FALL QUARTERLY MEETING – November 1, 2022

Chesapeake Bay Program

Submerged Aquatic Vegetation

Brooke Landry
Maryland DNR and
Chair, SAV Workgroup

Through the Chesapeake Bay Watershed Agreement*, the Chesapeake Bay Program has committed to…*

Goal: ***Vital Habitats***

Outcome:

Sustain and increase the habitat benefits of SAV in the Chesapeake Bay. Achieve and sustain the ultimate outcome of 185,000 acres of SAV Bay-wide necessary for a restored Bay. Progress toward this ultimate outcome will be measured against a target of 90,000 acres by 2017 and 130,000 acres by 2025.

What is our Progress?

67,470 acres of SAV in 2021

- 52% of the 2025 target of 130,000 acres
- 36% of the ultimate 185,000-acre goal

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The Submerged Aquatic Vegetation (SAV) Outcome is off course. Gains from 2020 to 2021 are positive, indicating an on-course trajectory, but these gains don't yet offset the recent major declines of underwater grasses observed in 2019. Additional years of positive trajectory will help clarify whether this recent gain in 2021 is the start of a new positive trend toward higher levels of SAV across the Bay, but it is unlikely that the 2025 goal of 130,000 acres will be reached.

https://www.chesapeakeprogress.com/abundant-life/sav

Note: All four Salinity Zones increased from 2020-2021.

Chesapeake Bay SAV Abundance 1984-2021

CBP Strategy Review System
SAV Management Strategy and Logic and Action Table/2-Year Workplan 2022-2023

Chesapeake Bay Program
Science, Restoration, Partnership

Submerged Aquatic Vegetation Outcome
Management Strategy
2015–2025, v.4

Water stargrass (Heteranthera dubia) in the clear waters of the upper Potomac River, Maryland on July 28th, 2019. (Photo by Brooke Landry/Maryland Department of Natural Resources)

I. Introduction

Submerged aquatic vegetation (SAV), or underwater grasses, provide significant benefits to aquatic life and serve critical functions in the Chesapeake Bay ecosystem. Underwater grasses provide food, habitat and nursery grounds for a number of commercially and ecologically important finfish and shellfish, such as striped bass and blue crabs, and migratory waterfowl. They reduce erosion by slowing currents and softening waves, anchor bottom sediments and help keep the water clear by absorbing nutrients and trapping sediments. Through photosynthesis, underwater grasses act as a carbon sink by taking in carbon dioxide. This contributes to the reduction of greenhouse gas emissions and reduces the potential for climate change impacts. Likewise, underwater grasses also produce oxygen, which helps sustain other aquatic life. Increasing the abundance of underwater grasses in the Bay and its rivers will dramatically improve the entire Bay ecosystem.

BIENNIAL STRATEGY REVIEW SYSTEM
Chesapeake Bay Program

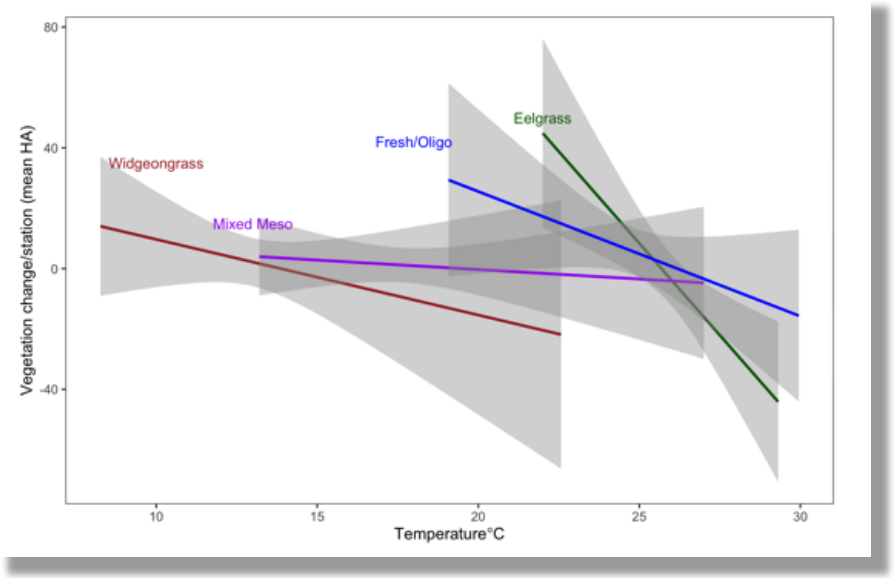
Logic and Action Plan: Post-Quarterly Progress Meeting

Submerged Aquatic Vegetation – 2022-2023

Long-term Target: Achieve and sustain the ultimate outcome of 185,000 acres of SAV Bay-wide; 130,000 acres by 2025
Two-year Target: To reach our 2025 goal of 130,000 acres, baywide SAV should increase by 16,000 acres per year. By 2023, we hope to achieve 98,000 acres of SAV, but a short-term target is not officially defined.

Factor	Current Efforts	Gap	Actions	Metrics	Expected Response and Application	Learn/Adapt
What is impacting our ability to achieve our outcome?	*What current efforts are addressing this factor?*	*What further efforts or information are needed to fully address this factor?*	*What actions are essential (to help fill this gap) to achieve our outcome?*	*What will we measure or observe to determine progress in filling identified gap?*	*How and when do we expect these actions to address the identified gap? How might that affect our work going forward?*	*What did we learn from taking this action? How will this lesson impact our work?*
Factor 1. Habitat Condition and Availability: SAV requires suitable water quality and clarity to recover and thrive as well as suitable shallow-water habitat in which to expand.	**Effort 1.1** The Bay TMDL was established to limit the amount of N, P and TSS entering the Chesapeake Bay. Reductions in N, P and TSS improve water clarity, which allows SAV to recover.	**Gap 1.1** Although SAV throughout the Bay has been shown to respond to improvements in water quality, it is also susceptible to degradation of water quality, particularly when impacted by multiple stressors, which we observed	**Action 1.1a** [Support WQ GIT in their efforts to improve water quality through the Bay TMDL and achieve water clarity/SAV standards in areas designated for SAV use.]	**Metric 1.1a** Acres of SAV mapped (Bay-wide aerial survey)	**Response 1.1a** Further improvements in water clarity will greatly affect the ability of SAV populations in the Bay to gain or maintain resilience against climate stressors; benefits of improved water	

2021 GIT-Funded Project



Modeling Climate Impacts on SAV in Chesapeake Bay

- STAR/SAV Workgroup Collaboration
- Contracted to VIMS (Chris Patrick's team is lead) with sub-contract to Jon Lefcheck at SERC.
- Standby for Marc Hensel's presentation later for updates.

This project is addressing the role of climate stressors on Chesapeake Bay SAV, including warming temperatures, rising sea levels, chronic low oxygen concentrations, and increased runoff driven by greater precipitation and more frequent, intense storm activity.

2022 GIT-Funded Project Lead: SAV Workgroup

$85,000
18 months

Determining the local effect of flow/stormwater runoff on SAV density and acreage and options for targeting watershed BMPs that protect priority SAV areas.

Proposed Project Outcomes

Best Management Practices (BMPs) are generally implemented in specific watershed areas to address pollutant concerns with the end-goal of an improvement in water quality (reduction of N, P, TSS) and alleviation of the specified concern(s). Watershed BMPs broadly associated with submerged aquatic vegetation (SAV) recovery are by-and-large seen as tangentially beneficial through potential improvements in water quality. Historically, BMPs have not been implemented specifically with SAV restoration, recovery, and conservation/protection in mind. This project will identify high-priority SAV protection 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 using GIS spatial analysis/modelling and existing SAV, flow, land-use, and water quality data. With this information at hand, efforts could target specific areas of the Bay and its tributaries for BMP implementation that would specifically prioritize the protection of SAV habitat in that area

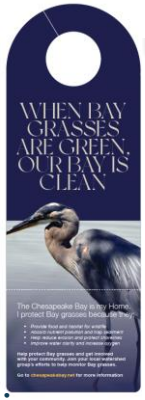
2022 GIT-Funded Project Lead: Comms Workgroup

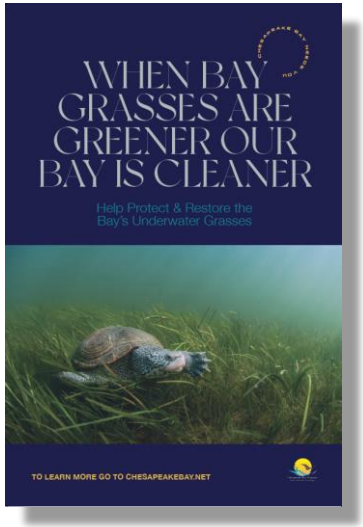
Advancing Social Marketing Through Three Pilot Programs

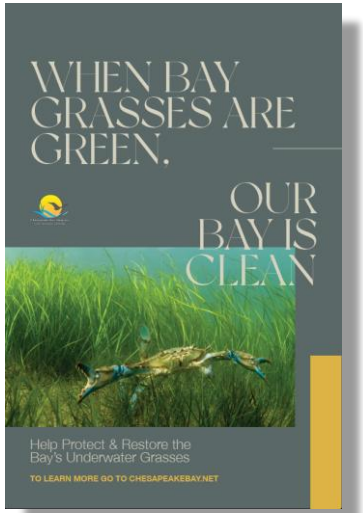
Proposed Project Outcomes

This project will develop pilot programs for three existing community-based social marketing (CBSM) campaigns that have been developed over the past few years, SAV being one.

Behavior Change Training and SAV Pilot Implementation sought to understand how shoreline property owners perceive and make decisions about SAV adjacent to their property. Background research was completed, including a survey of shoreline property owners and a literature review. The research determined that the behavior to focus on was to encourage homeowners not to disturb their SAV. Marketing materials were developed but the project did not include a strategy for implementation.







Chesapeake Bay SAV Monitoring webpages are live on www.chesapeakebay.net

Chesapeake Bay SAV Monitoring: A 3-Tiered Hierarchical, Integrated and Coordinated Monitoring Approach

WHAT WE DO > PROGRAMS & PROJECTS > MONITORING

SAV Monitoring Program

The Chesapeake Bay Program takes an integrated, three-tiered approach to monitoring Submerged Aquatic Vegetation.

SAV Monitoring Program

- SAV Monitoring Program
- Tier I: Chesapeake Bay-wide Aerial Survey
- Tier II: Chesapeake Bay SAV Watchers Program
- Tier III: SAV Sentinel Site Program

Programs & Projects

- Modeling
- Monitoring

Tier I: Chesapeake Bay-wide Aerial Survey

Since 1984, the Chesapeake Bay Program has worked with the Virginia Institute of Marine Science (VIMS) to conduct an annual, Bay-wide aerial SAV survey. The data collected are used to report SAV acreage and density throughout the Bay and its tidal tributaries.

TIER I **Aerial Survey** SPECIFIC 1

WHO IS MONITORING?	YEAR STARTED	LOCATION
Virginia Institute of Marine Science (VIMS)	1984	Bay-wide

PURPOSE? Tracking progress towards SAV restoration goals

WHAT PARAMETERS ARE MONITORED? SAV acreage and density

Tier II: Chesapeake Bay SAV Watchers

Volunteer scientists observe and report SAV habitat characteristics (e.g., species present, Secchi depth, sediment type) at sites throughout the Bay and its tributaries. These data are useful for a broad-scale condition assessment and for identifying and quantifying cause-effect relationships.

TIER II **SAV Watchers** MORE SPECIFIC

WHO IS MONITORING?	YEAR STARTED	LOCATION
Watershed monitoring groups and volunteers	2019	Tributaries throughout the Chesapeake Bay

PURPOSE? Ground-truthing aerial survey data | Broad scale condition assessments | Identifying and quantifying driver-response relationships

WHAT PARAMETERS ARE MONITORED? SAV species composition and total density | Presence/absence of seeds, flowers, epiphytes and filamentous macroalgae | Indications of human impacts, water column and Secchi depth | Sediment type and shoreline type

Tier III: Chesapeake Bay SAV Sentinel Site Program

A detailed, long-term SAV data collection effort at several representative locations throughout the Bay and its tidal tributaries. These data help identify causal relationships by monitoring drivers of change, ecosystem responses, and ecological processes.

TIER III **SAV Sentinel Site Program** MOST SPECIFIC

WHO IS MONITORING?	YEAR STARTED	LOCATION
Chesapeake Bay Program SAV workgroup and partners	2022	~20 representative sites throughout the Bay

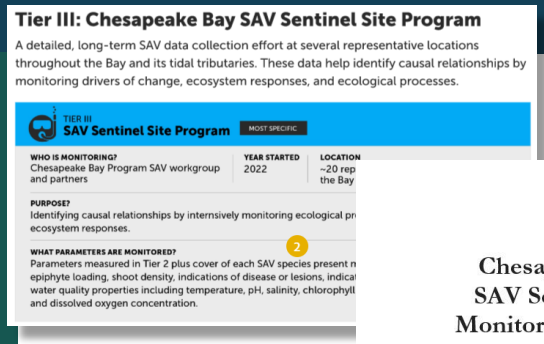
PURPOSE? Identifying causal relationships by internsively monitoring ecological processes, drivers of change and ecosystem responses.

WHAT PARAMETERS ARE MONITORED? 2

Parameters measured in Tier 2 plus cover of each SAV species present macroalgae, canopy height, epiphyte loading, shoot density, indications of disease or lesions, indications of herbivory, biomass and water quality properties including temperature, pH, salinity, chlorophyll a, turbidity/total suspended solids and dissolved oxygen concentration.

https://www.chesapeakebay.net/what/programs/monitoring/sav-monitoring-program

SAV Sentinel Site Program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TIER III
SAV Sentinel Site Program MOST SPECIFIC

WHO IS MONITORING?	YEAR STARTED	LOCATION
Chesapeake Bay Program SAV workgroup and partners	2022	~20 rep the Bay

PURPOSE?
Identifying causal relationships by intensively monitoring ecological pr ecosystem responses.

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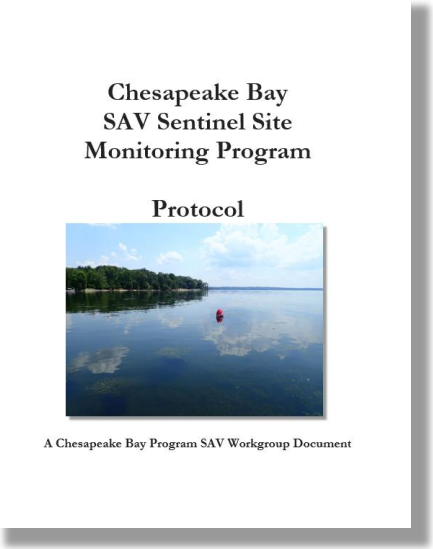

Chesapeake Bay
SAV Sentinel Site
Monitoring Program

Protocol

A Chesapeake Bay Program SAV Workgroup Document

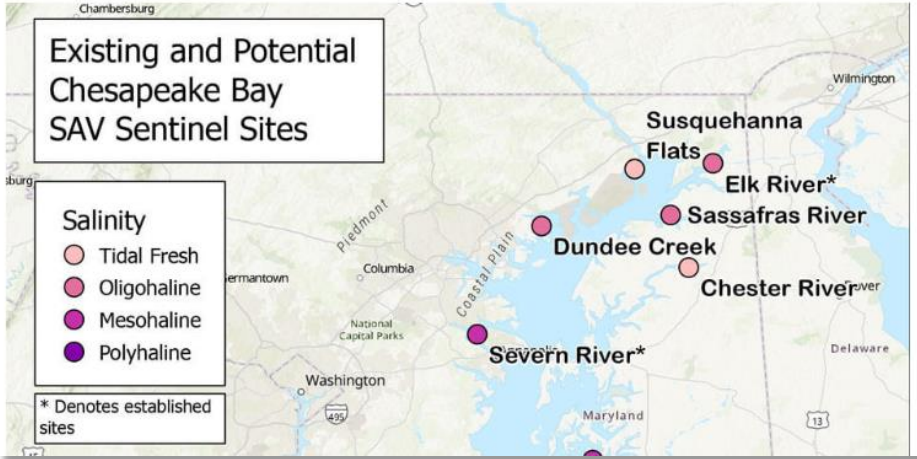
Who wants to adopt a site for 2023?

Tier III: SAV Sentinel Site Program

The SAV Sentinel Site Program is a monitoring effort conducted by Bay scientists

What is the Chesapeake Bay SAV Sentinel Site Program?

The Chesapeake Bay SAV Sentinel Site Program forms the third tier of the Chesapeake Bay SAV Monitoring effort. SAV sentinel sites are located in each of the Bay's four salinity zones (tidal fresh, oligohaline, mesohaline and polyhaline) and are monitored using a standardized, in-depth data collection protocol. These sentinel sites are a combination of existing, long-term sites and new sites where Bay scientists monitor changes in SAV habitat characteristics and resilience indicators. This program is coordinated by the Bay Program's SAV Workgroup. If you are interested in adopting and managing an SAV Sentinel Site, contact the program coordinator at brooke.landry@maryland.gov.



https://www.chesapeakebay.net/what/programs/monitoring/sav-monitoring-program

Chesapeake Bay SAV Watchers Program

Chesapeake Bay SAV WATCHERS

Chesapeake Bay SAV Watchers – Tier 2 Participation

SHORERIVERS

Havre de Grace MARITIME MUSEUM and Environmental Center

James River ASSOCIATION

SRA Severn River Association
America's Oldest River Group

Magothy River Association
Saving our river for future generations

THE GUNSTON SCHOOL 1911 CENTREVILLE, MD

TEAM BCPS Baltimore County Public Schools
Raising the bar. Closing gaps. Preparing for our future.

Arundel Rivers FEDERATION

Chesapeake Bay National Estuarine Research Reserve Maryland
Using Sound Science...Finding Solutions...Promoting Wise Decisions

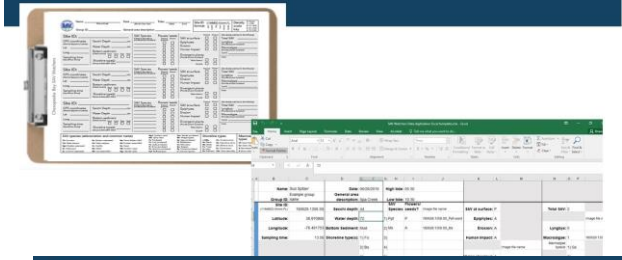
Chesapeake Bay SAV Watchers

Chesapeake Bay SAV Watchers is a program to provide volunteer scientists with an engaging and educational experience with submerged aquatic vegetation (SAV) while also generating useful data for Bay scientists and managers.

This is the first official SAV monitoring program for volunteer scientists developed by the Chesapeake Bay Program.

www.chesapeakebaysavwatchers.com

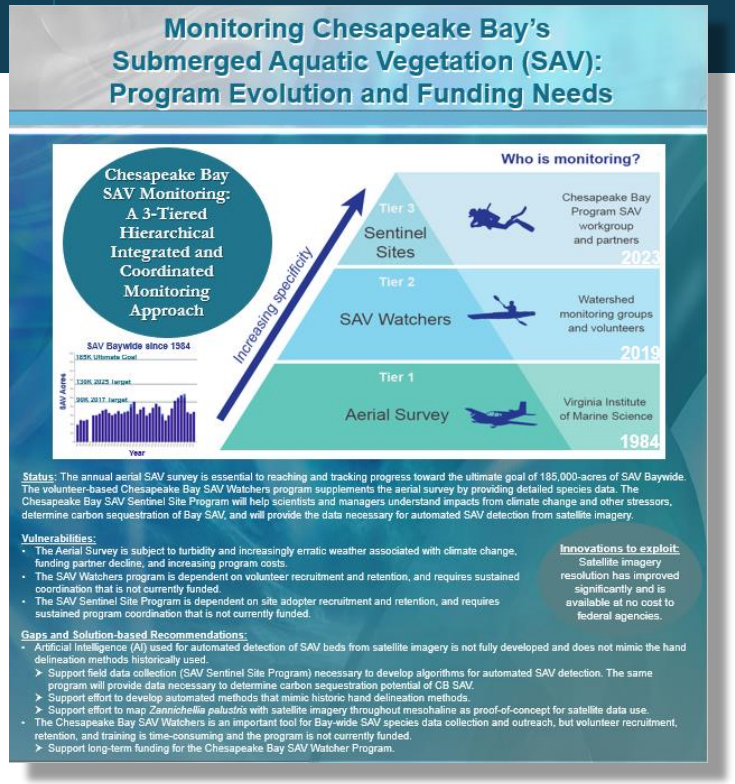
Standardized datasheet and digitization template



"Train the trainer" certification events offered each summer

www.chesapeakebaysavwatchers.com

PSC Report and Recs



Gaps and Solution-based Recommendations:

- AI used for automated detection of SAV beds from satellite imagery is not fully developed and does not mimic the hand delineation methods historically used.
  - ➢ Support field data collection (SAV Sentinel Site Program) necessary to develop algorithms for automated SAV detection. The same program will provide data necessary to determine carbon sequestration potential of CB SAV.
  - ➢ Support effort to develop automated methods that mimic historic hand delineation methods.
  - ➢ Support effort to map *Zannichellia palustris* with satellite imagery throughout mesohaline as proof-of-concept for satellite data use.
- The CB SAV Watchers is an important tool for Bay-wide SAV species data collection and outreach, but volunteer recruitment, retention, and training is time-consuming and the program is not currently funded.
  - ➢ Support long-term funding for the Chesapeake Bay SAV Watcher Program.

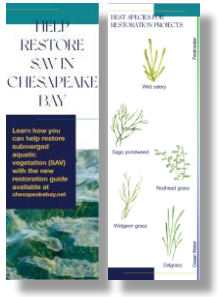
SAV Workgroup and STAC Workshops

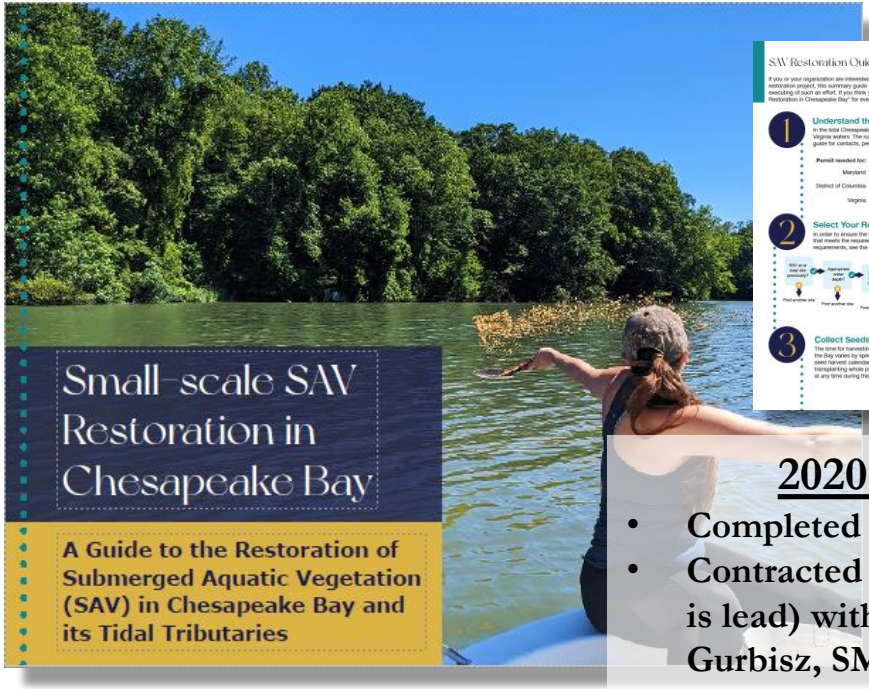
1. **Rising Watershed and Bay Water Temperatures—Ecological Implications and Management Responses**

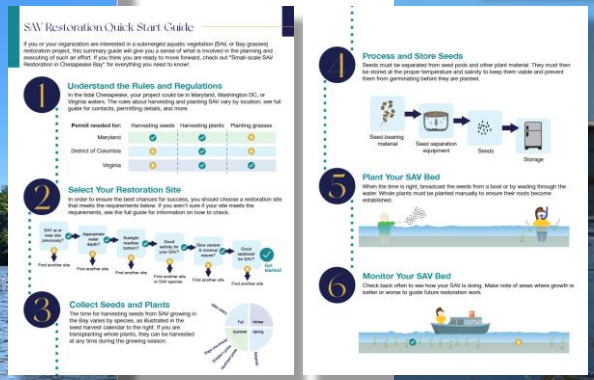
2. **Advancing Monitoring Approaches to Enhance Tidal Chesapeake Bay Habitat Assessment including Water Quality Standards for Chesapeake Bay Dissolved Oxygen, Water Clarity/SAV and Chlorophyll *a* Criteria**

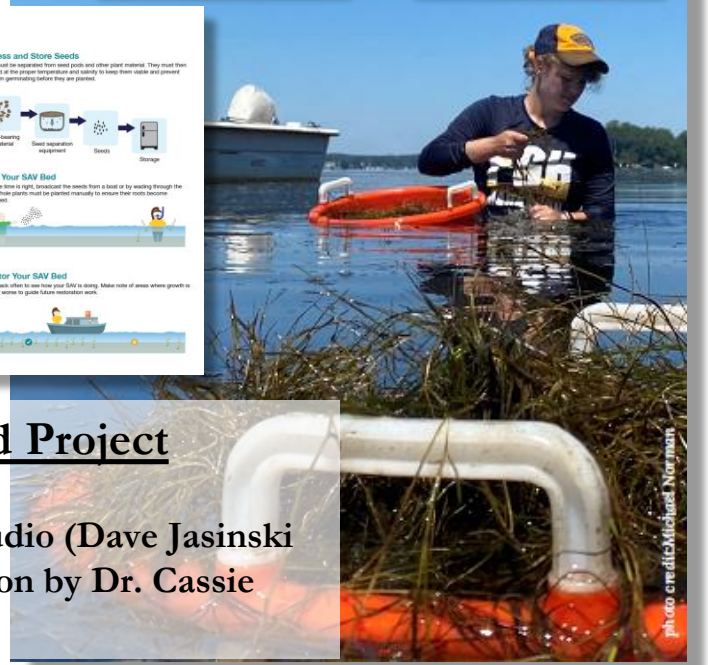
3. **Evaluating a Systems Approach to Wetland Crediting**

SAV Restoration Guide and associated outreach materials







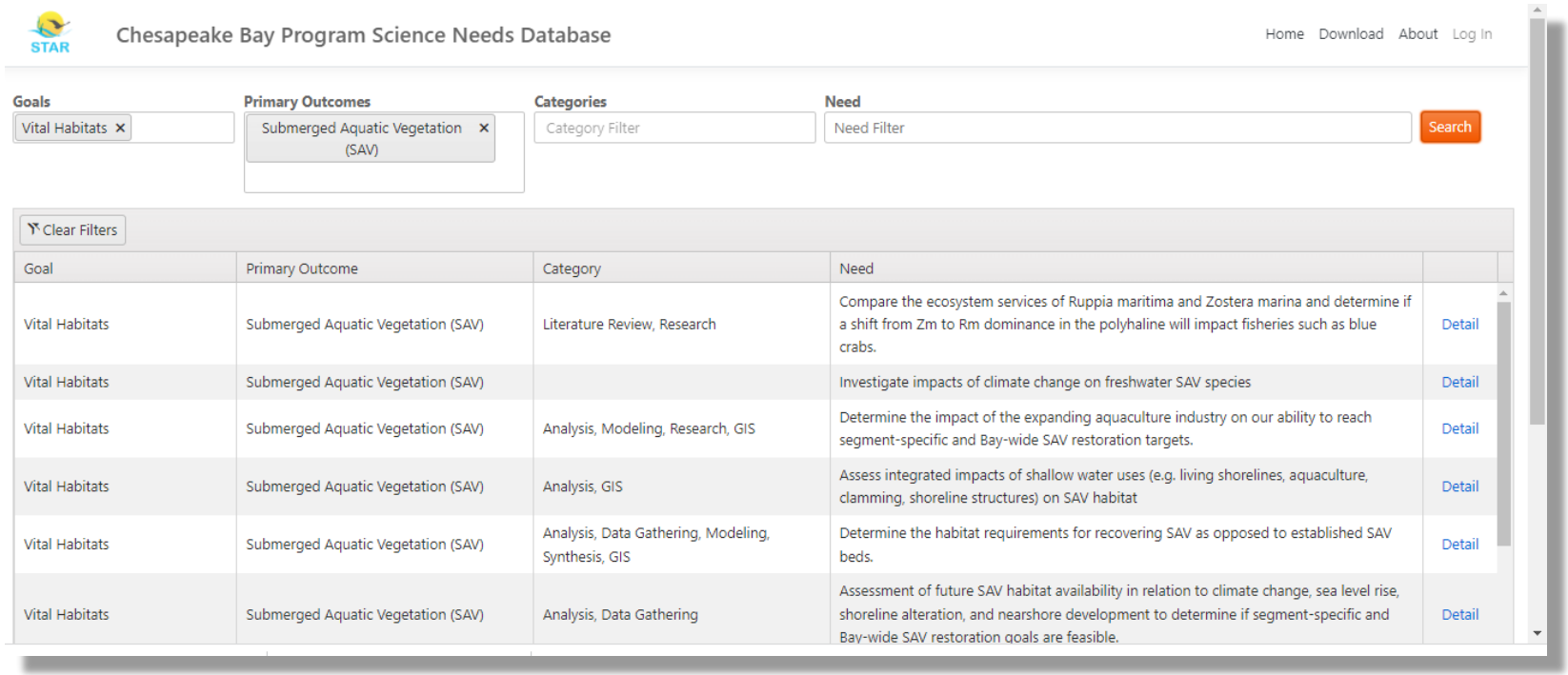


2020 GIT-Funded Project

- Completed December 2021
- Contracted to Green Fin Studio (Dave Jasinski is lead) with SAV consultation by Dr. Cassie Gurbisz, SMCM.

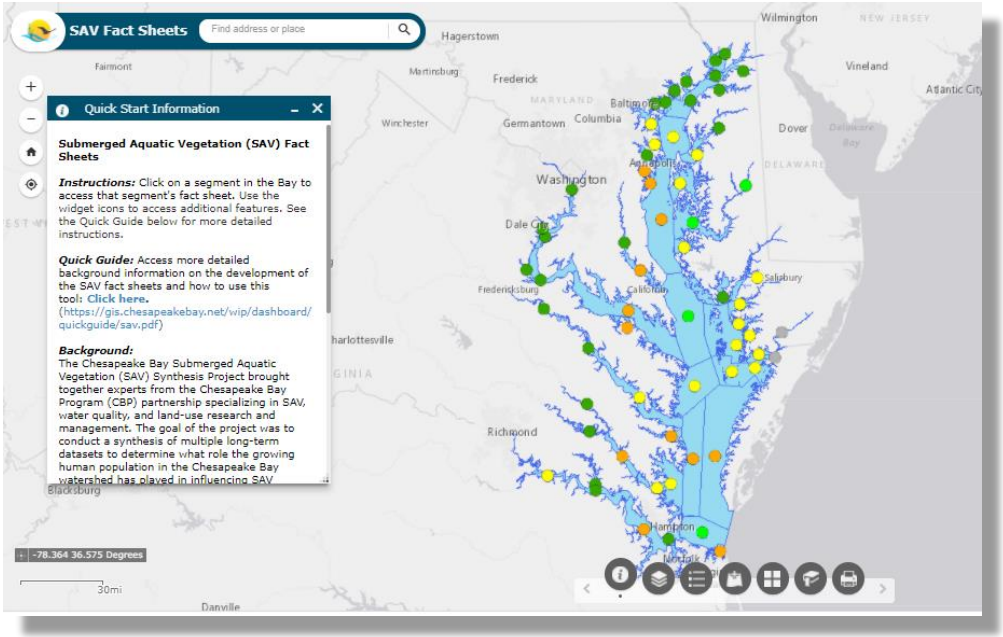
Science and Research Needs

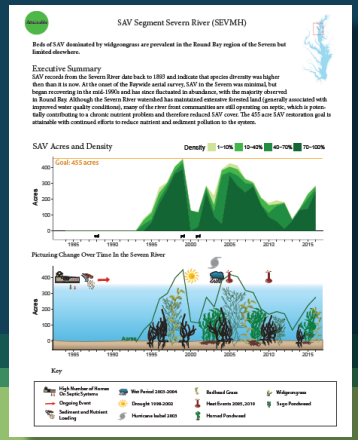
https://star.chesapeakebay.net/#



Goal	Primary Outcome	Category	Need	
Vital Habitats	Submerged Aquatic Vegetation (SAV)	Literature Review, Research	Compare the ecosystem services of Ruppia maritima and Zostera marina and determine if a shift from Zm to Rm dominance in the polyhaline will impact fisheries such as blue crabs.	Detail
Vital Habitats	Submerged Aquatic Vegetation (SAV)		Investigate impacts of climate change on freshwater SAV species	Detail
Vital Habitats	Submerged Aquatic Vegetation (SAV)	Analysis, Modeling, Research, GIS	Determine the impact of the expanding aquaculture industry on our ability to reach segment-specific and Bay-wide SAV restoration targets.	Detail
Vital Habitats	Submerged Aquatic Vegetation (SAV)	Analysis, GIS	Assess integrated impacts of shallow water uses (e.g. living shorelines, aquaculture, clamming, shoreline structures) on SAV habitat	Detail
Vital Habitats	Submerged Aquatic Vegetation (SAV)	Analysis, Data Gathering, Modeling, Synthesis, GIS	Determine the habitat requirements for recovering SAV as opposed to established SAV beds.	Detail
Vital Habitats	Submerged Aquatic Vegetation (SAV)	Analysis, Data Gathering	Assessment of future SAV habitat availability in relation to climate change, sea level rise, shoreline alteration, and nearshore development to determine if segment-specific and Bay-wide SAV restoration goals are feasible.	Detail

SAV Syn Segment Descriptions




SAV Segment Severn River (SEVMH)

Beds of SAV dominated by widgeongrass are prevalent in the Round Bay region of the Severn but limited elsewhere.

Executive Summary

SAV records from the Severn River date back to 1860 and indicate that species diversity was higher then than it is now. At the onset of the Baywide aerial survey, SAV in the Severn was minimal, but began recovering in the mid-1960s and has since fluctuated in abundance, with the majority observed in Round Bay. Although the Severn River watershed has maintained extensive forested land (generally associated with improved water quality conditions), many of the river front communities are still operating on septic, which is potentially contributing to a chronic nutrient problem and therefore reduced SAV cover. The 455 acre SAV restoration goal is attainable with continued efforts to reduce nutrient and sediment pollution to the system.

SAV Acres and Density

Density 1-10% 10-40% 40-70% 70-100%

Goal: 455 acres

Acres

Picturing Change Over Time In the Severn River

Key

- [Data Dashboard: https://gis.chesapeakebay.net/sav/](https://gis.chesapeakebay.net/sav/)
- [VIMS maps: https://www.vims.edu/research/units/programs/sav/access/maps/index.php](https://www.vims.edu/research/units/programs/sav/access/maps/index.php)
- [CAST: https://cast.chesapeakebay.net/Home/TMDLTracking#SAVReportsSection](https://cast.chesapeakebay.net/Home/TMDLTracking#SAVReportsSection)

World Seagrass Conference 2022 & International Seagrass Biology Workshop 14

Annapolis, MD
August 7th – 12th, 2022

- 250 guests from over 20 countries
- 14 Sessions
- 13 Workshops
- 7 Fieldtrips
- 4 Plenaries
- 1 Poster Session
- 13 Student Travel Awards
- ALL THE FUN!

isbw14.org

Questions?