disconnect – we spoke about getting our entire Workplan funded, more than just monitoring. They grabbed onto the restoration portion of our actions because that was a tangible activity with direct results. They were less interested in funding monitoring.

- Since WQ is the issue for SAV coming back, why not set up mitigation credits for WQ?
  - Golden: They knew about WQ, but it was treated separately.
  - Myers: Nutrient trading focuses on credits in a small area. If we were to focus SAV restoration and this financial instrument, we want to do a lot of it in a small area to be able to detect WQ change.
- If we do consider mitigation banking, there is an interagency review team in MD that should be contacted to discuss this possibility.

C. SAV Synthesis Project (SAV SYN) (Brooke Landry)

The goal of this project was to take the 30+ years of aerial SAV survey data combined with long-term WQ data (Loading, land use change, etc.) and do a full scale trends analysis using modern statistical techniques. CBP funded a post doc (through VIMS: Jon Lefcheck) to guide the analytical aspects of this project. Bill Dennison and JJ Orth led this endeavor. Other team members (not supported by CBP for this) include Brooke Landry, Jeni Keisman, Cassie Gurbisz, Rebecca Murphy, Dave Wilcox, Ken Moore, Chris Patrick, Don Weller, Jeremy Testa, and Mike Hannam. Additionally, some members of the team are also working on Segment Descriptions. See below for details.

- **Trends analysis** - Three publications have been produced to date.
  - The 1st study found that high heat and high turbidity in the southern bay is detrimental to eelgrass survival and that loss of eelgrass will have major financial implications for the bay economy. Lefcheck et al. 2017. *Global Change Biology. Multiple stressors threaten the imperiled coastal foundation species eelgrass (Zostera marina) in Chesapeake Bay, USA. doi: 10.1111/gcb.13623*

  - The 2nd publication was a review that discusses SAV in a changing bay and its role as a sentinel species – both indicator and defender of water quality and ecosystem health. *Orth et al. 2017. Submersed Aquatic Vegetation in Chesapeake Bay: Sentinel species in a changing world. BioScience 67(8): 698-712.*

  - The 3rd publication was the actual trends analysis that linked reductions in N and P loading to the recovery of SAV we've seen in the bay over the last 30 years, with much of that recovery occurring since 2012 after the TMDL went into effect. *Lefcheck et al. 2018. Long-term nutrient reductions lead to the unprecedented recovery of a temperate coastal region. Proceedings of the National Academy of Sciences. doi/10.1073/pnas.1715798115*

    - Contact Brooke Landry (brooke.landry@maryland.dnr) if you'd like a copy of any of these papers.

- **Segment Descriptions** – There are 92 designated CBP segments in the Chesapeake Bay, each with their own SAV restoration goal. Those 92 segments were clumped to create ~54 "segments" that are included in this exercise (ie. we clumped things like Choptank mesohaline segment 1 with Choptank mesohaline segment 2). Essentially, we are working to tell the SAV stories in each of the bay's tributaries through these segment-specific analyses. Note, however, that an analysis with specific water quality data was not included, as there's generally only one WQ station in each trib and that station is not necessarily anywhere near the SAV. When we did attempt to analyze the data in this manner, the results were all over the place. It was only at the baywide scale that we could legitimately compare the water quality data sets to the SAV data (as discussed in the PNAS paper mentioned

above). Each segment description includes the history of SAV distribution (in acres) and density since 1984, a conceptual diagram showing what happened in that trib during those years (ie. heat events, expansion of specific species, aquaculture), the goal or combined goal for that segment or segments and its attainability, a description of the known historic coverage (species present), a description of the key events that took place during the monitoring period and their influence on the system's SAV, factors that make that tributary's SAV more vulnerable or resilient to degradation over time, and management implications of the information provided. The segment descriptions are by no means exhaustive (we were limited to two pages), but they do highlight the things that the SAV Syn team found to be the most important driving factors of SAV success or degradation in the system. They are intended for use at the county level to help guide local management decisions.

- Discussion:
  - Will they tell specific stories?
    - Landry: Yes, to a limited extent
  - How will these be available to use? Is the data available?
    - Landry: Fact sheets will be available on Bay Program website; segment specific data will be available there as well, or at least links to the data. A booklet including all of the fact sheets, as well as introductory material, will be provided to local jurisdictions (county managers, Riverkeepers, etc.)
  - Who is the audience for these analyses?
    - Landry: River keepers, county level decision makers – they're tailored for local scale.

D. HGIT Funded Project – SAV Regulatory Review (Becky Golden)

Every year the CBP goal teams have a lump of money that gets distributed to workgroups for outcome-related projects. This year, the SAV Workgroup put in for funding to perform a review of all of the statutes and regulations that protect SAV in the bay. We received $25,000 for this project, which was then put out for bid. The Chesapeake Legal Alliance won the bid.

- They will:
  - make recommendations for any changes or proposed additional regulations.
  - create a searchable database of SAV-related statutes and regulations in all bay states.
  - provide a Draft Final Report by January 15, 2019 (timeline includes review process).
  - present to SAV Workgroup at meeting in Spring 2019.
- How will this be accessible?
  - Landry: Ideally will live on the Chesapeake Bay Program website – expanding SAV landing page. But that's ultimately TBD at this point.

E. Progress on SAV Survey Design (Dave Wilcox)

In March 2017, the SAV Workgroup sponsored an SAV Survey Design Workshop to determine who was using the SAV survey data, how they were using it, what data was absolutely essential, and what they could live without. The intent was to determine the best way to improve the Survey's efficiency and reduce its cost. Four options came out of the workshop

- Retain survey as is
- Upgrade to semi-automated imagery processing routine
  - Will hire post-doc this fall (Fall 2018) to do this
    - Will also look into remote sensing tools/techniques that could save time and effort

- Collect annual imagery but only process specific regions of the bay each year with the entire bay mapped every 3-4 years
- Collect baywide imagery but only process a statistically random subset
    - This work was completed by Dr. Dong Liang at UMCES CBL
        - Dr. Liang evaluated statistical sub-sampling strategies to further improve cost efficiency of survey program.
        - Dr. Liang determined that with 1000 cells in each segment you can estimate total cover within 1.5-2.5 percent.
        - Using 2000 cells per segment, accuracy = 85-92%.
        - Cautions:
            - Cost estimates are undetermined.
            - Accuracies are optimistic given implementation restraints (he couldn't sample variation within polygons).
            - Large errors can occur with expansion of SAV into new areas (only sampled areas that have had grass).

        - Comments:
            - Myers: On last slide, methods used to survey entire system, not related to subsampling, correct?
                - Wilcox: Correct.
        - Brennan: Any work in using citizen science to contribute to this process?
            - Wilcox: Used in different areas, something we might potentially consider. Implementation is tough, need to look at compatibility with 30+ dataset. We want to make sure were not doing something that will change comparability.
        - Wilcox: Now that we get imagery within 24 hours, we touch base with people on the ground to make sure that new presence is true/ground truth it in areas we have little groundcover. Helps us understand signal we see on the imagery. Will be helpful moving forward with machine learning process.
        - Wilcox: Important to have these tools available and easy to use in online environment so people can access it.
        - Swerida: Good platforms already exist, Zooniverse. Compiles projects and have volunteers click through and respond - has good success.
        - Zinnecker: Type of multispectral imagery used in resolution?
            - 24cm for aerial imagery.

3. SAV Workgroup Research Prioritization (Brooke Landry)

This discussion was initiated with the recognition that the time allotted was completely insufficient and that the conversation would need to continue at a later date (we briefly discussed the possibility of facilitating an inter-agency workshop to compile a list of SAV research needs). At this time, however, we went through the Management Strategy and TS III to review which gaps had been filled, which gaps hadn't been filled, and which new gaps had been identified. Following is a summary of that discussion.

- *Gaps identified in Management Strategy.* Refer to the SAV Management Strategy for details (https://www.chesapeakebay.net/documents/22042/2f_sav_6-24-15_ff_formatted.pdf). Note that this process will guide MStrat updates currently being conducted.
    - Adjacent Watershed impacts on SAV
        - Largely done through NOAA Shoreline Project (work done by SERC and DNR)
            - Increasing land use near sav is bad, same with shoreline hardening generally

- Succession as it relates to SAV restoration
  - Work has been done, but is not entirely complete
  - Comments:
    - Swerida: Some interest in this topic at Otter Point Creek (Julie Bortz did work with hydrilla succession, interest in picking this work back up).
    - Golden: This ties in with climate resiliency work as well.
- Species diversity as it relates to SAV restoration
  - AACC scientists as well as SAV Syn team did work on this, find that it does help resiliency.
- Reconciliation ecology
  - Area we could potentially look more into, also gets into possibility of bringing in subtropical species into the bay as the water warms. Lots of controversy, obviously.
- Genetic diversity
  - Maile Neel and Katia Englehardt (UMd) are conducting SAV genetics work – looking at connectivity, dispersal, etc.
- Propagule choice for SAV restoration
  - Some work has been done involving eelgrass and mesohaline species
- Size, density, and pattern for SAV restoration
  - Some of this work has been done, but on a less formal basis.
  - Cassie touched on this in Technical Synthesis III (TSIII).
- Exclosures for SAV restoration
  - If you protect seedlings physically (e.g. fence), plants do better.

- *Gaps Identified by TSIII*
  - SAV feedback processes: Implications for restoration and resilience
    - Important research project: Determine habitat requirements for recovering sav beds rather than existing beds.
  - Role of genetics in connectivity in the restoration of SAV beds
    - Possible research project: genetic and connectivity studies on fresh and brackish water species.
  - Effects of land use and shoreline armoring on SAV
    - Possible research project: Determine impact of Living Shorelines on SAV. Comparison study similar to natural vs. riprapped study by Landry and Golden 2017. Cindy Palinkas is currently conducting a study to assess living shoreline on SAV. Need to check in with her for more information.
    - Landry: We worked on how riprap specifically affected SAV right offshore (negatively impacts size, density, diversity of bed – in general, statistically). SERC group took a modeling approach using shoreline data and used aerial survey data to determine how it was affecting SAV at a sub-watershed scale (once it reaches 5.4% riprapped shoreline, trajectory changes. Less than 5.4% - recovery trend is positive; More than 5.4% riprap - no recovery trend).
    - Swerida: There is much confusion about this subject in the marine and regulatory community, need for more science. People have observed different things under different circumstances. Research, regulatory, industry need guidance.
    - Iliff: What defines a sub-watershed?
      - Weller: Sub-embayments up and down the bay called sub-estuaries. Pockets of water associated with local watershed that drained right into it. Able to look at shoreline condition and local land use aspects of each sub-estuary. Parsed watershed into about 140 sub-estuaries with some overlap. About 100 that don't overlap.
    - Weller: Field studies will be valuable. Could also do a lot using SAV monitoring data if we had a good living shoreline location/age/design database.

- Swerida: There is a huge need for this, but there are also challenges associated with this (e.g. department policies). Tried to begin small scale efforts like this within the group, but unless there are changes with the players involved, this will never happen.
    - Anacostia might be good place to collect pre-restoration data.

- 21st century climate change and SAV in the Chesapeake Bay
    - Research project: Transplant experiment using the sub-tropical species, shoal grass (Halodule wrightii). Controversial…..
        - Discussion:
            - Could it naturally propagate into the bay under natural conditions?
                - Halodule wrightii is robust, similar to Ruppia. It might be able to take energy better. It is more marine in its salinity thresholds. Might not be able to handle Chesapeake Bay winter temperatures. Annual populations only most likely.
            - If you transplant grass, you transplant other organisms with it; might have implications on native populations. Unintended consequences with transplanting grass.
            - Idea: Mesocosm experiments to delve into tolerances, possibility of bringing a subtropical species.
            - Idea: Transport model to see if it'll possibly show up on its own.
    - Research project: We have requested that STAR work on an SAV habitat forecasting map which will combine SLR projections with current shoreline hardening and nearshore land use maps to determine how much soft bottom habitat will be available in the future.
        - Discussion:
            - Slope will be important component of SAV predictions.
            - Will reaching the outcome goal be possible under SLR and shoreline hardening?
                - Living shorelines provide marsh migration corridors; not a whole lot of research to support that.
    - Research project: poor understanding of indirect effects of climate change on organisms associated with SAV die-offs.

- Overall Discussion:
    - Where do these research questions go? Is there money available for these?
        - Landry: SAV Workgroup is charged with keeping list of gaps/research needs. Possibility of academic partners to tackle these subjects, possibility of GIT Funding to be applied.
    - Myers: Any researchers looking for sediment cores?
        - Swerida: Cindy Palinkas, possibly.
    - Landry: Older studies have determined seed viability… not any sort of seedbank map.

    - Mitchell: I deal with public, want to get involved, but don't know where to plug in. Where can I connect people or help build that support? There is lots of public support and even commercial support for restoration projects. Getting citizen scientists involved is great and if a certain project carries well, it could get commercial/corporate sponsorship.
    - Wazniak: Don't forget macroalgae!!!
    - Myers: Macroalgae can be an indicator of recovery, shows us that more than phytoplankton can grow now. Needs to be research and education about that transition so that people don't make rash decisions.
    - SLR and land ownership: the likelihood of waterfront landowners to use living shorelines? Public education effort here as well. Census income levels of waterfront landowners.
        - Landry: This could also lend itself to our proposed enhanced communication efforts (addressing nuisance concern as well).

4. CBP SAV Sentinel Sites (Brooke Landry)

One of our goals is to establish a baywide network of SAV sentinel sites where workgroup members and partners "adopt a sentinel" and monitor a transect at that location annually at peak biomass. We need to determine which previously established monitoring locations should be designated as sentinel sites and what new locations should be established. We also need to establish a sentinel site monitoring protocol. Again, this is just the beginning of this discussion – there's not enough time today to iron out all the details. Hopefully we'll get the protocol and locations established over the winter and start officially monitoring these sites in 2019.

- Chesapeake Bay sentinel site network already established, but at marsh sites, not SAV. Need SAV sentinel sites as well.
- Want to establish sentinel sites at grass beds, action item in new workplan.
- To be monitored by the same protocol annually to see how area is responding to improvements in water quality and effects of climate change.

- Locations
  - VIMS has 26 long term sites throughout Virginia tributaries. Some are clustered, so not all need to be designated as sentinels (ie. Mobjack Bay area, some on eastern shore). Monitoring for over 10 years. Paper coming out shortly on data collected.
  - DNR has 10 sites throughout MD: 4 clustered on Smith Island, others on Elk, Severn, Honga, Choptank, Port Tobacco, St. Mary's
  - CBNERR monitors 6 transects in York River (15 years now, monthly data April-October); 3 in front of VIMS (no grass currently present). Paper coming out soon on data collected.
  - MDNERR monitors transects at Jug Bay and Otter Point reserves since 2005, willing to share data. Interested in beginning monitoring component at Monie Bay.
  - Potomac/Anacostia takes readings.
  - Recommended sites:
    - Susquehanna Flats – HdG MM
    - Kent Island
    - Dundee Creek – Kolar, DNR
    - Hambleton Island – CBF
    - South River – Iliff
    - Wye/Miles River – Shorerivers
    - Jug Bay/Solomons (Patuxent) – CBNERR-MD
    - Otter Point Creek (Bush River) – CBNERR-MD
    - Chickahominy (James River) – CBNERR-VA
    - Port Tobacco, St. Mary's – Gurbisz?
    - Rappahannock
    - Karen Noonan Center (possibly) – CBF
    - TNC Bay Grass Project (Exmore, VA?)
    - Monie Bay (MDDNR),
    - Magothy River -MRA

- Partners
  - Sites should be easy to get to and have grass present, a partner willing to monitor site with specific interest in the area.
- Protocol
  - Start training this summer, officially start monitoring next summer.
  - Current:

- VIMS collects data in quadrats; data collected is % cover and % cover of each individual species to the nearest 10%. Microalgae is noted. Depth recorded.
- CBNERR-VA: Collects every 10m depending on length of each transect, microalgae not noted. Max shoot length measurements, density. Depth recorded. Does shoot counts for eelgrass.
- CBNERR-MD: Transects revisited every year from a boat, oyster tongs grab samples every 10m, volumetrically measure, clean and dry for biomass measurement (species separated). Every other year in June, August, and October. In the process of making changes to protocol. Depth recorded.
- MDDNR: Paired transects. Length of bed dictates how far apart quadrats are. Capture first instance and farthest extent of SAV and even intervals in between. Depth recorded. Doesn't take perimeter since it is taken by aerial survey. Total % cover, %cover/species, max canopy height, epiphyte presence. Quads are ¼ meter^2.

- Discussion:
  - Myers: Request for perimeter monitoring to verify that aerial survey is capturing all of that information adequately.
  - Data would stay within each organization collecting it, would also come to workgroup in a newly developed database for Workgroup website.
  - Sampling should take place during peak biomass per particular region.
  - Horn pondweed: Found everywhere, one of the first that comes out during the spring and dies back once it gets really warm. Not captured during aerial survey, but important component of SAV community in bay.
    - Myers: Propose that each site squeezes in a horn pondweed survey early in the spring.
    - Possibly do a tiered design. MDDNR doesn't go farther offshore than 200m for safety reasons, smith island some are 1000m, but studies entire thing because the lagoon there is safe.
    - For sites with impaired water quality or clarity, possibly use cameras.
      - Rakes for presence/absence for those who don't want to get in the water (qualitative, not quantitative). Not good for quantifying change over a gradient.
    - Myers: SAV beds are variable from year to year, when can you say change has been detected over all of these sites? Shoreline location will change over time, where you start and stop transect may change over time?
      - Landry: Do we start where bed starts, or where we start every single year – something to decide on for protocol.
        - CBNERR-VA starts at same site every single year, makes note of how far shoreline has eroded.
          - VIMS transects are done the same way.
          - CBNERR – MD does not do this way (What to do when bed disappears?).
            - There are stats for that.
        - Landry: Density, composition of site from year to year might change.
        - Myers: CBF Hambelton Island in broad creek (Talbot County) entirely surrounded by SAV.
        - CBNERR-MD has living shoreline sites with surrounding SAV.

5. SAV HGIT Project –SAV Survey Protocol and Certification Program for Citizen Scientists (Suzi Spritzer and Jason Howard)

This conversation was led by Suzi Spritzer and Jason Howard. Suzi and Jason, along with Bill Dennison and other UMCES folks, have been contracted by the CBP/CBT/SAV Workgroup to design an SAV Monitoring/Survey Protocol that's scientifically rigorous but also realistic for volunteers to conduct. This is a follow-up to last years "Riverkeeper Project" in which four watershed organizations were funded to start SAV monitoring programs in their tributaries. The monitoring programs established were overwhelmingly successful in both collecting data and increasing outreach among the organizations involved, but it was determined that a defined protocol needed to be established for more cohesive data collection to take place.

- Deliverables: Protocol development, trainings, certification program
- Started with SAV expert attitude survey
    - Practitioners want to address negative attitudes toward SAV by developing robust protocol.
- Seagrass Variables and Measurements needs:
    - Density of sampling: Three spatially separated quadrats - how far apart? How big?
    - Meadow extent: Gathered via drone, GPS, transects - allow for multiple methods? Drones for citizens?
    - Environmental data: Water depth, secchi depth - importance of sediment, water temp, salinity?
    - Animal data: Optional fields for mollusks, fish, crabs?
    - Other important data: epiphytes, floating algae, benthic algae, propeller scars, litter, aquaculture?
    - Shoreline type data: multiple choice boxes?
    - Canopy height: how to gather data?
- Breakout Discussion results:
    - Unsure how to approach shoreline types
        - Possibly multiple choice with pictures
            - "Armored" vs "natural"
        - Take erosion into consideration
        - Data collectors should also take pictures
        - A training will have to be held
    - Species identification
        - Volunteers should take pictures
    - Sediment type
        - Possibly use sink test?
        - The less equipment someone needs to take with, the better
            - Some people go out in kayaks, larger boats
                - Use paddle test?
        - Add gravel/rocky/shell category as well
    - Salinity
        - Not entirely doable for volunteers
    - Temperature
        - More important than salinity
        - State keeps water quality monitoring data you can take from
        - Suggest avoiding water quality measurements due to possibility of misconstrued data
        - There may be value in volunteers collecting this data for educational purposes
    - Discussion:

        - Myers: Would rather have thousands of less reliable data than tens of super reliable data.
        - Wilcox: Tagging data, if it's being generated in a more scientifically sound way, can be important. Harder to go back and get that later.
- Monitoring Certification
    - Discussion:
        - Should be tiers of data collection by indicator
            - E.g. secchi readings are easy to perform reliably, cheap, too.
            - Density of bed is a lot more intensive, subject to perception and methodology. Observations may differ a lot between volunteer.
        - QAQC should NOT be ignored
            - Should there be one level of quality each person should conform to or should there be different levels of rigor with respect to quality?
            - Latitude/longitude from phones? Or GPSs (with minimum reliability level)? Quality between devices might differ.
- Biased data collection
    - How to choose sites?
        - Prescribed vs opportunistic?
        - Same sites over time?
        - Random location?
        - Targeted monitoring?
        - Sentinel sites
            - Might be practical to let them have more control over frequency than location.
        - Absence data
            - If you're giving a location and your mission is to go somewhere to confirm whether grass exists there.

6. SAV as BMP (Becky Golden and Cassie Gurbisz)

We discussed the possibility of convening an expert panel to consider the utility of giving SAV credit as a Best Management Practice. Local jurisdictions get credit for BMPs that reduce the amount of nitrogen, phosphorus, and sediment that goes into the Bay (part of the Bay TMDL/pollution diet). Oyster aquaculture is currently under consideration for BMP credit and because SAV is also effective at reducing TSS and nutrient concentrations, we introduced this idea to the group, thinking that BMP status may give SAV equal footing in the future. Understandably, there was concern regarding the threat of unintended consequences (not to mention the logistics) and the potential benefits to SAV didn't outweigh this concern, so the idea is being shelved for the time being. Once we know more about how things go with the oyster BMP, we may revisit the idea.

- Panel Goal: To evaluate SAV effectiveness in reducing nutrients and sediments. Assess the feasibility of application in the Chesapeake Bay TMDL water quality model.
    - 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 TMDL.
- Why now?
    - Over 104,000 acres in 2017
        - Recent increases may facilitate further TMDL reductions.

- TMDL mid-point assessment is complete
  - Opportunities for new BMPS, innovative technologies, programs, etc.
- Take away from SAV/Budget and Finance dialogue sessions
  - From investment perspective, investors want to know what sav provides as a return.
- Interest in ecosystem services, co-benefits and valuation of existing BMPs and aquatic habitat resiliency.
- Oyster BMP Expert Panel update
  - EPA opinion that sequestered N and P is legal for in-water BMPs.
  - Existing in-situ BMPs – floating wetlands, Anacostia trash trap, Mr. trash wheel.

➢ Why bother?
- Reduce public perception of SAV as a nuisance
- Increase perceived benefits of SAV to local jurisdictions
- Provide a positive and concrete result
- Increase engagement at the local level

➢ Quantifying nutrient sequestration in SAV bends
- Research done by Drs. Gurbisz and Palinkas
  - Increasing the seasonal nutrient retention associated with recovering sav bed could potentially complement restoration efforts by accelerating whole-system recovery from eutrophication.
  - Important to quantify this internal process to improve capacity to predict estuarine responses to additional nutrient load reductions.
  - SAV enhances long term burial rate of sediments.
  - SAV uptake – nutrients remineralize when biomass synapses; time of year is important.
    - ✓ Jeremy Testa did modeling; more phytoplankton production over the summer needed to retain dead zone, doesn't just occur from spring production. SAV could help offset this phytoplankton production.

➢ Next Steps
- As WG, should we pursue this?
  - We would only move forward if it will afford additional SAV protection.
  - As aquaculture takes off and oysters are credited as a BMP, we want to get SAV on equal footing.

➢ Discussion:
- Possibly look to forest or land conservation BMPs for guidance.
- Regarding existing SAV, counties aren't getting credits for not impacting SAV already, shouldn't get credit for that.
- Living shoreline exemptions – if reviewer of project knows it's an SAV priority area, they wouldn't grant exemptions for riprap, for example.
- Myers: Don't see value of our Workgroup to begin panel, charge should come from someone else.
- Zimmerman: SAV needs clear water to survive, as a BMP it needs sediment and nutrient loading down beforehand. Then that BMP is leading to your exact intentions.
- Golden: Maybe we should wait a year to see output from Oyster BMP process.
- Possibly give double credit for SAV protection if you increase water quality to a certain threshold.
- SAV is an indicator, the BMP is better water quality.
- Landscape position could matter a lot with respect to how SAV restoration is beneficial for entire bay.
  - Needs to be a big part of project design
  - Not every acre will be equal in nutrient reduction
    - Use number of SAV acres as force multiplier

Decision: SAV Workgroup will not pursue a BMP Expert Panel at this time, but will revisit the idea later to reevaluate potential advantages/drawbacks.

7. Member Updates

A. Carbon Cycling, Remote Sensing and Oysters (Dick Zimmerman)

Dick Zimmerman and his colleagues at ODU are working on a number of SAV-related projects. Dick discussed blue carbon and the role of seagrasses in sequestering CO2, quantifying blue carbon burial in seagrass ecosystems, and the potential for seagrasses to mitigate ocean acidification thresholds for oyster populations in the Bay.

- Project 1: Determining the role of seagrass in sequestering CO_2
  - Created budget for entire Atlantic seaboard
  - Seagrasses occupy less than 5% of estuarine area
    - Dominant source of carbon burial
  - Used Grasslight biological model to predict seagrass impacts on carbon flux
  - More seagrass doesn't necessarily mean more changes to water chemistry as plant self-shade
  - Impacts on water chemistry are greatest in shallow water with moderate shoot density
  - Next steps: Incorporating sediment geochemistry in model
  - Trying to validate model using eddy covariance techniques
    - Measures net community metabolism
    -
- Project 2 – Quantifying Blue Carbon Burial in Seagrass Ecosystems and the Impact of Projected Climate Change
  - Using remote sensing based algorithm to measure below ground biomass for carbon sequestration estimates
  - Developed machine learning algorithm to detect propeller scars
  - Morphological differences in plants affect carbon burial
    - Eelgrass allocates most biomass above ground
    - Tropical species allocate most biomass below ground

- Project 3 – Can Seagrass Meadows Mitigate Ocean Acidification Thresholds for Eastern Oysters in the Chesapeake Bay?
    - We're coupling EcoOyster and Grasslight models to predict ecological level responses to climate change.
    - Discussion:
      - Swerida: Zostera exhibits a lot of different growth below and above ground depending on conditions, can that impact carbon sequestration here?
        - Zimmerman: Higher CO_2 environments stimulate overall plant growth, below ground biomass growth.
      - Myers: Self-shading at higher densities, would cooling of water associated with that still be favorable condition even if productivity isn't very high?
        - Zimmerman: Will need to revisit this later.

B. STAC Microplastics Workshop (Matt Robinson)

The SAV Workgroup successfully competed for funding to hold a STAC-supported workshop on Microplastics in the Bay. The workshop was described by co-chair Matt Robinson (DC DOEE). Bob Murphy (Tetra Tech) will also co-chair the workshop and a team of experts in the field will form the steering committee. The workshop will take place in the vicinity of Annapolis/DC sometime in the winter of 2019.

- Purpose: To explore the state of the knowledge of microplastics (and other marine debris) on Chesapeake Bay ecosystems, including SAV.
  - Why now?
    - Microplastic pollution is ubiquitous worldwide
    - Only modest amount of research done on this in CB watershed
    - Seems to be high correlation with urban development
    - Could affect nitrogen cycle in bay, disrupt bacteria
  - Key questions
    - How common are they in the Chesapeake?
    - What additional info do we need to gauge the ubiquity of microplastics in the bay and its tributaries?
    - What are sources of microplastics to bay and tributaries?
    - Possible effects of microplastics on habitats in bay and watershed and living resources? Are there any specific to the Chesapeake to confirm that microplastics are impacting these resources? What are data gaps?
    - Are there any policy and management tools being used to address plastic pollution in the bay? How effective are they? Can tools be emulated elsewhere? Additional tools we can recommend?
    - Can we recommend pursuing further studies on management of microplastics?
  - Logistics
    - To be held mid Jan-mid March somewhere in the Annapolis/DC vicinity

C. SAV Seeding Work in Middle River (Chris Wharton)

TetraTech's Chris Wharton presented on SAV seeding work taking place in Middle River. Middle River has experienced a resurgence of SAV the last few years and TetraTech is doing their part to promote that recovery at select restoration sites.

- Dredging done last year
- Cadmium sediment contamination, new fill brought in
- Restored wetland and riparian buffer as part of effort
- Collected seeds throughout middle river
- VIMS data vital to finding beds
- Will be monitoring site for 5+ years
- Begin underwater investigation end of summer
- Will be running transects along shoreline and wetland
  - Getting more funding to do another harvest and another planting of seeds to make the area more robust in case original seeding didn't go as planned.
- Discussion:
  - Myers: Is there a way to tell new seedlings or expansion by rhizome?
    - Wharton: Yes, premapped preexisting beds, GPS, and visual surveys. Also surveyed after dredging and once they did the fill. Did exclosures as well, will be able to monitor those.
  - Baxter: Who paid for it?

        - Wharton: This is a remediation project.
    - Swerida: Will results be shared?
        - Wharton: Hopefully, data collection online portion to open soon.

D. Macroalgae and its Identity Crisis (Cathy Wazniak and Becky Golden)

Cathy and Becky discussed the need to recognize macroalgae as a component of our SAV ecosystems and include it in our monitoring framework. It turns out most of us already do, so we need to make sure to get that information to Cathy.

- Delaware has SVP – submerged vascular plants.
- We separate SAV from SVP, but regulations apply to both seagrass and macroalgae.
- Data needs
    - Lyngbya monitoring
        - When is it harmful?
        - Impacts to DO
        - Limiting light to SVP
        - What benefit it may have to species using it in place of SAV or SVP
- Macroalgae Life cycle
    - Reproduces by spores
    - Starts attached to hard substrate by holdfast rather than roots, grows
    - Breaks off and continues growing in water column
    - Overwintering phase; tough to monitor
- Discussion:
    - Myers: Potential connection between macroalgae and discharge water; any mapping of groundwater discharge to help describe macroalgae distributions?
        - Indian river discharge is mapped thermally, no correlation with distribution of macroalgae.
    - Swerida: How would it benefit you most for us to quantify macroalgae we see?
        - Anything you physically must move out of the way to see grass underneath or sitting next to it, estimate the percent cover. Take pictures. Describe color (Brown, green, red), describe shape/texture.
    - Landry: Important to note difference between macroalgae and cyanobacteria (lyngbya, didymo).