SAV Workgroup Winter 2024 UPDATES
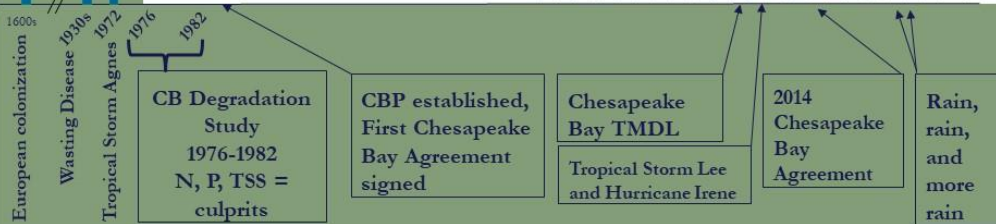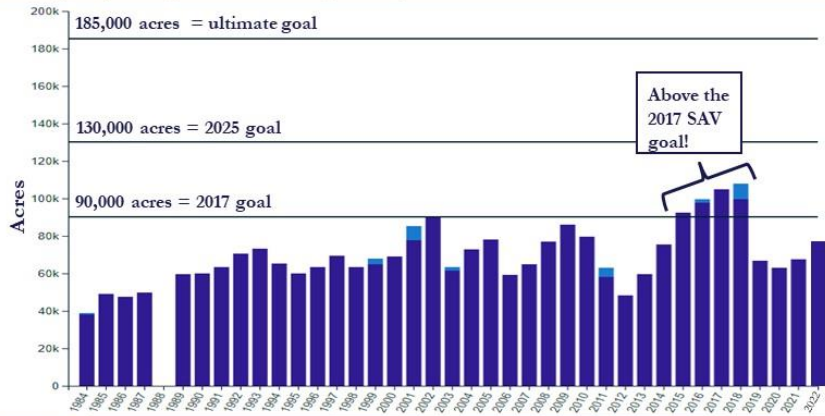
Goal: *Vital Habitats*

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.
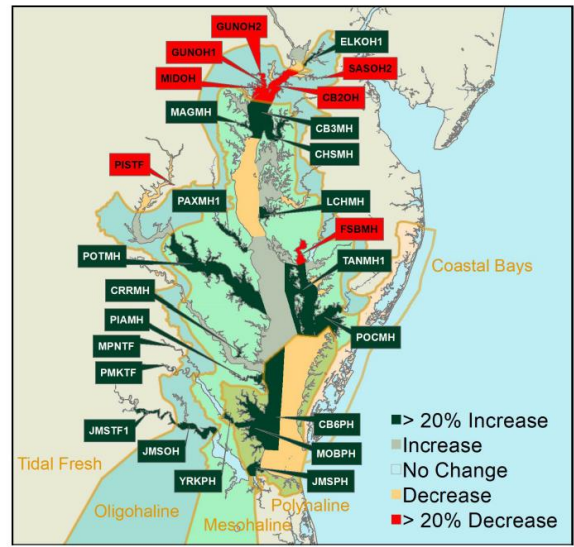
What is our Progress?

Final SAV #s were up in 2022:
- 77,425 acres were mapped in 2022 (+13.8%)
- This is 60% of the 2025 target and 42% of the ultimate 185,000-acre outcome.

Progress towards the Bay-wide SAV goal

Submerged Aquatic Vegetation Abundance (1984-2022)

185,000 acres = ultimate goal
130,000 acres = 2025 goal
90,000 acres = 2017 goal

Above the 2017 SAV goal!

European colonization | Wasting Disease 1930s | Tropical Storm Agnes 1972 | 1976 | 1982

CB Degradation Study 1976-1982 N, P, TSS = culprits

CBP established, First Chesapeake Bay Agreement signed

Chesapeake Bay TMDL
Tropical Storm Lee and Hurricane Irene

2014 Chesapeake Bay Agreement

Rain, rain, and more rain

https://www.vims.edu/research/units/programs/sav/access/maps/index.php

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

CBP Strategy Review System
SAV Management Strategy and Logic and Action Table/2-Year Workplan
–
SRS process ran October – March 2024
2024-2025 (V. 5)Updated Management Strategy and SAV Workplan available soon.

https://www.chesapeakebay.net/who/group/submerged-aquatic-vegetation-workgroup

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Submerged Aquatic
Vegetation Outcome
Management Strategy
2015–2025, v.5

Chesapeake Bay Program
Science. Restoration. Partnership.

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.

1

SAV Workgroup Action Plan
2024-2025

Management Approach 1: Support Efforts to Conserve and Restore Current and Future SAV Habitat and SAV Habitat Conditions.

1.a 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.

- **What are the steps needed for this action?** WQ Management Action 1: Enhance monitoring; Work with Bay states to support implementation of BMPs, encourage enhancement of TMDL.
- **Who are the responsible parties?** Bay States, Water Quality GIT, SAV Workgroup
- **What is the impacted geographic location?** Chesapeake Bay and Chesapeake Bay Watershed
- **What is the expected timeline for completion?** 2025 for this workplan; On-going
- **What are the goals or metrics you will use to determine the impact of your action?** Nutrient and sediment load reductions; water clarity standards attainment; Acres of SAV mapped.
- **How will we collect and assess the data that we want to monitor, how will we use the data, and how will we communicate the results?** Water quality monitoring; annual Bay-wide SAV Survey; CBP communications team; Bay states communication teams
- **How do we expect the action to fill the priority factor or gap? What do you expect to happen when the action is completed?** Further improvements in water clarity will greatly affect the ability of SAV populations in the Bay to gain or maintain resilience against climate stressors. SAV is heavily dependent on sufficient water quality for growth; improved water quality will support SAV expansion and goal attainment.

1.b Determine the local effect of flow/stormwater runoff on SAV density and acreage and options for targeting BMPs that would protect priority SAV areas. This is a current SAV Workgroup GIT-funded project contracted to Tetra Tech for completion.

- **What are the steps needed for this action?** Tetra Tech will follow the protocol established in the project QAPP and Scope of Work.
- **Who are the responsible parties?** Tetra Tech (contractor for project), SAV Workgroup (Technical lead on project; Project Steering Committee members), CBP Modeling Team (Steering Committee members), BMP experts (Steering Committee members)
- **What is the impacted geographic location?** Chesapeake Bay and Chesapeake Bay Watershed
- **What is the expected timeline for completion?** This project will be completed in 2025.
- **What are the goals or metrics you will use to determine the impact of your action?** Completed project determining the local effect of flow/runoff on SAV density and acreage and proposed options for targeting BMPs that would protect priority SAV areas.
- **How will we collect and assess the data that we want to monitor, how will we use the data, and how will we communicate the results?** The results of this study will be

https://www.chesapeakebay.net/who/group/submerged-aquatic-vegetation-workgroup

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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."

This tier-3 monitoring effort would not only monitor the impacts of climate change on the functional value of shallow water habitats throughout the Bay but also track the effectiveness of measures taken beyond 2025.

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Management Board: Go forth and Explore the Possibilities

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Step 1: Conduct a STAC Workshop to determine where to place the Sentinel Sites and what parameters to include (ie. toxins, benthos, fish and shellfish, SAV, WQ measurements, etc.). This step would also identify which CBP Workgroups and Goal Teams would be included in this 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.

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2024 Call for STAC Workshop Proposals

- **Funding announcement end of March**

- **We will invite many of you to participate in the workshop if funded**

Chesapeake Bay Shallow Water Habitat Sentinel Site Program Development
Proposal for a Programmatic STAC Workshop
Submitted by the CBP's Submerged Aquatic Vegetation (SAV) Workgroup
February 14th, 2024

We propose a Programmatic STAC Workshop to explore the development of a Chesapeake Bay Shallow Water Sentinel Site Program. The program would monitor climate impacts on the functional value of shallow water habitats in Chesapeake Bay as well as the effectiveness of management measures taken by the Chesapeake Bay Program (CBP) partnership beyond 2025 as a focus on shallow water habitat restoration is emphasized. The Chesapeake Bay Program Management Board is in support of this effort and has directed the Submerged Aquatic Vegetation (SAV) Workgroup and Habitat Goal Implementation Team (HGIT) to take the initial steps necessary to determine what a Shallow Water Habitat Sentinel Site Program would entail and if its implementation would be feasible.

Background
As the CBP partnership approaches 2025, a number of small teams, workshops, reviews, and reports have been undertaken or are underway to evaluate Chesapeake Bay restoration progress to date, address successes and failures, and design a path toward Bay recovery *Beyond 2025*. Three reports in particular are relevant to this workshop proposal: Rising Watershed and Bay Water Temperatures— Ecological Implications and Management Responses (Batiuk et al., 2023), *A Comprehensive Evaluation of System Response* (CESR, STAC 2023), and Enhancing the Chesapeake Bay Program Monitoring Networks: A Report to the Principals' Staff Committee (CBP, 2022). Together, these reports highlight and emphasize the importance of maintaining and expanding restoration and monitoring efforts in Chesapeake Bay to accelerate recovery and track impacts associated with climate change, particularly in shallow water habitats. One specific recommendation in the monitoring report to the Principals' Staff Committee was to fund the SAV Sentinel Site Program to improve understanding of SAV habitat response to shifting conditions and management actions.

The SAV Sentinel Site Program is the third and most detailed tier of a hierarchical monitoring approach employed by the CBP's SAV Workgroup to monitor SAV in Chesapeake Bay. Partially implemented in 2023, the SAV Sentinel Site Program was designed to monitor twenty sentinel sites distributed throughout the four salinity regimes of the Bay. Development of the SAV Sentinel Site Program happened concurrently with the other CBP partnership efforts identified above and consequently, **the benefits and necessity of expanding the SAV Sentinel Site Program into a comprehensive Shallow Water Habitat Sentinel Site Program emerged.** Rather than concentrating solely on SAV, this comprehensive effort would monitor multiple living resources and water quality measures as well as climate impacts on the functional value of shallow water habitats in Chesapeake Bay. The program would also serve to monitor the effectiveness of measures taken by the Partnership beyond 2025 as focus on shallow water habitat restoration is emphasized.

Incorporating a Shallow Water Habitat Sentinel Site Program into the Chesapeake Bay monitoring effort is essential to outcomes within the partnership. The purpose of sentinel site monitoring is to systematically observe and gather data from specific locations (sentinel sites) to track changes, assess environmental conditions, and provide early warning signals for potential issues. Sentinel site monitoring serves as a proactive and systematic approach to understanding, managing, and preserving ecosystems. By focusing on specific locations with known significance or vulnerability, these monitoring programs contribute to environmental conservation, research, and informed decision-making. Sentinel site monitoring can serve various purposes depending on the context, but common objectives include:

1. **Early Detection of Changes**: Sentinel sites are strategically chosen to represent key ecosystems or areas vulnerable to specific threats or changes; early detection of changes in environmental parameters, such as land use changes, water quality, habitat health, or biodiversity, allows for timely intervention and management.
2. **Monitoring Trends and Patterns**: By consistently collecting data from sentinel sites over time, trends and patterns in environmental conditions can be identified; understanding long-term changes helps researchers and policymakers make informed decisions about conservation, restoration, or mitigation strategies.
3. **Indicator of Ecosystem Health**: Sentinel sites often serve as indicators of overall ecosystem health; changes observed at these sites can reflect broader shifts in ecological conditions, providing valuable insights into the well-being of the larger ecosystem.
4. **Research and Scientific Study**: Sentinel site monitoring provides valuable data for scientific research and studies; researchers can use the collected information to analyze ecological processes, study the impact of human activities, and advance scientific understanding of ecosystems.
5. **Risk Assessment and Management**: Identifying changes or abnormalities at sentinel sites helps assess potential risks to ecosystems and biodiversity; this information is crucial for developing management strategies and implementing measures to mitigate or prevent negative impacts.

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Step 4: Implement the Shallow Water Habitat Sentinel Site Program as a CBP and partner effort.

2024 GIT Funding

The newly updated Chesapeake Bay Program GIT Funding Competition is now accepting proposals for projects that will support Workgroup Outcomes. We strongly urge each Workgroup submit their top funding request(s).

Historically, projects requested between $50k-100k, but there is no official minimum nor maximum limit as to how much funding can be requested. Funding decisions will be made by EPA Leadership and ultimately, by the CBPO Director, Martha Shimkin (EPA).

The FY2023 process has been simplified to seven criteria that must be addressed for each project proposal. These questions can be found below:

1. Brief description of project, including key tasks
2. Targeted audience/user base
3. 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?*)
4. Identification of (any) cross-GIT application(s)
5. Intended results
6. Projected budget
7. What other funding sources have been pursued for the project (if any)

==If you are interested in pursuing a GIT Funding project:== Interested Parties will work with their Workgroup Chairs (**Brooke Landry & Becky Golden**) to submit their proposal ideas to Lucinda Powers (Chief of the CBP's Partnerships & Accountability Branch), and Lee McDonnell (Acting CBP Deputy Director and Chief of the CBP's Science, Analysis & Information Branch). The deadline for submissions is COB April 8th.

If you are interested in pursuing a GIT Funded Project, let your Workgroup Chairs (Brooke Landry, brooke.landry@maryland.gov; Becky Golden, rebecca.golden@maryland.gov) and Staffer (Dede Lawal, lawal.dede@epa.gov) know as soon as possible so that we can support you in this effort. The above proposal information (addressing the 7 questions) must be submitted to your Workgroup Chairs and Staffer by COB Monday, April 8th.

Following the April 8th deadline, the Habitat GIT Co-Chairs, **Bill Jenkins & Gina Hunt**, will submit the completed project proposal to EPA Leadership by COB April 14th.

Science and Research Needs: More on this later

https://star.chesapeakebay.net/#

Protecting Chesapeake Bay SAV Given Changing Hydrologic Conditions: Priority SAV Area Identification and Solutions Development

Project Objective

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 using GIS spatial analysis/modeling and existing SAV, flow, land-use, and water quality data. With this information, steps can be taken to target high-priority SAV areas for implementation of BMPs and land management policies that will protect or restore those priority SAV habitats.

Contracted to: Tetra Tech
- Steering committee has been identified and had their first meeting
- Bob Murphy, Tetra Tech, will present on project and progress later this morning

2022 GIT-Funded Project Lead: Comms Workgroup

Advancing Social Marketing Through Two Pilot Programs

Proposed Project Outcomes
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

Four SAV Watcher Trainer Certification Events planned for 2024:
Marshy Point Nature Center - Havre de Grace maritime Museum
Accokeek Foundation at Port Tobacco - ShoreRivers

Chesapeake Bay SAV Watchers Program
(program dev for this was also GIT-funded)

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

Chesapeake Bay SAV Watchers – Tier 2 Participation
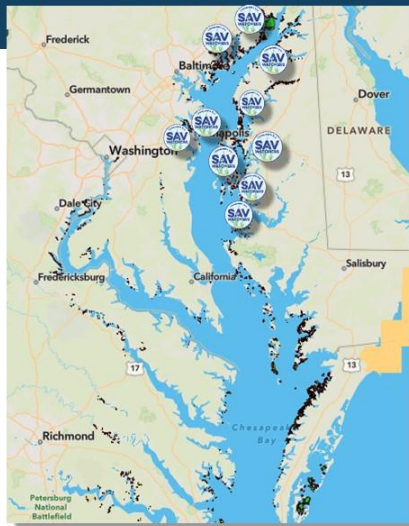
Standardized datasheet and digitization template
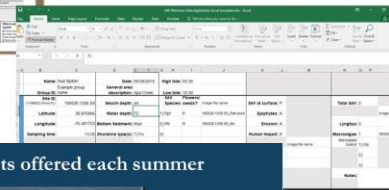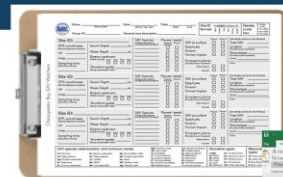
"Train the trainer" certification events offered each summer

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

New app:
ArcGIS Survey123

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

SAV Sentinel Site Program – continuing in 2024!

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 intensively monitoring ecological processes, drivers of change and ecosystem responses.

WHAT PARAMETERS ARE MONITORED?
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.

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.

Sites that will be installed and monitored in 2024:
- Severn River
- Susquehanna Flats
- Smith Island
- Marshy Creek
- Dundee Creek
- St. Mary's
- VIMS sites
- CB- NERR sites

Chesapeake Bay
SAV Sentinel Site
Monitoring Program

Protocol

A Chesapeake Bay Program SAV Workgroup Document

Existing and Potential Chesapeake Bay SAV Sentinel Sites

Salinity
- ○ Tidal Fresh
- ○ Oligohaline
- ● Mesohaline
- ● Polyhaline

* Denotes established sites

Susquehanna Flats
Elk River*
Sassafras River
Dundee Creek
Chester River*
Severn River*

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

PSC Report and Recommendations - Funding for two topics allocated.

Monitoring Chesapeake Bay's Submerged Aquatic Vegetation (SAV): Program Evolution and Funding Needs
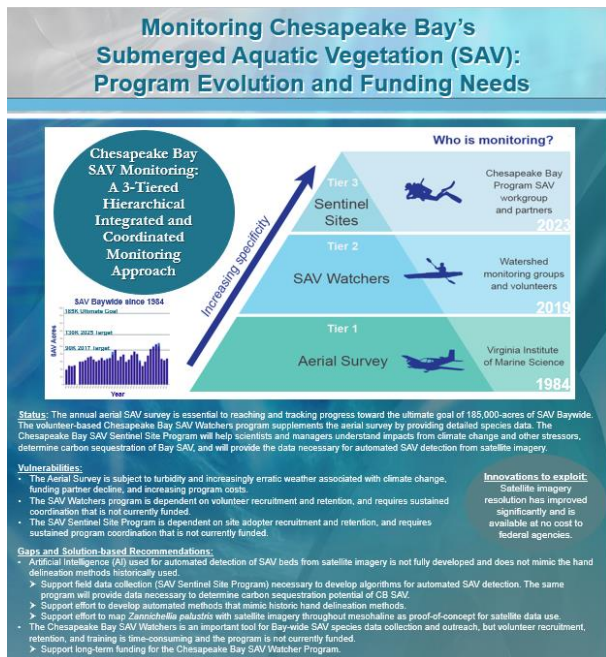
RFP #1 will: Support effort to develop automated methods that mimic historic SAV bed delineation methods for aerial imagery. Will also support effort to map *Zannichellia palustris* with satellite imagery throughout mesohaline as proof-of-concept for satellite data use. **This RFP was awarded to Old Dominion University based on their expertise in satellite-based mapping and algorithm development.**

RFP #2 will: Support long-term funding for the Chesapeake Bay SAV Watcher Program...data entry portal and management, program coordination, etc. This RFP is being developed and will be posted later this fall.

Upcoming NOAA Funding Opportunity

National Marine Fisheries Service Transformational Habitat Restoration and Coastal Resilience Grants
                -closes November 17, 2023

2023 Inflation Reduction Act Climate Ready Workforce for Coastal and Great Lakes States, Tribes, and Territories Initiative
                -closes November 30, 2023

Coastal Habitat Restoration and Resilience Grants for Underserved Communities
                -closes December 19, 2023

NOAA Funding Opportunity

(funding announcement likely in June)

Proposal 1:

RESTORE AMERICA'S ESTUARIES

Infrastructure and Capacity Building for Transformational Submerged Aquatic Vegetation Restoration in the Mid-Atlantic United States

Funding Stream: NOAA Transformational Habitat Restoration and Coastal Resilience Grants

Budget Requested: $13,874,547 over 5 years

Submerged aquatic vegetation (SAV) habitat is in crisis globally due to pressure from human development along our coasts and degraded water quality. Due to the ecosystem services that SAV provides, however, its recovery is a priority and steps must be taken to accelerate SAV recovery both locally and nationally.

Restore America's Estuaries (RAE) and its partners propose to enhance SAV restoration capacity throughout the Mid-Atlantic by leveraging substantial existing infrastructure to develop SAV nurseries and seed processing facilities, forge strategic partnerships with the aquaculture industry, conduct direct SAV restoration, develop and implement an SAV restoration training and certification program, and develop accessible SAV lesson plans and community outreach products. Together these project components will significantly enhance the capacity for SAV restoration throughout the mid-Atlantic and serve as an example for SAV restoration efforts nationally.

Map legend:
▲ Non-Profit Organization ▲ State Government
▲ University/Institution ▲ Company
▲ Tribe ● Restoration Site

Map labels: MD, NJ, Barnegat Bay, Delaware Bay, Inland Bays, VA, Chesapeake Bay, York River, James River, Albemarle Sound, NC, Pamlico Sound, Neuse River

Key Benefits	Program Partners	
• Build SAV Nurseries and Seed Processing Centers throughout the Mid-Atlantic	**Primary**	**Supporting**
• Expand SAV Restoration Capacity through Aquaculture Industry Partnership	• Tetra Tech • Maryland Department of Natural Resources	• Delaware Center for Inland Bays • Delaware State University • Ferry Cove Oyster Hatchery • Green Fin Studios
• Conduct Direct, Transformative SAV Restoration to Enhance Coastal Climate Resiliency		• Maryland Coastal Bays Program • Mattaponi Indian Tribe and Reservation • Old Dominion University • Smithsonian Environmental Research Center
• Establish an SAV Restoration Training and Certification Program		• St. Mary's College of Maryland • Stockton University • University of Delaware and Delaware Sea Grant • University of North Carolina Wilmington
• Develop K-12 Lesson Plans and Community Outreach Product		• Virginia Institute of Marine Science • Virginia Institute of Marine Science CB NERR • Waterkeepers Chesapeake

Restore America's Estuaries (RAE) is a national leader in the protection and restoration of our nation's estuaries and bays. RAE has over 25 years of experience managing complex programs on behalf of federal agencies, public/private partnerships, corporations and foundations.

Proposal 2: HEAT

Helping Eelgrass Adapt to Temperature – this project will conduct common garden experiments with eelgrass from NC to ME, facilitating the migration of more heat tolerant plants northward.
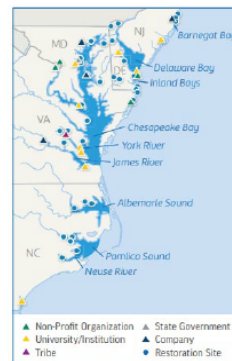
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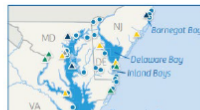
Session, Abstract, and Poster Proposals are due March 15th!

2024 COASTAL & ESTUARINE SUMMIT

HOSTED BY RESTORE AMERICA'S ESTUARIES

October 6-10, 2024   **Washington, D.C. Region**

https://estuaries.org/2024-rae-summit/

East Coast SAV Collaborative

~

Co-chairs:
Brooke Landry, Md DNR
Jessie Jarvis, UNCW
Elizabeth Lacey, Stockton U.

The goal for this collaborative is to bring together experts in SAV research and management from each of the U.S. East Coast states from NC to ME to share ideas and information, provide training and resources, and collaborate on efforts that bring actionable science to the forefront of our SAV management strategies.

Upcoming East Coast SAV Collaborative Meetings:

- **SAV and Aquaculture:** April 26th, 10am - 1pm
- www.eastcoastsavcollaborative.com

Winter 2024 Science and Research Needs Update

CB SAV Science Needs Google Form and Responses

Chesapeake Bay SAV Workgroup Science Needs_2024 Update

Hello hello SAV Workgroup members!

Please review the following list of SAV science and research needs and in your best professional opinion, indicate whether that need is a 3 (High), 2 (Medium), or 1 (Low) Priority at this time. Other responses for each science need listed include "In progress, not complete" and "We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future." I know, I know, that selection is lacking commitment, but are we ever really just finished with a topic? None of the questions are required, so if you are completely unfamiliar with the state of the science on a topic and have no clue how important it is, just skip it. Likewise, there are three questions at the bottom of the list that will allow you to write in any additional SAV science needs that you may consider important. If you add any additional needs, please say whether you think they're high, medium, or low priority.

Thanks everyone! Please complete this form by March 6th so that I can tally responses in time for the March 13th SAV Workgroup Meeting.

brooke.landry@maryland.gov Switch account

* Indicates required question

Email *

Your email

Name *

Your answer

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.

20 responses
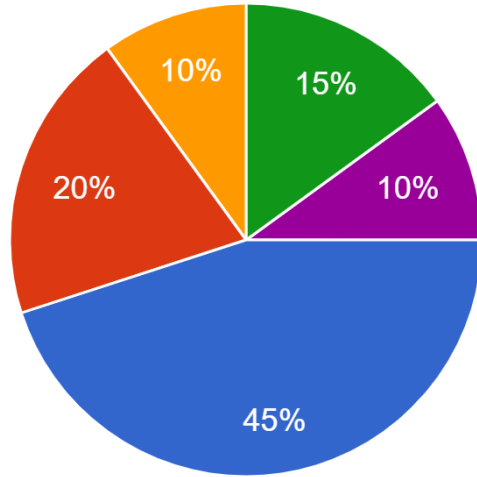
- 🔵 3
- 🔴 2
- 🟠 1
- 🟢 In progress, not complete.
- 🟣 We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

We have a decent handle on how climate change is going to impact Zostera and Ruppia, but we don't have as much information on how climate im...reshwater SAV community and individual species.

21 responses

- 🔵 3
- 🔴 2
- 🟠 1
- 🟢 In progress, not complete.
- 🟣 We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

Shallow water use conflicts (e.g. living shorelines, aquaculture, clamming, shoreline structures and hardening, etc.) may ultimately affect our ability to ...itat to determine long-term SAV goal attainability.

22 responses

- ● 3
- ● 2
- ● 1
- ● In progress, not complete.
- ● We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

40.9%

31.8%

9.1%

13.6%

Research is currently being conducted by SAV Workgroup members to determine the impact of the expanding aquaculture industry on SAV habitat but f...t-specific and Bay-wide SAV restoration targets.

22 responses

- 🔵 3
- 🔴 2
- 🟠 1
- 🟢 In progress, not complete.
- 🟣 We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

Our currently established SAV Habitat Criteria were developed based on stable, established SAV beds. Since our goal is based on the recovery of S...ile plants) as opposed to mature SAV plants/beds.
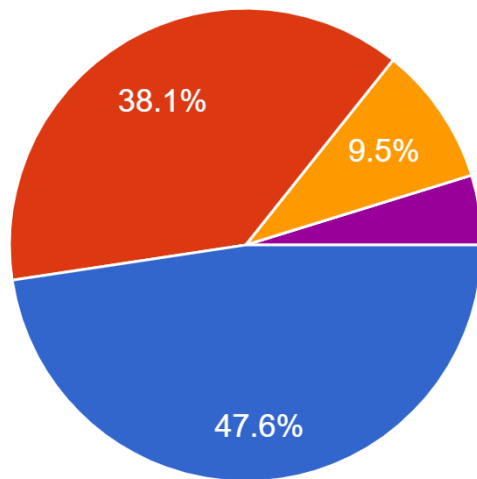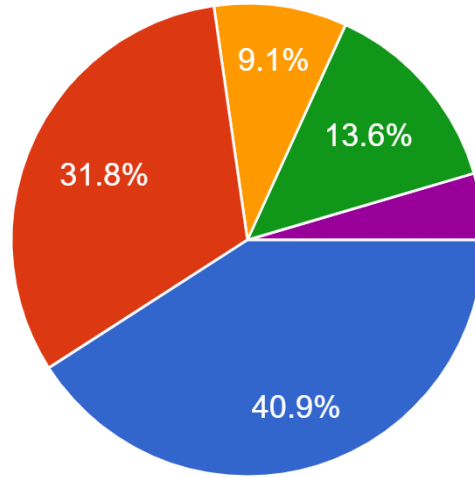
21 responses

- 3
- 2
- 1
- In progress, not complete.
- We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

38.1%

33.3%

23.8%

Two large scale projects, the GIT-funded climate/SAV project conducted by VIMS and the EESLR project conducted by DNR and partners, determined ...nd Bay-wide SAV restoration goals are feasible.

21 responses

- 🔵 3
- 🔴 2
- 🟠 1
- 🟢 In progress, not complete.
- 🟣 We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

Establish a more thorough understanding of climate impacts on SAV biology and ecology in Chesapeake Bay (i.e. are our SAV species flowering e...e shifts occurring based on salinity shifts, etc?)

22 responses

- 🔵 3
- 🔴 2
- 🟠 1
- 🟢 In progress, not complete.
- 🟣 We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

40.9%

22.7%

36.4%

Identify the potential mutualistic relationships between SAV restoration and bivalve (oysters/freshwater mussels) restoration.
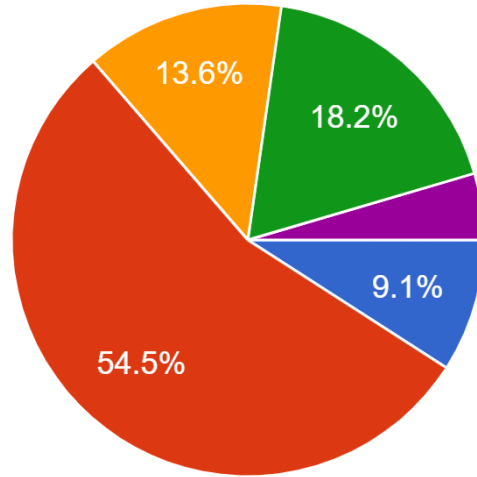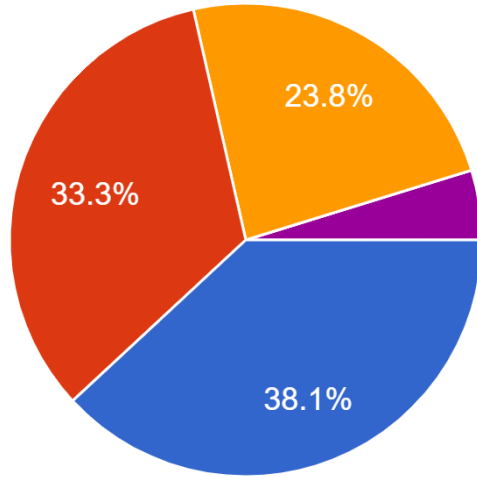
21 responses

- 3
- 2
- 1
- In progress, not complete.
- We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

47.6%

9.5%

9.5%

33.3%

Determine carbon sequestration potential in the three primary SAV communities in Chesapeake Bay (Freshwater SAV, Mesohaline SAV, and Polyhaline SAV).

22 responses

- ● 3
- ● 2
- ● 1
- ● In progress, not complete.
- ● We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

Determine the contribution of Zannichellia palustris (horned pondweed) to baywide SAV totals.
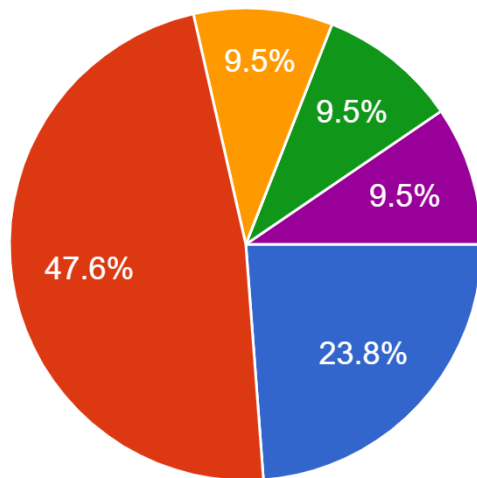
21 responses

- 3
- 2
- 1
- In progress, not complete.
- We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

Conduct the required research to advance the use of satellite imagery in Chesapeake Bay SAV monitoring.
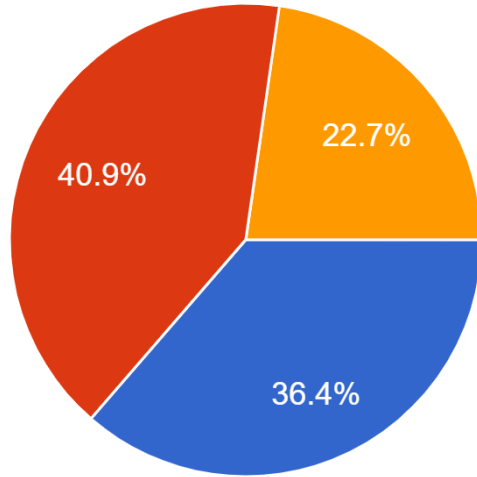
23 responses

- 🔵 3
- 🔴 2
- 🟠 1
- 🟢 In progress, not complete.
- 🟣 We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

Determine potential to restore Zostera populations in the Chesapeake by facilitating the migration of potentially more heat resistant Zostera seeds from North Carolina.

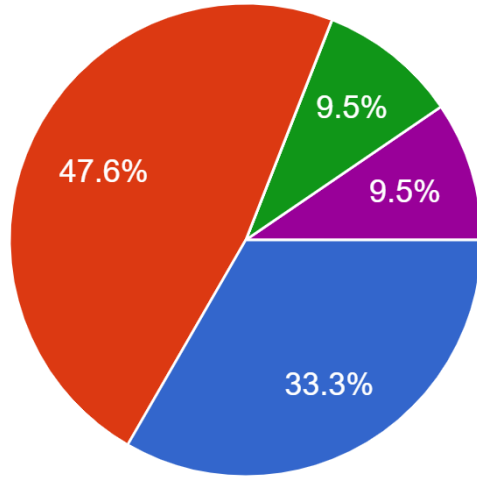21 responses

- 🔵 3
- 🔴 2
- 🟠 1
- 🟢 In progress, not complete.
- 🟣 We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

Increase the capacity to conduct direct SAV restoration throughout the Chesapeake Bay by developing a commercial source of SAV seeds throug...of SAV processing facilities and SAV nurseries.
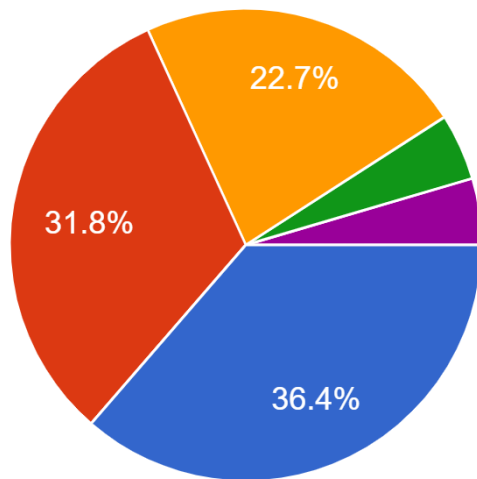
22 responses

- 🔵 3
- 🔴 2
- 🟠 1
- 🟢 In progress, not complete.
- 🟣 We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

Determine the role of microplastics in Chesapeake Bay SAV bed health and how they may be impacting the food web associated with SAV beds.

21 responses

Legend:
- 3
- 2
- 1
- In progress, not complete.
- We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

Pie chart values: 47.6%, 38.1%, 9.5%

What impact does hydraulic clamming and associated impacts have on SAV and potential SAV habitat?
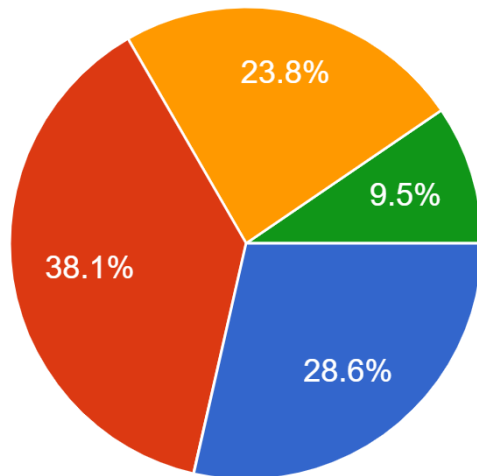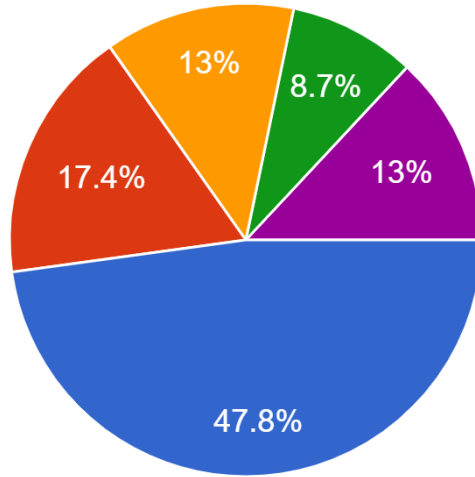
17 responses

Legend:
- 3
- 2
- 1
- In progress, not complete.
- We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

Pie chart values: 17.6%, 23.5%, 23.5%, 35.3%

Assess the impact of living shoreline construction and placement on SAV habitat, as well as identify best practices for the incorporation of SAV restoration efforts into living shoreline designs.
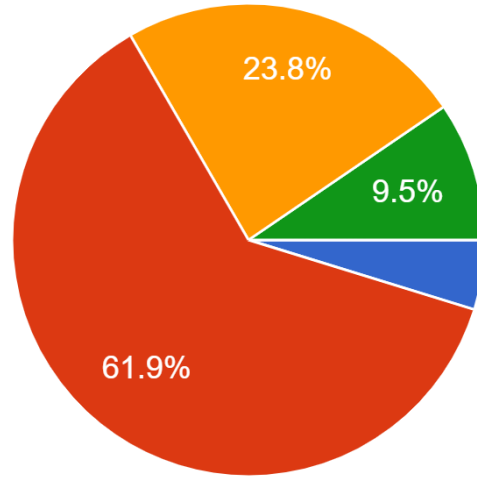
21 responses

- 3
- 2
- 1
- In progress, not complete.
- We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

Determine the Local effect of flow/Stormwater run-off on SAV density and acreages and options for targeting BMPs that would protect priority SAV areas.

17 responses

- 3
- 2
- 1
- In progress, not complete.
- We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

Pie chart values: 35.3%, 29.4%, 17.6%, 11.8%

Conduct further research on fresh and brackish SAV species restoration best practices.
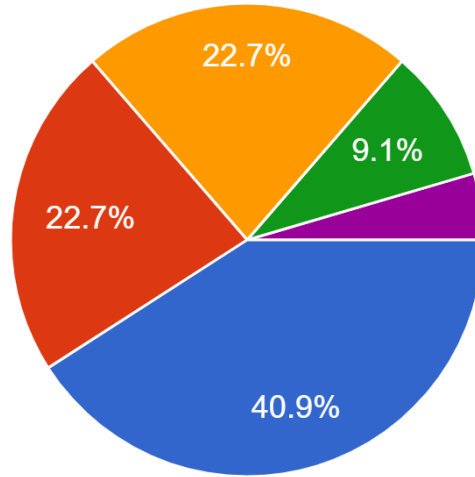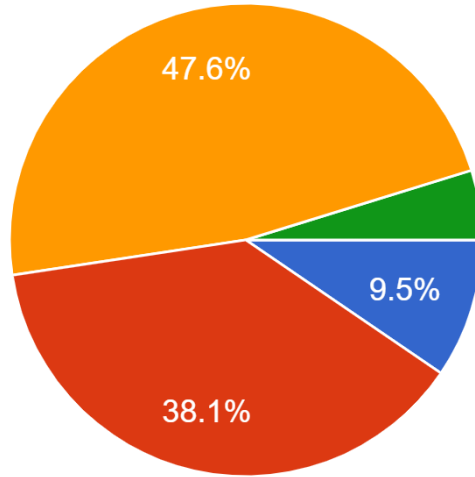
21 responses

- 🔵 3
- 🔴 2
- 🟠 1
- 🟢 In progress, not complete.
- 🟣 We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

Conduct in-situ study of seed-based SAV restoration to better understand the ideal time for seed broadcasting, timing of seed germination and how te... and timing of seeding affects plant recruitment.

22 responses
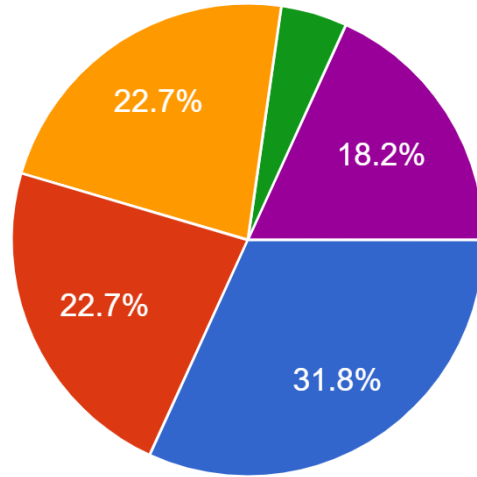
- 🔵 3
- 🔴 2
- 🟠 1
- 🟢 In progress, not complete.
- 🟣 We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

Expand implementation of a Chesapeake Bay SAV Sentinel Site Program throughout the Bay to monitor SAV response to climate change, land use impacts, and management actions.
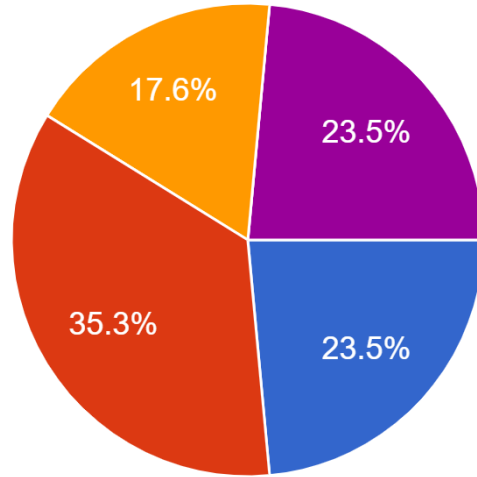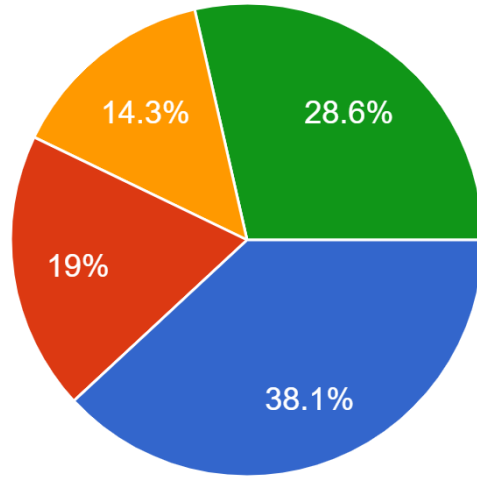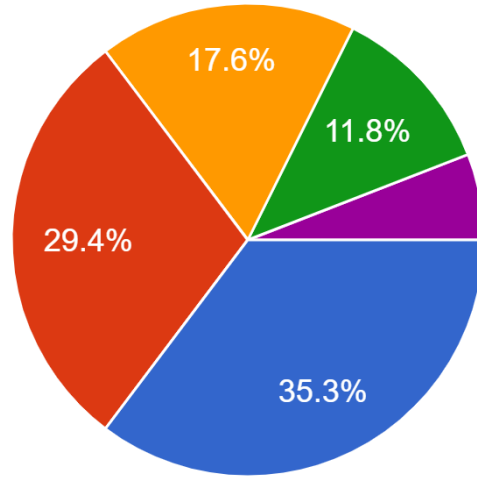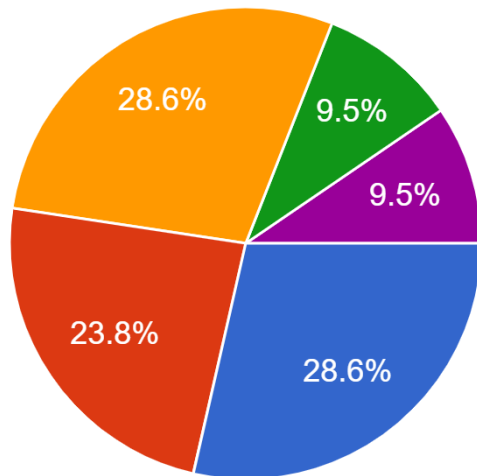
20 responses
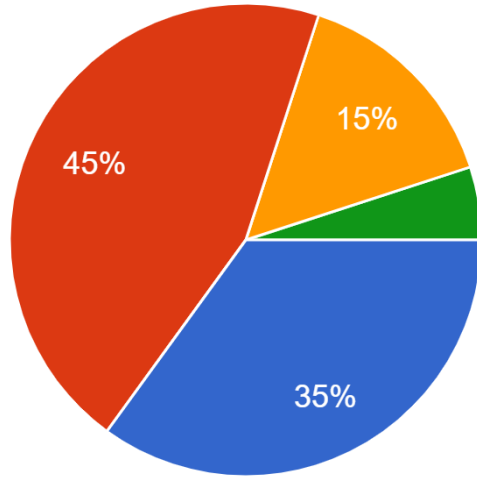
- 🔵 3
- 🔴 2
- 🟠 1
- 🟢 In progress, not complete.
- 🟣 We have enough information on this topic to consider it complete and deprioritize it for now with the understanding that there are elements to the question we don't have all the answers for at this time and may need to revisit in the future

45%
15%
35%

Additional Science Needs Listed on Questionnaire

Are there any additional SAV science needs not mentioned here that we should include. Additional Need #1. Also indicate if this is high, medium, or low priority.

7 responses

Develop a better processed-based model for bay-wide SAV? high-priority

Checking potential for Halodule wrightii to survive in Chesapeake Bay, similarly looking at seed sources of Zostera other than North Carolina. High priority.

Prioritizing species-specific monitoring and research (via expanded Sentinel Sites?!) to detect shifts in SAV species relative abundance and understand the food web structure of each SAV species/dominant community, especially in the productive freshwater areas [Medium priority]

Crab pots and crabbing physical effects on SAV communities

Impacts of benthic filamentous/macroalgae on nutrient cycling and SAV growth.

Valuation of SAV habitat benefits/ecosystem services (in addition to carbon sequestration) in order to better understand habitat trade-offs and ecological uplift of nearshore/shallow water projects #3

How does the diversity of SAV in oligohaline and tidal freshwater areas affect bed resilience and stability?

Additional Science Needs Listed on Questionnaire

Are there any additional SAV science needs not mentioned here that we should include. Additional Need #2. Also indicate if this is high, medium, or low priority.

2 responses

Evaluating impacts of rays on SAV in Chesapeake Bay. Medium Priority.

Jurisdictional review of shallow water SAV designated use criteria in relation to recent SAV acreage data #2

Are there any additional SAV science needs not mentioned here that we should include. Additional Need #3. Also indicate if this is high, medium, or low priority.

2 responses

Evaluating effects of bed stability on carbon sequestration and storage. Medium priority.

Evaluation of recovery trajectories of SAV following maintenance dredging. #3

Averaged and Ranked

Science Need	Average Score 1-3	Rank
Zostera v Ruppia Ecosystem Services and impact of shift on fisheries	2.47	1
Research to advance the use of Satellite data in Bay-wide survey	2.44	2
SAV and bivalve co-restoration advantages	2.41	3
Investigate the impacts of climate change on our freshwater SAV community and individual species.	2.40	4
Assess integrated impacts of shallow water uses (e.g. living shorelines, aquaculture) on SAV habitat to determine long-term SAV goal attainability.	2.39	5
Assess the impact of Living shorelines on SAV	2.33	6
Local effect of stormwater runoff and targeted BMPs for SAV priority beds	2.21	7
Increase SAV Restoration Capacity in CB	2.21	8
Expand implementation of CB SAV Sentinel Site Program	2.21	9
Determine future SAV habitat availability in relation to climate change, sea level rise, shoreline alteration, and nearshore development to determine if SAV restoration goals are	2.18	10
Determine the habitat requirements for recovering SAV (seedlings, juvenile plants) as opposed to mature SAV plants/beds.	2.15	11
Determine carbon sequestration potential in the three primary SAV communities in Chesapeake Bay	2.15	12
Establish a more thorough understanding of climate impacts on SAV biology and ecology in Chesapeake Bay	2.14	13
In situ study of seed based SAV restoration to determine ideal timing for seed broadcasting and other parameters	2.12	14
Impact of hydraulic clamming on SAV and potential SAV habitat.	2.08	15
Determine the contribution of Zannichellia to baywide SAV totals	2.05	16
Conduct further research on fresh and brackish SAV species restoration best practices.	2.00	17
Conduct further SAV/aquaculture research to determine our ability to reach segment-specific and Bay-wide SAV restoration targets.	1.94	18
Determine potential for facilitated migration of Zostera into CB to restore Zm populations	1.79	19
Determine role of microplastics in/on SAV beds	1.60	20

Factors and Gaps ➡ Management Strategies

Factors and Gaps
1. Habitat Condition and Availability
2. Protection of Existing and Recovering SAV
3. SAV Restoration Potential and Activity
4. SAV Research and Monitoring
5. Public Perception, Knowledge, and Engagement

Management Strategies
1. Support Efforts to Conserve and Restore Current and Future SAV Habitat and Habitat Conditions.
2. Protect Existing and Recovering SAV
3. Restore SAV
4. Enhance SAV Research and Monitoring
5. Enhance Community Involvement, Education, and Outreach

Science Need	Average Score 1-3	Rank	Factor/Gap/Approach
Assess integrated impacts of shallow water uses (e.g. living shorelines, aquaculture) on SAV habitat to determine long-term SAV goal attainability.	2.39	5	1 (Habitat Cond and Availability)/2 (Protect SAV)
Assess the impact of Living shorelines on SAV	2.33	6	1 (Habitat Cond and Availability)/2 (Protect SAV)
Local effect of stormwater runoff and targeted BMPs for SAV priority beds	2.21	7	1 (Habitat Cond and Availability)/2 (Protect SAV)
Determine future SAV habitat availability in relation to climate change, sea level rise, shoreline alteration, and nearshore development to determine if SAV restoration goals are feasible.	2.18	10	1 (Habitat Cond and Availability)/2 (Protect SAV)
Impact of hydraulic clamming on SAV and potential SAV habitat.	2.08	15	1 (Habitat Cond and Availability)/2 (Protect SAV)
Conduct further SAV/aquaculture research to determine our ability to reach segment-specific and Bay-wide SAV restoration targets.	1.94	18	1 (Habitat Cond and Availability)/2 (Protect SAV)
SAV and bivalve co-restoration advantages	2.41	3	3 (Restoration)
Increase SAV Restoration Capacity in CB	2.21	8	3 (Restoration)
In situ study of seed based SAV restoration to determine ideal timing for seed broadcasting and other parameters	2.12	14	3 (Restoration)
Conduct further research on fresh and brackish SAV species restoration best practices.	2.00	17	3 (Restoration)
Research to advance the use of Satellite data in Bay-wide survey	2.44	2	4 (Monitoring)
Expand implementation of CB SAV Sentinel Site Program	2.21	9	4 (Monitoring)
Determine the contribution of Zannichellia to baywide SAV totals	2.05	16	4 (Monitoring)
Zostera v Ruppia Ecosystem Services and impact of shift on fisheries	2.47	1	4 (Research)
Investigate the impacts of climate change on our freshwater SAV community and individual species.	2.40	4	4 (Research)
Determine the habitat requirements for recovering SAV (seedlings, juvenile plants) as opposed to mature SAV plants/beds.	2.15	11	4 (Research)
Determine carbon sequestration potential in the three primary SAV communities in Chesapeake Bay	2.15	12	4 (Research)
Establish a more thorough understanding of climate impacts on SAV biology and ecology in Chesapeake Bay (redundant w line 5)	2.14	13	4 (Research)
Determine potential for facilitated migration of Zostera into CB to restore Zm populations	1.79	19	4 (Research)
Determine role of microplastics in/on SAV beds	1.60	20	4 (Research)

Factors and Gaps → Management Strategies

1. **Habitat Condition and Availability**
2. **Protection of Existing and Recovering SAV**
3. **SAV Restoration Potential and Activity**
4. **SAV Research and Monitoring**
5. **Public Perception, Knowledge, and Engagement**

1. **Support Efforts to Conserve and Restore Current and Future SAV Habitat and Habitat Conditions.**
2. **Protect Existing and Recovering SAV**
3. **Restore SAV**
4. **Enhance SAV Research and Monitoring**
5. **Enhance Community Involvement, Education, and Outreach**

Assess integrated impacts of shallow water uses (e.g. living shorelines, aquaculture) on SAV habitat to determine long-term SAV goal attainability.
Assess the impact of Living shorelines on SAV
Local effect of stormwater runoff and targeted BMPs for SAV priority beds
Determine future SAV habitat availability in relation to climate change, sea level rise, shoreline alteration, and nearshore development to determine
Impact of hydraulic clamming on SAV and potential SAV habitat.
Conduct further SAV/aquaculture research to determine our ability to reach segment-specific and Bay-wide SAV restoration targets.

Factors and Gaps → Management Strategies

Factors and Gaps

1. Habitat Condition and Availability
2. Protection of Existing and Recovering SAV
3. SAV Restoration Potential and Activity
4. SAV Research and Monitoring
5. Public Perception, Knowledge, and Engagement

Management Strategies

1. Support Efforts to Conserve and Restore Current and Future SAV Habitat and Habitat Conditions.
2. Protect Existing and Recovering SAV
3. Restore SAV
4. Enhance SAV Research and Monitoring
5. Enhance Community Involvement, Education, and Outreach

SAV and bivalve co-restoration advantages
Increase SAV Restoration Capacity in CB
In situ study of seed based SAV restoration to determine ideal timing for seed broadcasting and other parameters
Conduct further research on fresh and brackish SAV species restoration best practices.

Factors and Gaps → Management Strategies

1. Habitat Condition and Availability
2. Protection of Existing and Recovering SAV
3. SAV Restoration Potential and Activity
4. SAV Research and Monitoring
5. Public Perception, Knowledge, and Engagement

1. Support Efforts to Conserve and Restore Current and Future SAV Habitat and Habitat Conditions.
2. Protect Existing and Recovering SAV
3. Restore SAV
4. Enhance SAV Research and Monitoring
5. Enhance Community Involvement, Education, and Outreach

Research to advance the use of Satellite data in Bay-wide survey

Expand implementation of CB SAV Sentinel Site Program

Determine the contribution of Zannichellia to baywide SAV totals

Factors and Gaps ➡️ Management Strategies

Factors and Gaps

1. Habitat Condition and Availability
2. Protection of Existing and Recovering SAV
3. SAV Restoration Potential and Activity
4. SAV Research and Monitoring
5. Public Perception, Knowledge, and Engagement

Management Strategies

1. Support Efforts to Conserve and Restore Current and Future SAV Habitat and Habitat Conditions.
2. Protect Existing and Recovering SAV
3. Restore SAV
4. Enhance SAV Research and Monitoring
5. Enhance Community Involvement, Education, and Outreach

Zostera v Ruppia Ecosystem Services and impact of shift on fisheries
Investigate the impacts of climate change on our freshwater SAV community and individual species.
Determine the habitat requirements for recovering SAV (seedlings, juvenile plants) as opposed to mature SAV plants/beds.
Determine carbon sequestration potential in the three primary SAV communities in Chesapeake Bay
Establish a more thorough understanding of climate impacts on SAV biology and ecology in Chesapeake Bay (redundant w line 5)
Determine potential for facilitated migration of Zostera into CB to restore Zm populations
Determine role of microplastics in/on SAV beds

Questions?