BIENNIAL STRATEGY REVIEW SYSTEM
Chesapeake Bay Program

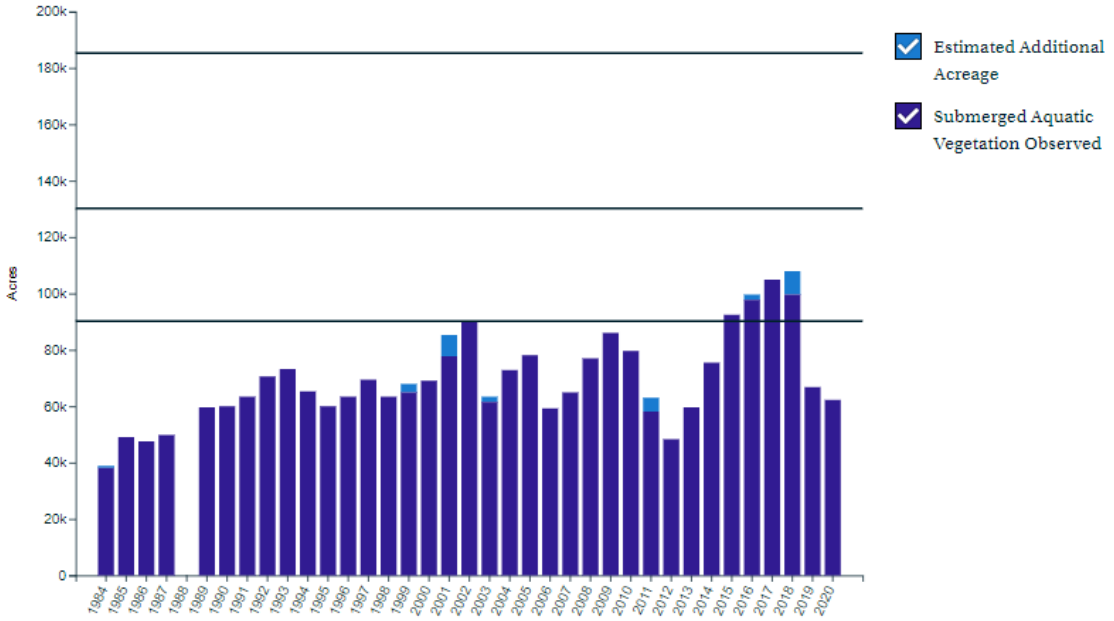
Narrative Analysis

SUBMERGED AQUATIC VEGETATION
NOVEMBER 18, 2021

ABSTRACT: Following six years of expansion, over 1/3 of Chesapeake Bay SAV was lost in 2019-2020 (~108,000 acres to ~62,000 acres).

NOTE: The narrative analysis summarizes the findings of the logic and action plan and serves as the bridge between the pre-quarterly logic and action plan and the quarterly progress meeting presentation. After the quarterly progress meeting, your responses to these questions will guide your updates to your logic and action plan. Additional guidance can be found on ChesapeakeDecisions.

1. Are we, as a partnership, making progress at a rate that is necessary to achieve this outcome? Use a graph or chart to illustrate where feasible (replace example provided with your illustration).



After six years of consistent expansion, Chesapeake Bay SAV declined dramatically in 2019 and 2020. Prior to this loss, we were on track to meet our 2025 SAV restoration target of 130,000 acres. With the loss of over a third of the Bay's SAV, reaching the Bay-wide 2025 goal on-time is highly unlikely. Segment-specific goal attainment is still possible and likely in some areas.

2. Looking back over the last two or more years, describe any scientific (including the impacts of climate change), fiscal, and policy-related developments that impacted your progress or may

influence your work over the next two years. Have these resulted in revised needs (*e.g.*, less, more) to achieve the outcome?

*To the extent feasible, describe your needs using the SPURR thought model, i.e., **S**pecific and actionable, **P**rogrammatic partner, **U**rgency of the needed action, **R**isk of not acting, **R**esources required.*

Regarding the SAV acreage outcome specifically:
In the Lefcheck et al. 2018 PNAS paper titled *Long-term nutrient reductions lead to the unprecedented recovery of a temperate coastal region,* the authors – Chesapeake Bay Program partners and SAV Workgroup members – showed that management actions to reduce nutrient loading to the Chesapeake had resulted in the gradual but impressive recovery of the Bay's SAV. Specifically, nitrogen and phosphorus reductions improved water quality to the extent where SAV expanded from ~38,000 acres in 1984 to ~108,000 acres in 2018 (although the paper only included data until 2016). The expansion was particularly noteworthy between 2012 and 2018 following implementation of the Chesapeake Bay TMDL. Freshwater and mesohaline plants in particular expanded in cover, density, and diversity during this time. Unfortunately, in 2019, SAV acreage plummeted to ~66,000 acres and in 2020, an additional four thousand acres were lost. While that is still nearly twice what was mapped in 1984, it signifies a substantial loss of habitat and ecosystem services.

Preliminary data review suggests that the loss of SAV was associated with above-average precipitation, which led to increased run-off and consequently increased nitrogen, phosphorus, and sediment loading despite management efforts. Increased precipitation and storm frequency are predicted symptoms of climate change – the region will only get wetter and stormier if we don't act globally to change course. If two years of climate-related increased precipitation were able to negate six years of rapid expansion under the TMDL, it appears that current efforts to reduce nutrient and sediment loading will be insufficient to ensure the SAV outcome is met. Nutrient and sediment loading needs to be reduced even further to mitigate/accommodate climate change.

Regarding workplan action items:
Much of what we set out to do, and more, was accomplished in the last two years. The action items not completed were a result of inadequate time, staffing, funding, and support that were exacerbated by Covid.

***S**pecific and actionable:* climate-related increased precipitation and runoff negated six years of SAV expansion in 2019-2020. Local jurisdictions need to increase their efforts to reduce stormwater runoff and implement other nutrient and sediment reducing BMPs so that when it does rain/storm/etc., there's less N, P, and loose sediment on the ground to wash into storm drains and local waterways.

***P**rogrammatic partner:* Much of the burden of SAV recovery is on the WQ GIT rather than the SAV Workgroup. Members of the SAV Workgroup concentrate on Management Strategies 2-5.

1. Supporting efforts to conserve and restore current and future underwater grass habitat and habitat conditions in the Chesapeake Bay;

2. Protecting existing and recovering underwater grasses in the Chesapeake Bay;

3. Restoring underwater grasses in the Chesapeake Bay;

4. Enhancing underwater grass research and monitoring in the Chesapeake Bay watershed; and

5. Enhancing citizen involvement, public education, and outreach in the watershed.

***U**rgency of the needed action:* Given the protracted nature of SAV recovery, particularly to a point where the bed is providing abundant ecosystem services, there is an urgent need to take action to further improve water quality to the extent that the system can mitigate and withstand damaging symptoms of climate change. There is very little chance of the SAV outcome being met by 2025.

***R**isk of not acting:* Without increased action, the 130,000 acre SAV outcome will not be met within the decade. 2025 is definitely off the table. The 185,000- acre ultimate goal will remain perpetually unattainable. Ecosystem services will be lost, including blue crab habitat. Most of the loss of SAV in 2019 and 2020 was a loss of widgeon grass in the mesohaline area of the Bay. Eelgrass was also lost. The 2020/2021 Blue Crab Winter Dredge Survey found a significant reduction in juvenile blue crabs following the loss of SAV. Additional loss of SAV may further exacerbate the stress on juvenile blue crabs.

***R**esources required:* Significant federal funding will be required to implement BMPs sufficient to reduce nutrient and sediment loading to the Bay to the extent necessary to offset further stress from climate change. To ensure all workplan action items are completed, the SAV Workgroup (and all workgroups, really) requests a staffer solely dedicated to the SAV Workgroup. Alternatively, funding should be funneled to each workgroup chair's agency to support a technical position meant specifically to assist with CBP Workgroup-related activities. This would facilitate effective workplan progress but also establish an incentive for agencies to participate in CBO Workgroup and Goal Team leadership.

3. Based on the red/yellow/green analysis of the actions described in your logic and action plan, summarize what you have learned over the past two years of implementation.

Summarize overall (not per action) what you have learned about what worked and what didn't work. For example, have you identified additional factors to consider or filled an information gap?

1. Support efforts to conserve and restore current and future underwater grass habitat and habitat conditions in the Chesapeake Bay;

Over time, modest improvements in water quality led to the expansion of SAV throughout the tidal fresh, oligo, and mesohaline portions of the Bay (and in some years, the polyhaline). With dramatic improvements in water quality, eelgrass may prove resistant to increased temperatures. With dramatic reductions in N, P, and TSS loads, CB SAV in general will have a better chance of withstanding symptoms of climate change. Less N, P, and loose sediments on the ground in the watershed mean less in the water when it rains.

2. Protecting existing and recovering underwater grasses in the Chesapeake Bay;

We did not have time to address the recommendations made in the SAV regulatory review, but many of our regulations relate to shallow water use conflicts, which we are addressing. There are regulations that need to be changed or at least tightened up to reduce the unnecessary removal of SAV for recreational navigation. The conversation about aquaculture and SAV conflicts need to continue until a resolution is identified (more research necessary). Research is also necessary to assess the impacts of clam dredging near SAV protection zones. Finally, additional research is necessary, and some of it underway, to determine the impact of living shorelines on SAV and to determine the potential for SAV restoration at living shoreline sites to reduce the number of permit applications denied on account of

SAV presence. This is primarily an issue when the property owner is encouraged to improve a bulkhead or riprap revetment, rather than install a living shoreline.

3. Restoring underwater grasses in the Chesapeake Bay;

Small-scale (<1 acre) SAV restoration efforts were largely successful in the years of SAV expansion prior to 2020, indicating that when WQ is sufficient for natural recovery, restoration practitioners should take advantage of the conditions. In 2021, SAV restoration efforts appear to have been unsuccessful (in Maryland), indicating that restoration projects should not be attempted when water quality is degraded. This is in line with earlier findings following large-scale CB SAV restoration efforts and STAC's review of SAV restoration practices in Chesapeake Bay. Methods to collect, process, and store seeds of various common Bay species, however, have improved and are included in the SAV restoration protocol developed with GIT funding. Riverkeeper and watershed groups are eager to participate in restoration efforts, so all attempts should be made to collaborate on projects with them when and if conditions improve.

4. Enhancing underwater grass research and monitoring in the Chesapeake Bay watershed; and

Over the past two years, much has been learned to enhance SAV monitoring in the Bay. Access to high resolution, commercial-grade satellite imagery has the potential to increase the long-term sustainability of our Bay-wide SAV monitoring program. Additionally, although somewhat hindered by Covid, the CB SAV Watcher program continues to expand and the incorporation of volunteer scientists into the world of SAV monitoring is proving to be a legitimate means of crowd-sourcing SAV data. With that said, although much of the program is conducted by the watershed and Riverkeeper groups involved, additional resources and staff support will be necessary in the future to continue coordination of the program, recruitment of volunteers and organizations, and data management.

Likewise, there is extensive interest in the SAV Sentinel Site program and a plethora of groups that are interested and willing to adopt a site or sites. Additional support would accelerate the timeline to getting this program implemented.

Regarding SAV research, SAV Workgroup partners continue to excel in their fields and have made significant contributions to SAV science recently. Most notably, the importance of large, dense SAV beds in buffering the effects of Chesapeake Bay acidification were described in a 2020 paper by Su et al.

That said, many questions have arisen over the last few years that should be prioritized. An example is the role of fresh and brackish water SAV species in carbon sequestration. More is known about the role of true seagrasses in carbon sequestration than of fresh and brackish water species, and for Chesapeake Bay SAV restoration efforts to be considered in the blue carbon market, more research is necessary on the topic.

5. Enhancing citizen involvement, public education and outreach in the watershed.

Citizen involvement, public education, and outreach in the watershed are vital to SAV recovery and the SAV Workgroup has taken steps to move each forward. The Chesapeake Bay SAV Watcher Program has taught us that volunteer-based SAV monitoring programs are a viable means of collecting species and other detailed information for SAV and SAV habitat. The data collected has been reviewed and used to answer questions about aerial survey imagery and to locate potential SAV donor beds for restoration projects. Further, the Riverkeeper and watershed groups involved in program have found that it's a successful means of bringing in additional volunteers and engaging the public about Bay issues. Especially during Covid, people were looking for opportunities with watershed groups and the SAV Watcher program provided those opportunities while simultaneously teaching participants about the Bay and collecting critical data. During a recent SAV Watcher Train the Trainer event, two staff

educators from Baltimore County Public Schools attended and got their certification. They plan to run workshops with other teachers as well as students.

The Community Based Social Marketing project that the SAV and Communications Workgroups conducted with Action Research was insightful as well. We learned that waterfront property owners have a very mixed response to the presence of SAV along their shoreline, and that there are age groups that should be targeted for social marketing efforts. Specifically, older homeowners and homeowners that have owned their property for longer tend to appreciate the presence of SAV as a sign of recovering Bay health, whereas younger property owners and those who have more recently purchased their property see SAV as an impediment to recreational opportunities. Consequently, property owners should be engaged for different purposes. It would be more appropriate for younger property owners to receive informational brochures or handouts, whereas older property owners may be willing to serve as Bay ambassadors that will place signs in their yard promoting SAV positive slogans.

During the next iteration of the SAV Workgroup workplan, implementation of the recommendations from the CBSM project should be included, and it may be worth going for the next round of GIT funding to fund the implementation.

4. Based on what you have learned through this process and any new developments or considerations described in response to question #2, how will your work change over the next two years? If we need to accelerate progress towards achieving our outcome, what steps are needed and, in particular, what specific actions or needs are beyond the ability of your group to meet and, therefore, you need the assistance of the Management Board to achieve?

Describe any adaptations that may be necessary to achieve your outcome more efficiently and explain how these changes might lead you to adjust your Management Strategy (if significant) or the actions described in column four of your Logic & Action Plan. What new science, fiscal, and policy-related information, could be recommended or pursued over the next two years to maintain or, if needed, accelerate progress? Use the SPURR model described in question #2, to provide detail to the needed steps and actions.

We are now significantly behind on SAV restoration and meeting the 2025 target is highly unlikely. We learned that during "normal years" only modest improvements in water quality are necessary to spark a resurgence of SAV in areas where some SAV has persisted and where seed sources are available. In "extreme years" however, continued recovery is extinguished and loss of SAV is the result. More extreme years are predicted under a changing climate. Since global action is necessary to reverse symptoms of climate change, the Bay Program and partnering states must lead the way in fighting climate change and climate adaptation. All of the obvious steps need to be taken to reduce emissions. Regarding climate adaptation, we need to reduce N, P, and TSS to the extent necessary to accommodate the changing climatic and weather patterns. Significantly improving water quality and clarity in the polyhaline portion of the Bay is the only hope in saving the Bay's eelgrass populations. Even if we were to import more heat-tolerant eelgrass plants from North Carolina where thriving populations still exist, those plants are adapted to clear water and would not survive the lower Bay's turbid conditions.

N, P, and TSS reductions are the domain of the WQ GIT; the SAV Workgroup cannot directly affect that change. We will, however, support the WQ GIT in any way possible.

Regarding direct SAV restoration, efforts were highly successful during the years when SAV was expanding throughout the Bay. Based on that, the SAV Workgroup contracted Green Fin Studios to develop an SAV restoration protocol and technical guidance document so that more groups and agencies could properly participate in the effort. Since SAV has crashed the last two years, however, there is concern about releasing the protocol once it's complete and published. We are considering holding it until conditions improve and SAV begins to rebound again. There's concern that already stressed beds will be over-exploited for seeds and that efforts will fail, leading to a distrust of the guidance. Alternatively, we could release the document with a warning that conditions need to improve significantly prior to restoration efforts and encourage partners to spend the time between now and then reviewing the protocol and setting up the lab space and tanks that will be necessary to process seeds when appropriate.

The Blue Carbon Market is another area of interest and over the next several years, the SAV Workgroup needs to learn more about engaging in the market and work with the states (Maryland in particular, Virginia is already there) to pass legislation that would allow our participation. This will require collaboration with the Climate Resiliency Workgroup and outside partners such as The Nature Conservancy. There are also specific research needs related to participation in the Blue Carbon Market – specifically the role of fresh and brackish water SAV species in carbon sequestration. This research is beyond the scope of a GIT-funded project, I believe, but should be a priority research topic among SAV Workgroup members and partners.

There were action items in the 2020-2021 SAV Logic and Action table that were not completed. Some of these actions are still a priority and will be bumped to the next iteration, but some may be removed due to an anticipated lack of resources. For example, action 4.1.b was to create a searchable database of Chesapeake Bay-based SAV research. This would be useful for SAV Workgroup members to stay on top of current efforts, not participate in redundant efforts, and to assist prioritizing of research needs. Unfortunately, however, the time it would take to create such a database proved too much and it's not a high priority among already over-taxed SAV Workgroup members, especially if funding isn't available to complete the task. Other action items, such as determining the habitat trade-off value of Ruppia vs. Zostera are still a priority. Some aspects of this question will be answered in research currently being conducted at VIMS, but some aspects of the question will remain.

5. What steps are you taking, or do you recommend, to ensure your actions and work will be equitably distributed and focused in geographic areas and communities that have been underserved in the past?

Currently, no steps are being taken to ensure our actions and work will be equitably distributed and focused in geographic areas and communities that have been underserved in the past. By the nature of SAV habitat requirements, it is found in shallow near-shore areas and along waterfront property, which is typically owned by more affluent populations.

The SAV Workgroup could, however, engage more underrepresented people and communities in SAV research, monitoring and outreach efforts. Unfortunately, many areas where underserved communities live are plagued by poor water quality conditions (WQ GIT) and the SAV Workgroup would be reluctant to encourage in-water restoration or monitoring efforts in those areas. The SAV Workgroup will engage the Stewardship and Diversity Workgroups to explore ideas and options for improving our efforts on this front. Another possible group to engage would be the Public Access team. We would like to encourage underserved community participation in our SAV Watcher Program, but to get on the water, you need either private access and a boat (waterfront property and a small motorboat or kayak) or public access and a boat. If a community doesn't have easy access to the water and a means to enjoy it, it's not likely they'll be jumping through hoops to get out and collect SAV data.