LGAC Meeting– June 1st, 2023

Chesapeake Bay Program

Chesapeake Bay Program
Science. Restoration. Partnership

MARYLAND DEPARTMENT OF NATURAL RESOURCES

Susquehanna Flats Submerged Aquatic Vegetation

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Maryland Department of Natural Resources
Chair, Chesapeake Bay Program's SAV Workgroup

Submerged Aquatic Vegetation or….SAV

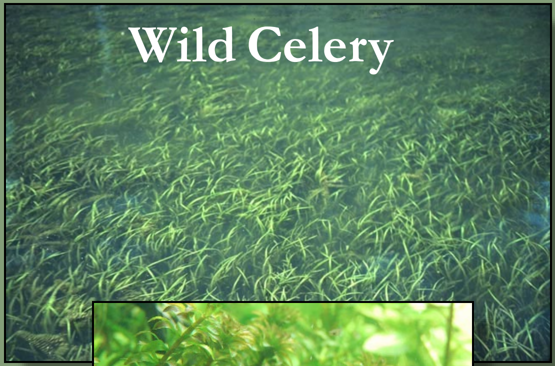
SAV is a term that includes true seagrasses, estuarine plants, and freshwater plants. All are rooted, vascular, flowering plants… and all are fully submerged (except for sometimes their reproductive parts)!

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

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.

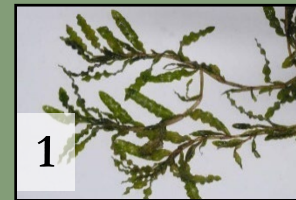
Chesapeake Bay SAV - 17 Species of grasses are commonly found in the Bay and its tributaries. The six most common are:

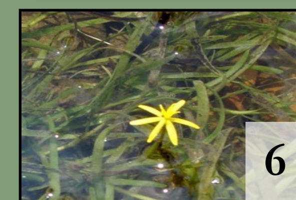
- Hydrilla (*Hydrilla verticillata*)
- Wild Celery (*Vallisneria americana*)
- Redhead Grass (*Potamogeton perfoliatus*)
- Sago Pondweed (*Stuckenia pectinata*)
- Widgeon Grass (*Ruppia maritima*)
- Eelgrass (*Zostera marina*)

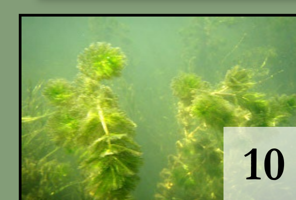


Other species of SAV commonly observed in the Bay

1. *Potamogeton crispus* (Curly pondweed)
2. *Potamogeton pusillus* (Slender pondweed)
3. *Zannichellia palustris* (Horned pondweed)
4. *Elodea canadensis* (Canadian waterweed)
5. *Ceratophyllum demersum* (Coontail)
6. *Heteranthera dubia* (Water stargrass)
7. *Najas guadalupensis* (Southern naiad)
8. *Najas gracillima* (Slender waternymph)
9. *Najas minor* (Brittle naiad)
10. *Myriophyllum spicatum* (Eurasian watermilfoil)







Chesapeake Bay Salinity Zones and SAV Distribution

<u>Tidal Fresh</u>

0-0.5 ppt

<u>Oligohaline</u>

0.5-5 ppt

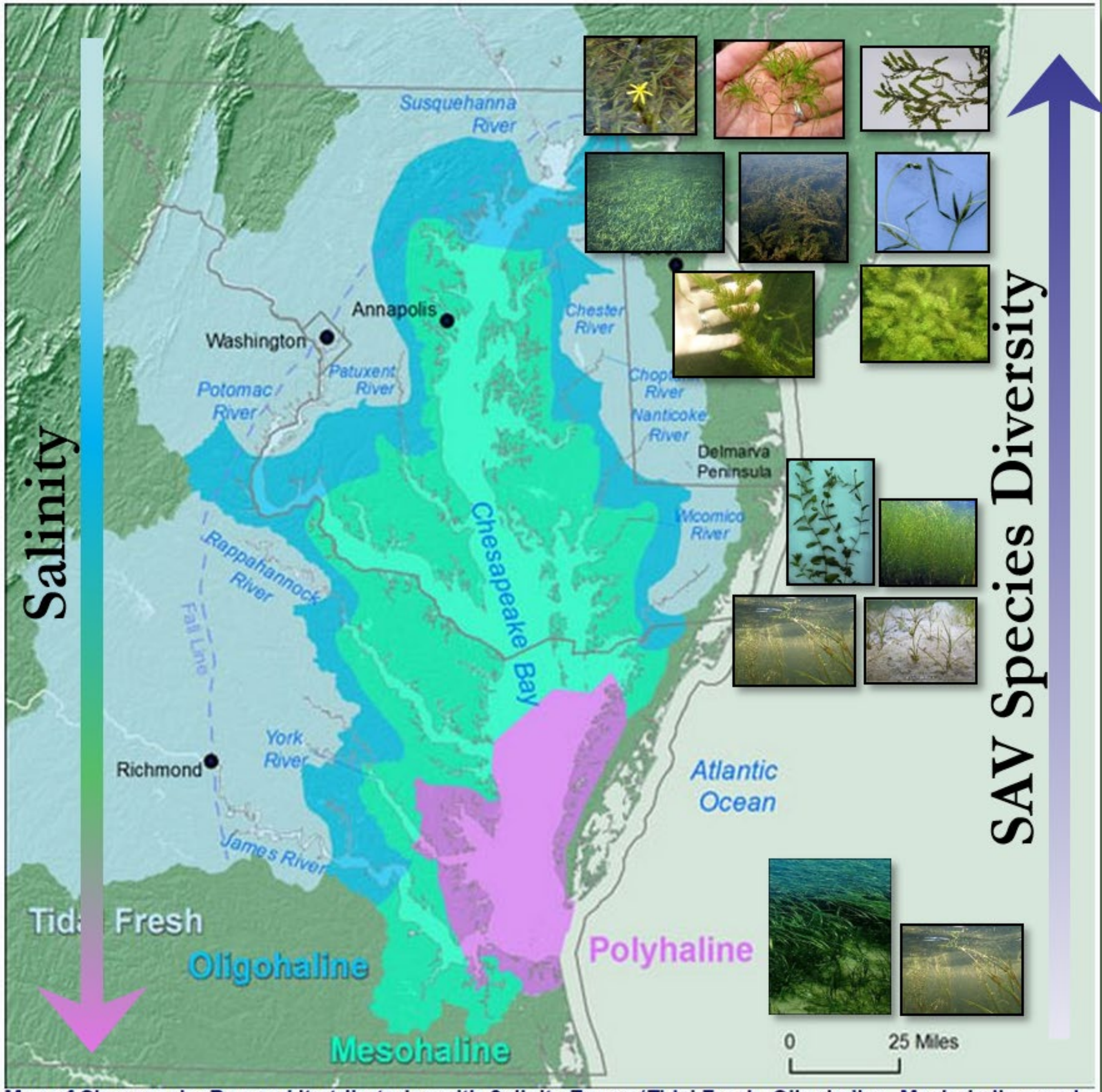
<u>Mesohaline</u>

5-18 ppt

<u>Polyhaline</u>

18-30 ppt

(The open ocean is 30+ ppt, on average about 35 ppt)



Map of Chesapeake Bay and its tributaries with Salinity Zones (Tidal Fresh, Oligohaline, Meshohaline, and Polyhaline)

SAV Habitat Requirements

Salinity

SAV occupies fresh, brackish, and salt waters, but each species of SAV has a particular range of salinities that it can tolerate. Changes in salinity can lead to changes in species distribution.

Clear water with light availability

Sunlight is needed for photosynthesis. Most SAV species live in waters shallower than 3 meters, but some low-light adapted species can survive at depths of up to 58 meters. Most Chesapeake Bay species are generally limited to waters no deeper than 2 meters. Light availability is determined by TSS, N and P concentrations and loading, Chl a, macroalgae, and epiphytes.

SAV Habitat Requirements

Water temperature

Temperature requirements differ between SAV species. Some species require warm waters for seeds to germinate while others, such as eelgrass, are cold-water dependent species. Changes in temperature impact the ability of SAV to survive and persist in areas where they have historically thrived.

Substrate and water movement

Some species need sandy substrate, while others prefer muddy or silty areas. Most SAV do not tolerate strong waves or currents.

Why is SAV so Important?

SAV beds are one of the Bay's most important habitats that provide food and shelter for a variety of commercially, ecologically, and recreationally important species (including waterfowl!)

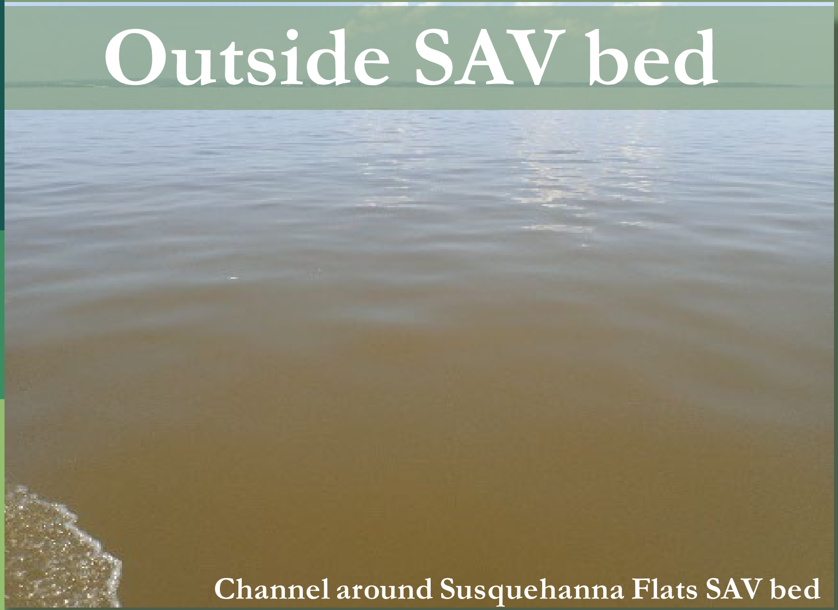
Photo: Jay Flemming

Graphic Courtesy of Slim Films

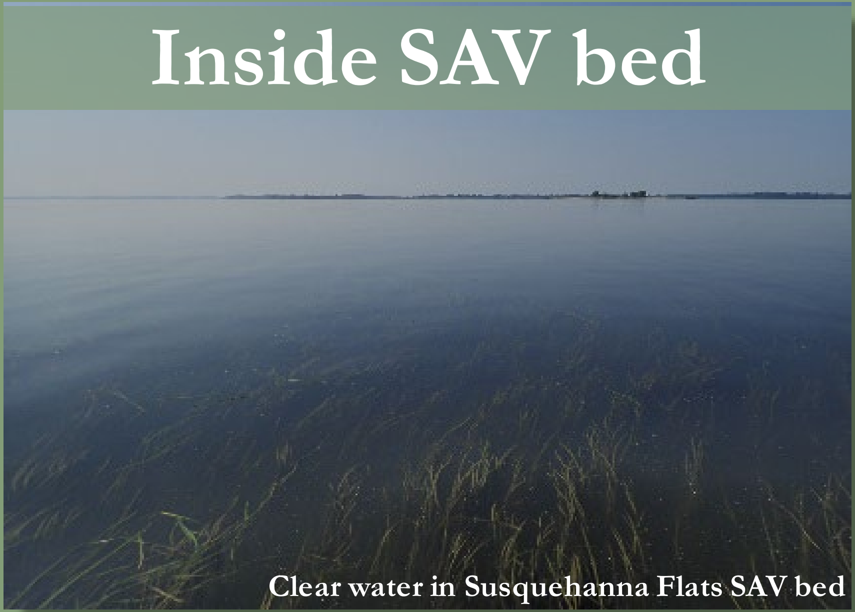
on seagrasses are important for commercial and recreational fisheries. In fact, in all regions of the world **fishermen will specifically seek out seagrass beds** for their abundance of fish. It

Why is SAV so Important?

SAV beds absorb and filter nutrients and sediments from the water column, reducing the prevalence of algae blooms and resuspension of sediments, promoting increased water clarity



Channel around Susquehanna Flats SAV bed



Clear water in Susquehanna Flats SAV bed

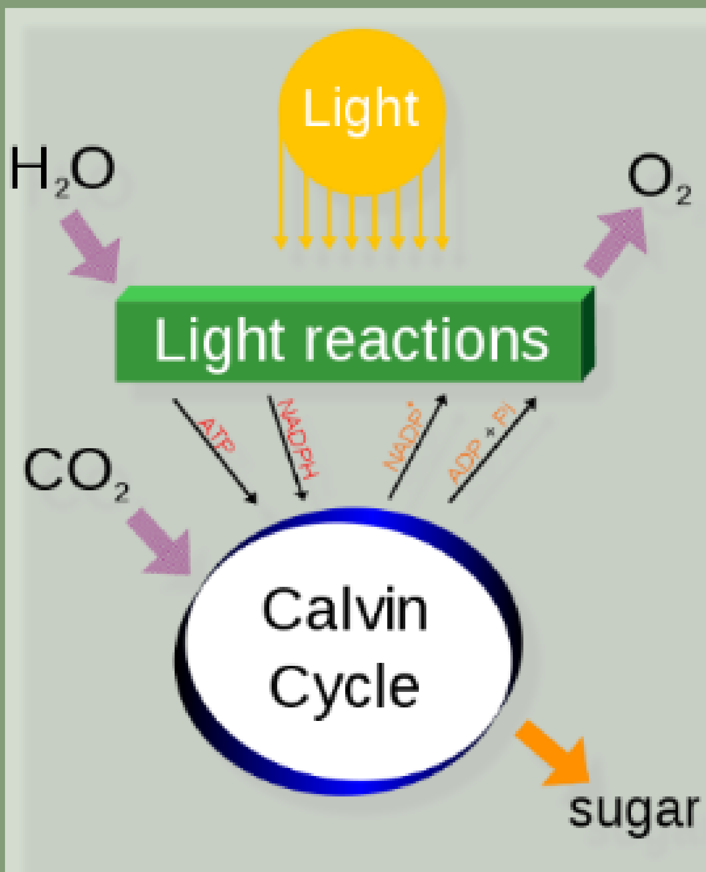
Why is SAV so Important?

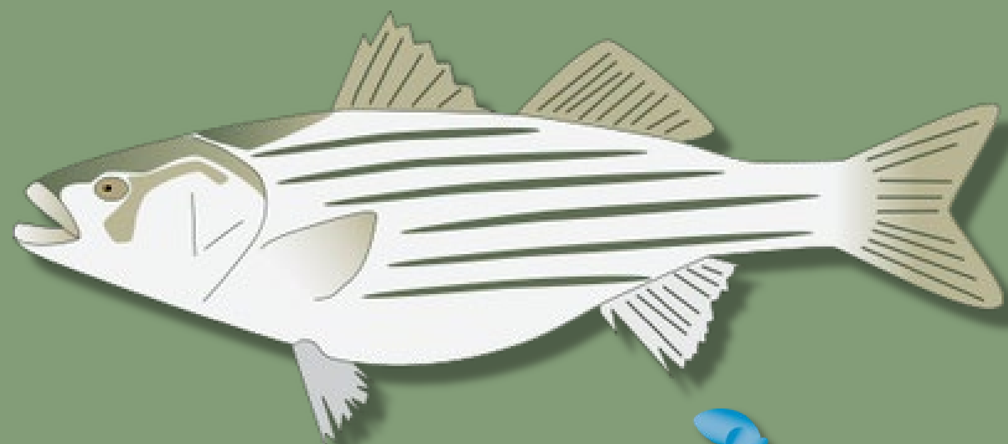
SAV beds reduce shoreline erosion by reducing wave and current energy with their shoots and blades and by trapping sediment with their roots and rhizomes.

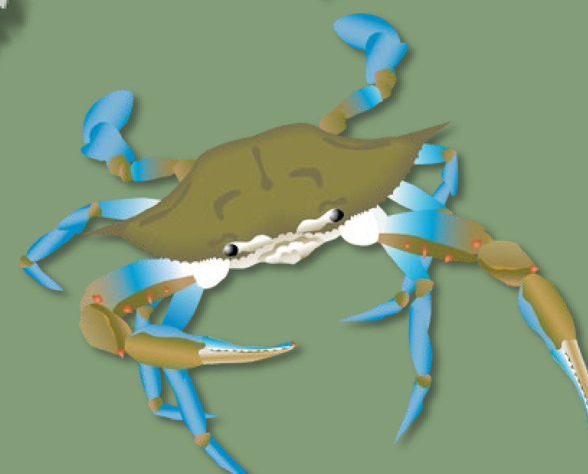
Storms often do less damage to coastal areas with offshore SAV beds.

Why is SAV so Important?

SAV releases oxygen into the water column as a by-product of photosynthesis, helping to support other aquatic life.



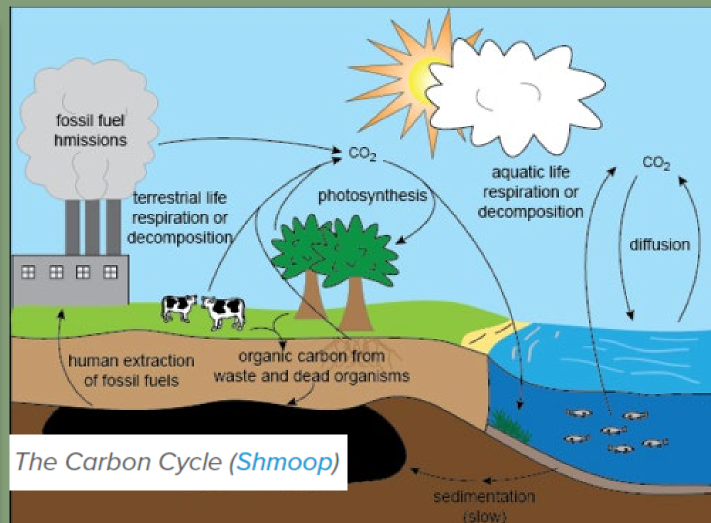




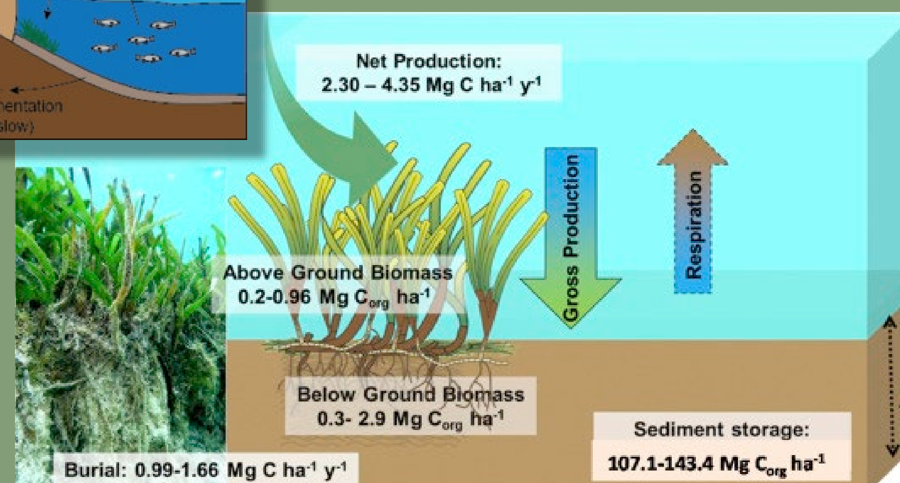
Why is SAV so Important?

SAV beds sequester carbon and show more promise for mitigating climate change than any other ecosystem.

Mangroves, seagrasses and tidal marshes (top to bottom) are promising solutions to mitigating climate change.



The Carbon Cycle (Shmoop)



Ganguly et al. 2018

https://elise-avallon-76l2.squarespace.com/namepa-blog/2017/4/17/carbon-sequestration-and-the-ocean-how-will-our-waters-react

Why is SAV so Important?

SAV beds buffer pH and neutralize acidic conditions – like TUMS. This is important for a variety of reasons, including shellfish restoration and aquaculture.

nature geoscience

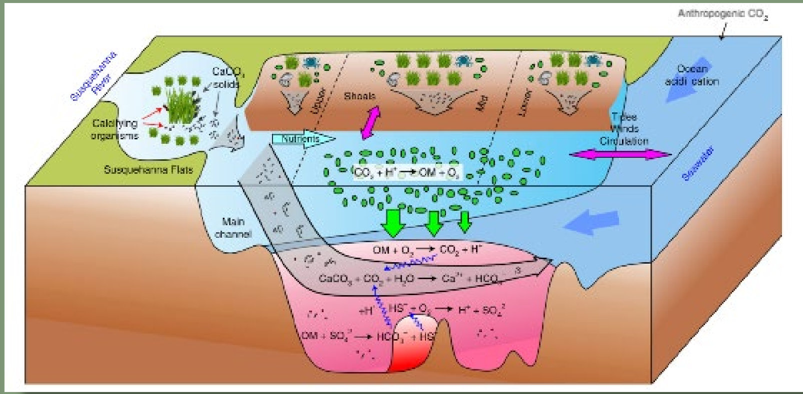
ARTICLES

https://doi.org/10.1038/s41561-020-0584-3

Check for updates

Chesapeake Bay acidification buffered by spatially decoupled carbonate mineral cycling

Jianzhong Su[1,2], Wei-Jun Cai[1]✉, Jean Brodeur[1], Baoshan Chen[1], Najid Hussain[1], Yichen Yao[3], Chaoying Ni[3], Jeremy M. Testa[4], Ming Li[5], Xiaohui Xie[5,8], Wenfei Ni[5], K. Michael Scaboo[1], Yuan-yuan Xu[1], Jeffrey Cornwell[5], Cassie Gurbisz[6], Michael S. Owens[5], George G. Waldbusser[7], Minhan Dai[2] and W. Michael Kemp[5]



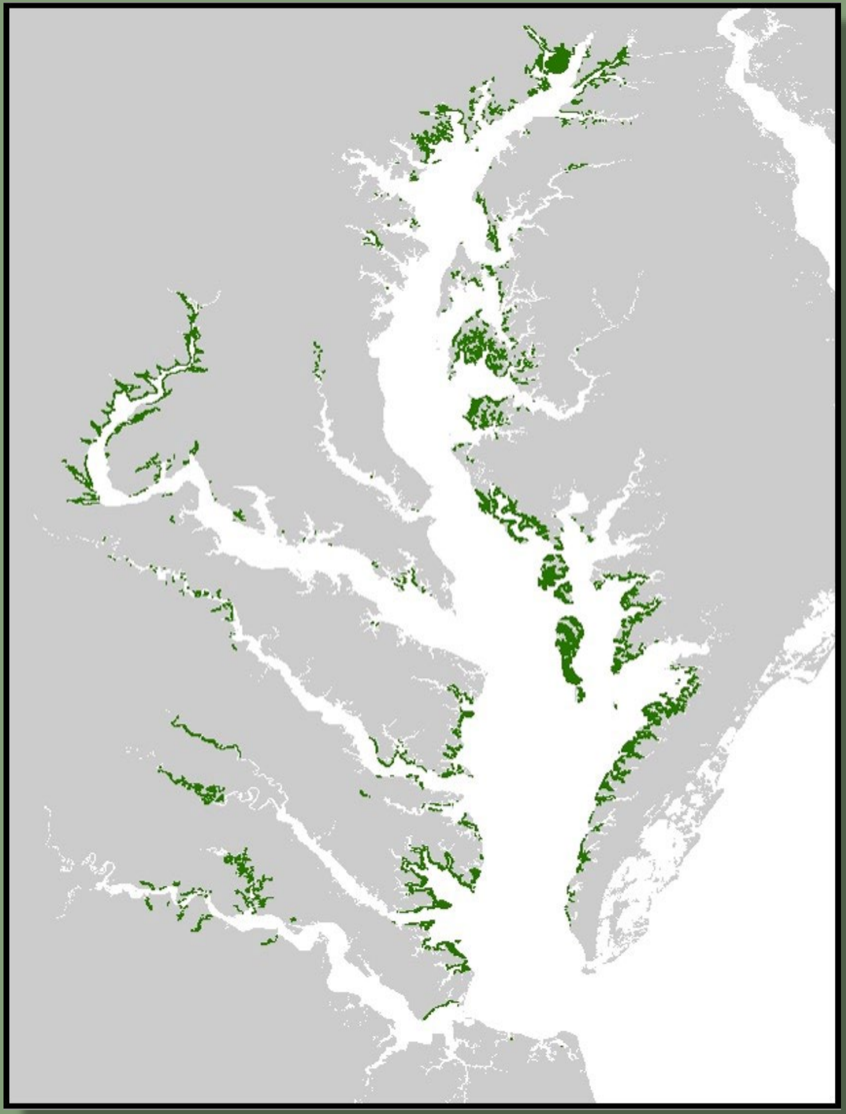
Conceptual model of the self-regulated pH-buffering mechanism in the Chesapeake Bay. Figure 5, Su et al. 2020

Uptake of anthropogenic carbon dioxide (CO2) from the atmosphere has acidified the ocean and threatened the health of marine organisms and their ecosystems. In coastal waters, acidification is often enhanced by CO2 and acids produced under high rates of biological respiration. However, less is known about buffering processes that counter coastal acidification in eutrophic and seasonally hypoxic water bodies, such as the Chesapeake Bay. Here, we use carbonate chemistry, mineralogical analyses and geochemical modelling to demonstrate the occurrence of a bay-wide pH-buffering mechanism resulting from spatially decoupled calcium carbonate mineral cycling. **In summer, high rates of photosynthesis by dense submerged aquatic vegetation at the head of the bay and in shallow, nearshore areas generate high pH, an elevated carbonate mineral saturation state and net alkalinity uptake. Calcium carbonate particles produced under these conditions are subsequently transported downstream into corrosive subsurface waters, where their dissolution buffers pH decreases caused by aerobic respiration and anthropogenic CO2.** Because this pH-buffering mechanism would be strengthened by further nutrient load reductions and associated submerged aquatic vegetation recovery, our findings suggest that the reduction of nutrient inputs into coastal waters will not only reduce eutrophication and hypoxia, but also alleviate the severity of coastal ocean acidification.

Why is SAV so Important?

People like clean, clear water, and SAV promotes water clarity – this promotes local tourism revenue and increased property values.

Chesapeake Bay Program SAV Goal:
185,000 acres of SAV Bay-wide



<u>Submerged Aquatic Vegetation Outcome</u>

-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.

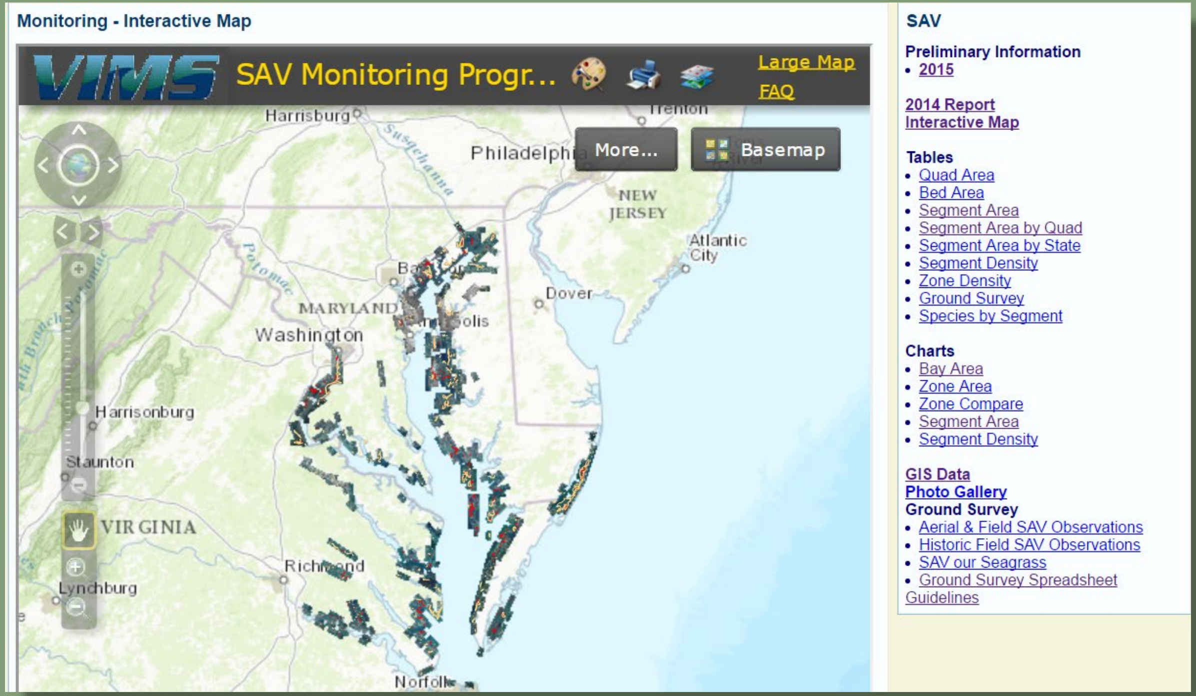
How do we track progress towards the goal?

-Bay-wide Aerial Survey, conducted by VIMS annually May-Oct

-180+ flight lines using Multispectral imagery, supplemented with satellite data

-Ongoing since 1984

-Funded by Federal/State partnership

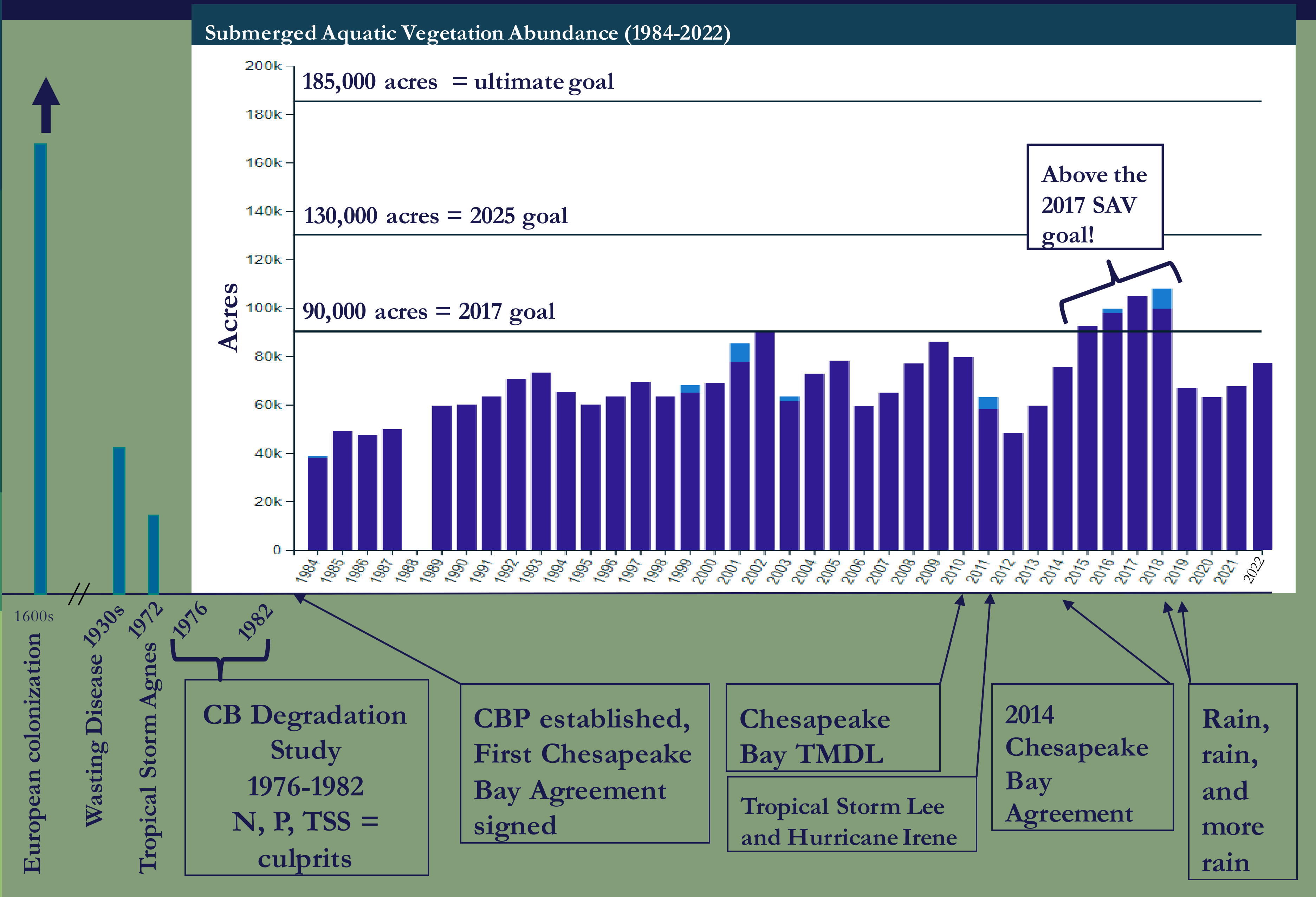


VIMS | WILLIAM & MARY

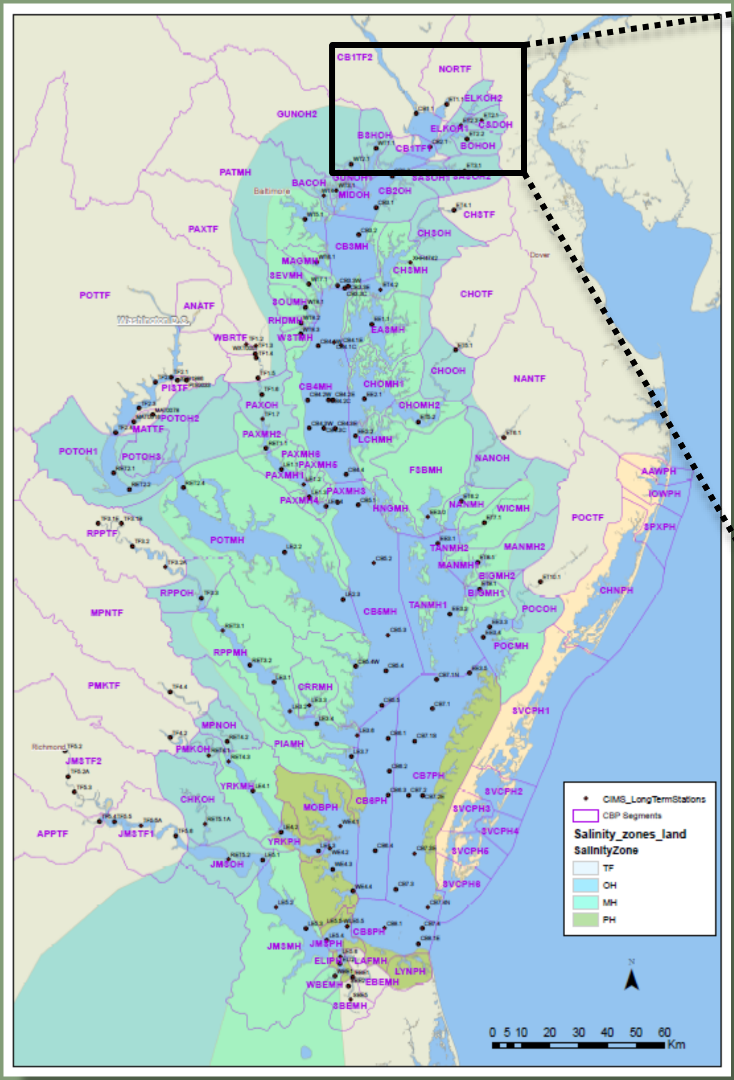
VIRGINIA INSTITUTE OF MARINE SCIENCE

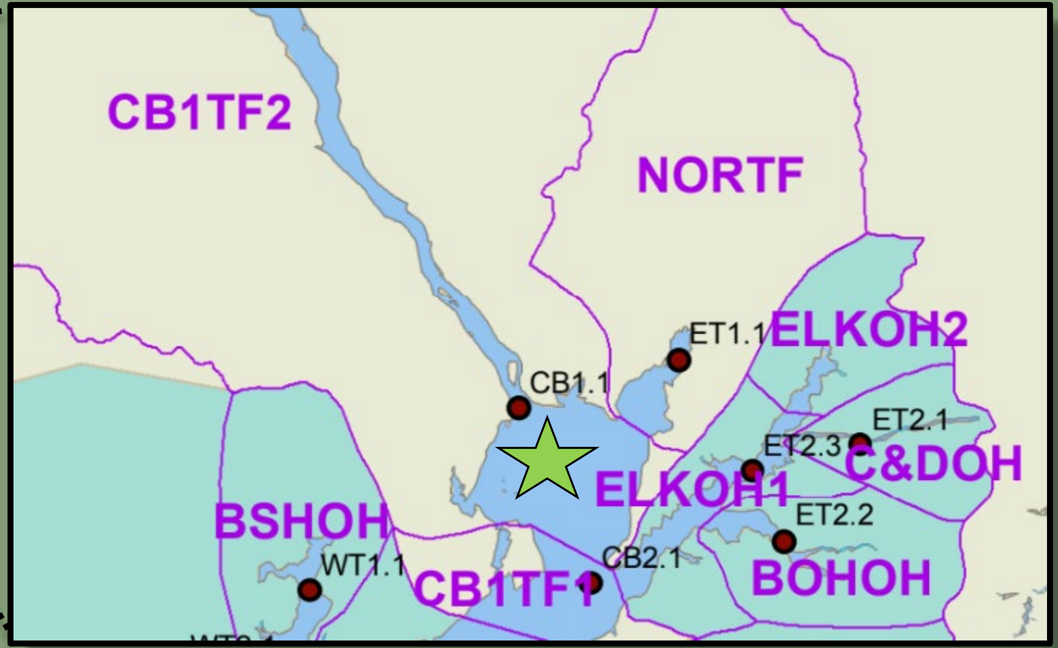
http://web.vims.edu/bio/sav/

Progress towards the Bay-wide SAV goal



92 CBP Segments, each with their own SAV goal

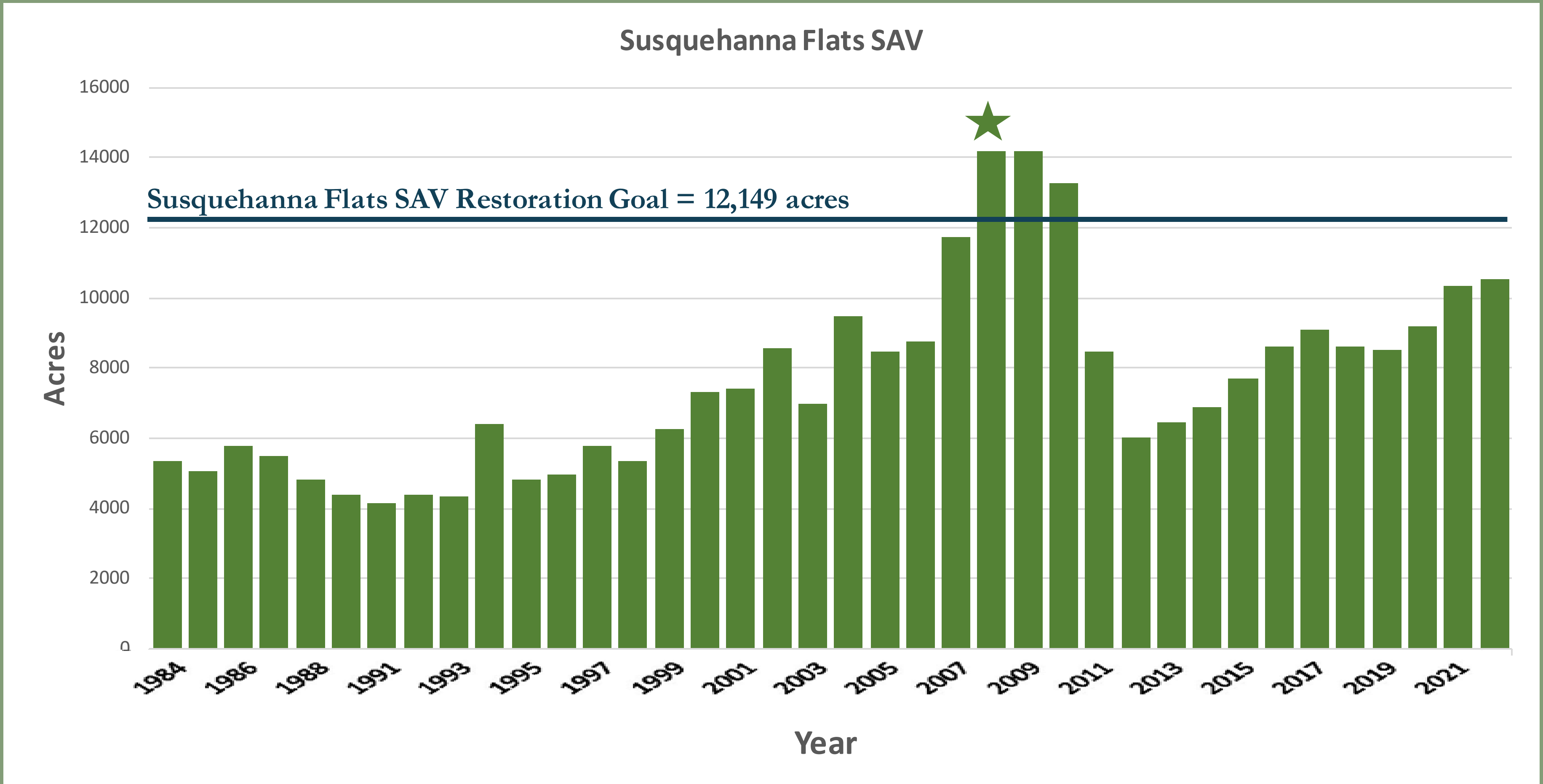




The Susquehanna Flats are in segment CB1TF2; the segment SAV goal is 12,149 acres.

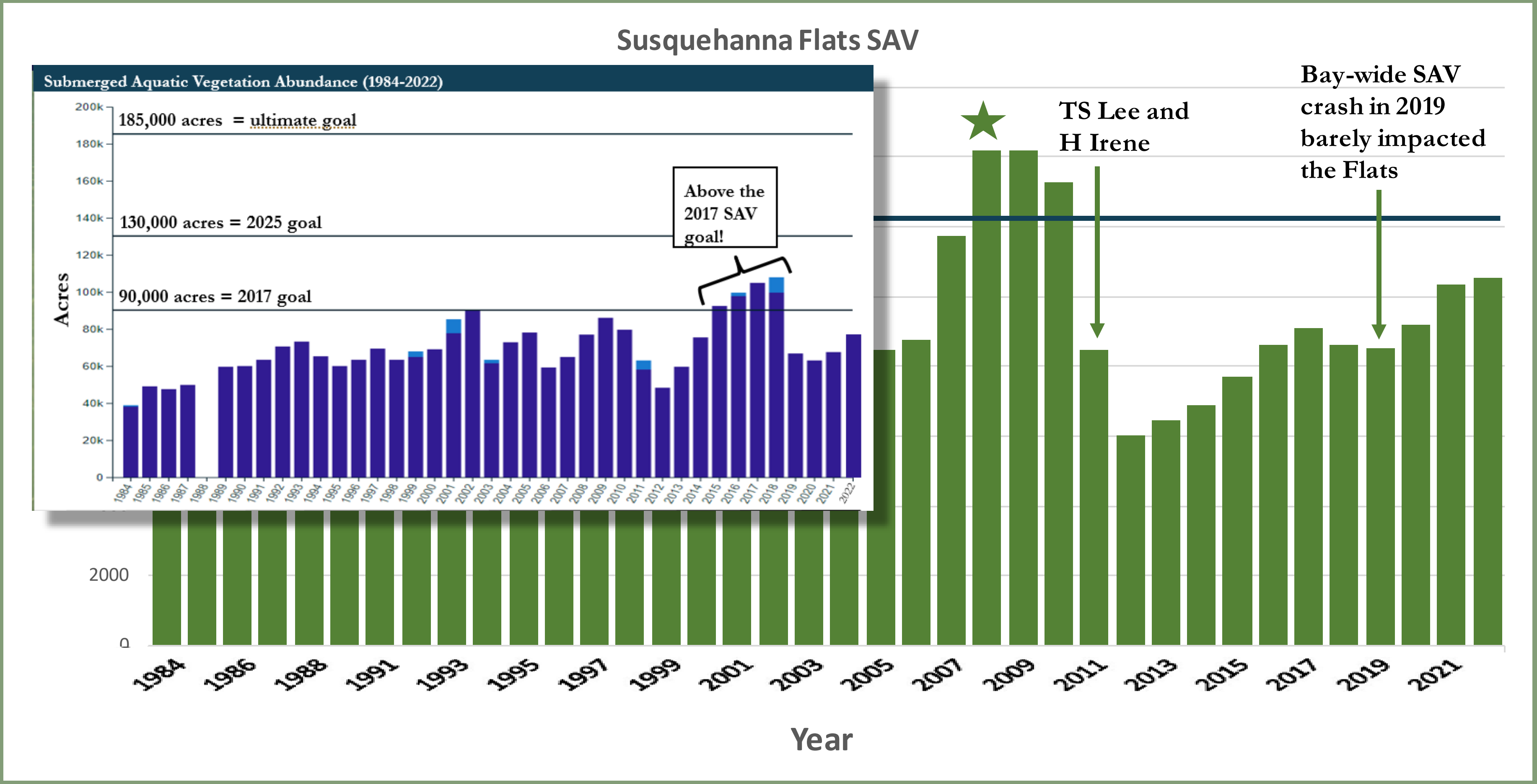
CB1TF2 = Chesapeake Bay 1, Tidal Fresh 2

Susquehanna Flats SAV: Maxed at 14,194 acres in 2008



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

Susquehanna Flats SAV: Compared to Bay-wide trends

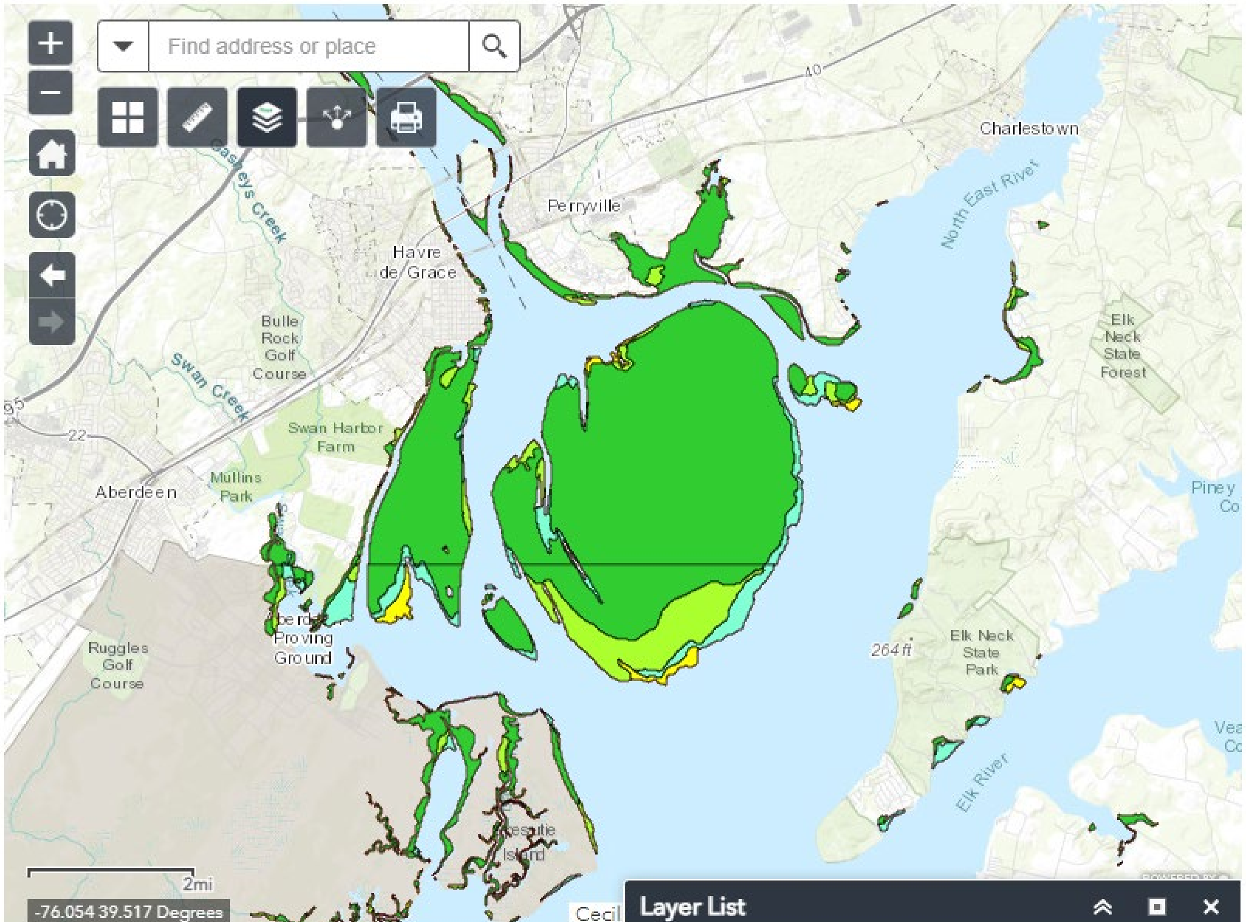


https://www.vims.edu/research/units/programs/sav/access/maps/index.php

2021 Susquehanna Flats SAV distribution

Interactive SAV Map

2021



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

Susquehanna Flats *Lyngbya* Study

Causes of benthic cyanobacteria overgrowth in submersed aquatic vegetation (SAV) beds in Chesapeake Bay: Potential consequences for ecosystem resilience

Judith M. O'Neil, Associate Research Professor
University of Maryland Center for Environmental Science Horn Point Environmental Laboratory

Jeffrey Cornwell, Research Professor
University of Maryland Center for Environmental Science Horn Point Environmental Laboratory

Cassie Gurbisz, Assistant Professor
Environmental Studies Program, St. Mary's College of Maryland

Catherine Wazniak, Program Manager
Resource Assessment Service, Maryland Department of Natural Resources

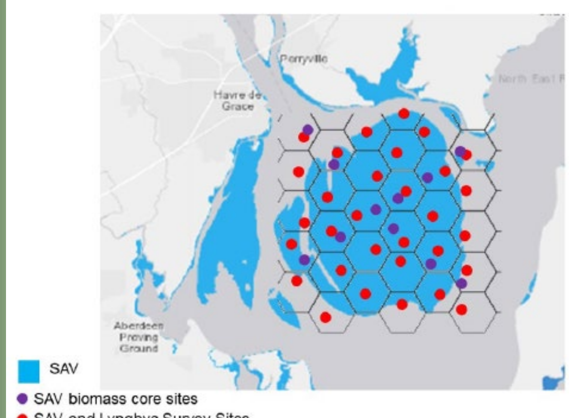
J. Brooke Landry, Natural Resource Biologist and Chair
Maryland Department of Natural Resources and Chesapeake Bay Program SAV Workgroup

We **hypothesize** that:

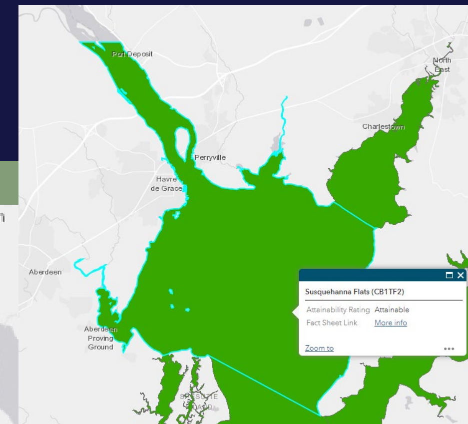
1. low N concentrations and abundant light availability increase *Lyngbya* production and, therefore, abundance,
2. filamentous cyanobacteria are affecting SAV physiology and potentially its resilience by decreasing light penetration to the plant canopy,
3. cyanobacterial N_2 fixation is altering the biogeochemical balance in the SAV beds, whereby the SAV beds may seasonally become a nitrogen source rather than a sink,
4. the cyanobacteria may potentially be affecting human and ecosystem health through toxin production.

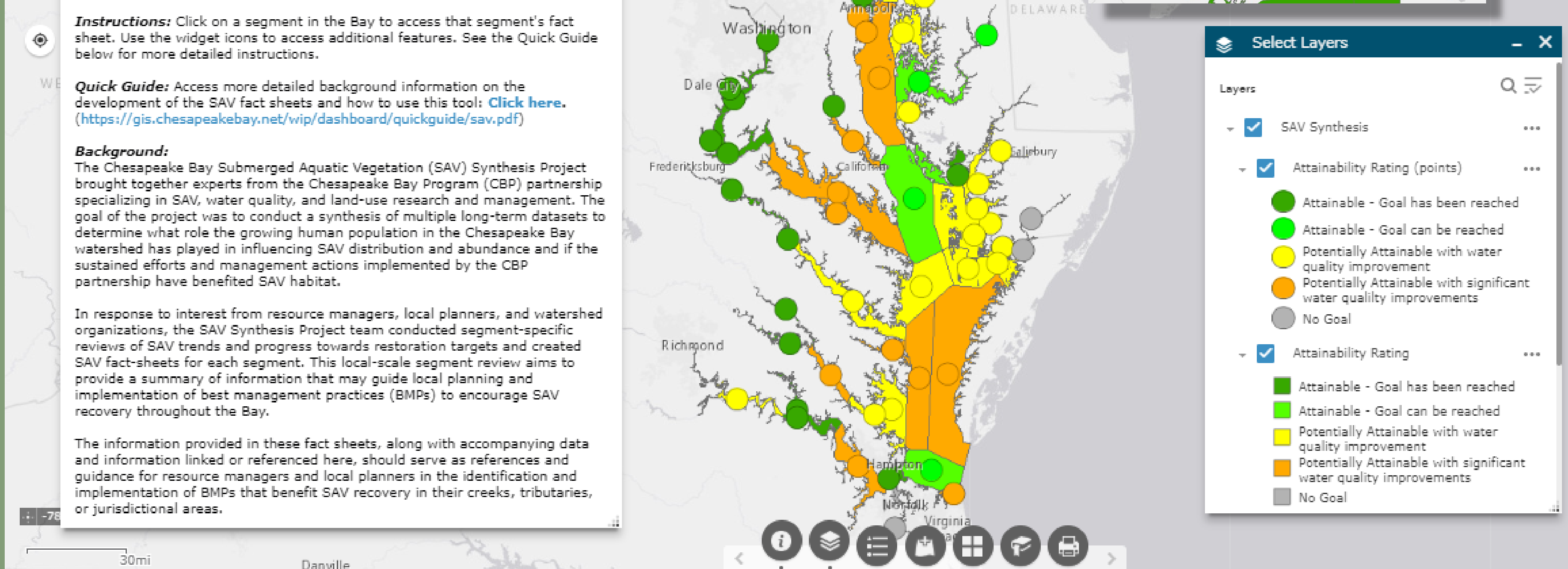
Broadly, the **goal** of this research is to better understand the causes and effects of increasing benthic cyanobacteria abundance in CB and specifically their impact on SAV resilience and ecosystem services. Our **objectives** are to:

1. determine what conditions support cyanobacteria growth by conducting field surveys of cyanobacteria distribution in relation to SAV biomass and environmental variables at SF and several additional sites in tidal fresh and oligohaline tidal tributaries,
2. determine the effects of environmental variables (nutrients, light) on cyanobacteria production, nutrient uptake, N_2 fixation, and potential toxin production by conducting bio-assay experiments
3. assess the effects of cyanobacteria on biogeochemical rate processes and SAV via nutrient flux experiments and ecological simulation modeling exercises, and
4. determine whether toxins are present in cyanobacteria tissue and the water column through chemical analysis.



SAV Fact Sheets





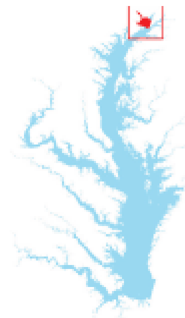
Available for each trib on CBP Data Dashboard, CAST, VIMS interactive map

https://gis.chesapeakebay.net/sav/

Susquehanna Flats Fact Sheet: CB1TF2

Attainable

Susquehanna Flats (CB1TF2)



The Susquehanna Flats are home to the largest and most diverse submerged aquatic vegetation (SAV) bed in Maryland.

Executive Summary

The Susquehanna Flats are home to the largest and most diverse SAV bed in Maryland. Although SAV abundance has fluctuated over the decades, it responded to Chesapeake Bay-wide improvements in water quality and exceeded the restoration goal of 12,149 acres for this segment in 2008, 2009 and 2010 before it was negatively impacted by Tropical Storm Lee in 2011. Sediment and nutrient loading from the Susquehanna River pose a risk to the system, but bed size, density and diversity will promote resilience to those stressors. Filamentous green algae and *Lyngbya* has also become a concern in this region as well, but more research is necessary to determine the scope of the problem.

Attainable

Take Home Points

Goal - Attainable

The goal of 12,149 acres is attainable and was achieved from 2008-2010, following a decade of improving water quality.

Historical Coverage

Changing patterns

The Susquehanna Flats once provided premier habitat for both resident and migratory waterfowl because of its dense and diverse abundance of SAV, which was documented in herbarium collections from as early as 1870. Herbarium specimens indicate that redhead grass, sago pondweed, wild celery, common waterweed and hornwort were all present between 1870 and 1900. In the 1950s-1970s, additional data from ground surveys indicate that diversity increased to include milfoil, naiads and muskgrass, with milfoil the dominant plant on the Susquehanna Flats in the late 1960s and early 1970s. Tropical Storm Agnes negatively impacted SAV throughout the Bay in 1972, however, and SAV remained fairly widespread but sparse for the next several decades here. At the onset of the Bay-wide aerial survey in 1984, SAV covered more than 5,000 acres of the Susquehanna Flats, but remained sparsely populated over much of that space. Transplant efforts helped restore native species and SAV has expanded in both distribution and density in recent years following Bay-wide improvements in water quality. The SAV restoration target was exceeded in 2008, 2009 and 2010, but in 2011, Tropical Storm Lee reduced SAV cover on the Susquehanna Flats by nearly half again. Recovery has been rapid since then, and in 2016, more than a dozen species were documented on the Susquehanna Flats, including wild celery, water stargrass, hornwort, milfoil, hydrilla, muskgrass and several species each of naiads and pondweeds.

Key Events

Tropical Storms Agnes and Lee

SAV was experiencing a general decline in abundance throughout the Bay in the 1960s and early 1970s when the region was hit by Tropical Storm Agnes in 1972. Agnes caused an extreme runoff event that resulted in the loss of most remaining SAV in the upper Bay. Following the resurgence of SAV in the region, Tropical Storm Lee led to another dramatic decline of SAV in September 2011. The impact from Tropical Storm Lee was compounded by an inundation of sediment, nutrients and debris spilling over from behind the Conowingo Dam that caused excessive turbidity, burial and scour of the plants on the Susquehanna Flats. Recovery, however, has been rapid in the years since.

Vulnerability/Resilience

Conowingo Dam and turbidity; resilience from bed size, density and diversity

SAV on the Susquehanna Flats will remain vulnerable to sediment and nutrient influx from the Susquehanna River and Conowingo Dam, but the size, density and diversity of species on the bed itself makes it a highly resilient system. The plants on the outer rim of the main central bed appear to serve as guardians of the plants at the bed's interior. The outer rim is composed of dense, bushy species, frequently observed with an abundance of epiphytes and sediment attached to the leaf blades. This indicates that those plants are efficiently filtering the water column, reducing the prevalence of turbidity over the interior of the bed. Thanks to the protection provided by the outer bed plants, that central population persists during extreme weather events and high flows and facilitates recovery in the years following.

Expansion of filamentous green algae and Lyngbya

Several species of filamentous green algae as well as *Lyngbya*, an invasive cyanobacteria that thrives in warm, nutrient-rich water, have become prevalent components of the Susquehanna Flats SAV bed in recent years. These nuisance species grow on the substrate and also loosely attach to SAV blades, but as they decompose, they form dense, floating mats on the surface of the water, shading the SAV below. In other regions of the world, *Lyngbya* has been known to decrease SAV density, but it has not been found to negatively impact SAV on the Susquehanna Flats to date. Some species of *Lyngbya* produce toxins that cause dermatitis, but additional research is needed to determine which species of *Lyngbya* are present on the Susquehanna Flats.

Management Implications

Sediment and nutrient reductions; filamentous green algae and Lyngbya

There are two major issues that will influence the continued abundance and diversity of SAV in this region: sediment and nutrient loading, and the expansion of *Lyngbya* and filamentous green algae. All efforts should be made to reduce sediment and nutrient loading from the Susquehanna River to ensure SAV persistence in this region. A reduction in nutrient loading would likely also decrease the prevalence of *Lyngbya* and filamentous green algae. More research is needed to determine if these nusiance species will impact SAV abundance and density in the long term, and if the species present are those that produce toxins and/or have other ecosystem impacts.

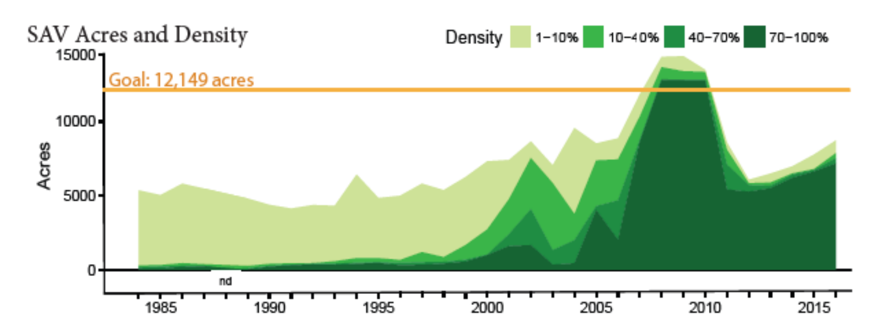
References

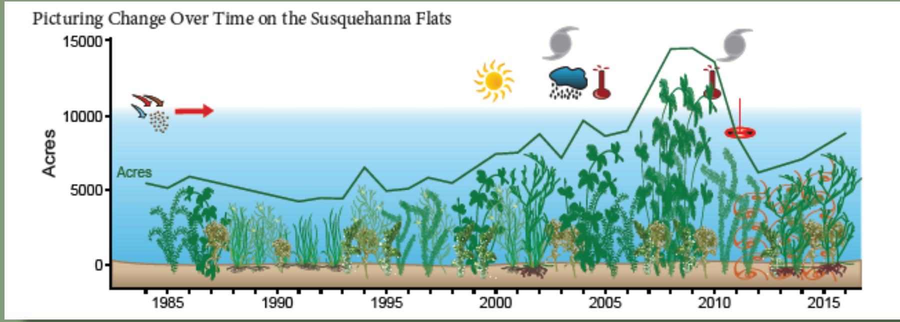
Stevenson and Confer 1978; Bailey et al. 1978; Orth and Moore 1983, 1984; Dennison et al. 1993; Moore et al. 2000, 2004; Kemp et al. 2005; Orth et al. 2010a, 2017; Patrick and Weller 2015; Gurbisz et al. 2016, 2017; Lefcheck et al. 2018

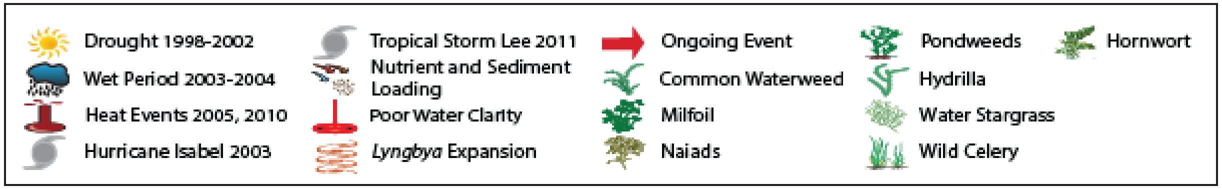
www.vims.edu/bio/sav/SegmentAreaChart.htm (abundance data)

www.vims.edu/bio/sav/maps.html (species information)

www.eyesonthebay.org (Maryland water quality data)







Get Involved!

SAV Monitoring, Restoration, and Stewardship

Chesapeake Bay SAV Watchers: A Volunteer Monitoring Program for SAV

Photo: Severn River Association

What is SAV and why is it important?

Submerged Aquatic Vegetation (SAV) is grass that grows underwater and is an important natural resource in Chesapeake Bay and around the world. It provides food and habitat for aquatic animals, sequesters nutrients and carbon, protects shorelines from erosion, and improves water clarity.

Become a Chesapeake Bay SAV Watcher!

The Chesapeake Bay SAV Watchers is the 2nd tier of a 3-tier monitoring approach that includes a Bay-wide aerial survey and an intensive SAV Sentinel Site Program. Data collected by SAV Watchers will help Bay scientists and managers determine whether management efforts are effective, detect issues of immediate concern, forecast emerging and potential issues and strategically guide SAV research.

Who are SAV Watchers?

Riverkeepers, watershed groups, and volunteers who are trained and certified to:

- Use a GPS device for coordinates
- Determine water clarity and depth with a Secchi disk
- Assess SAV bed density
- Identify SAV species found in the Bay
- Recognize epiphytes and macroalgae
- Identify reproductive structures on SAV (flowers and seeds)
- Determine sediment/shoreline type
- So much more!

How can I get involved?

Contact Kaitlin Scowen for more information

kaitlin.scowen@maryland.gov

Visit our website

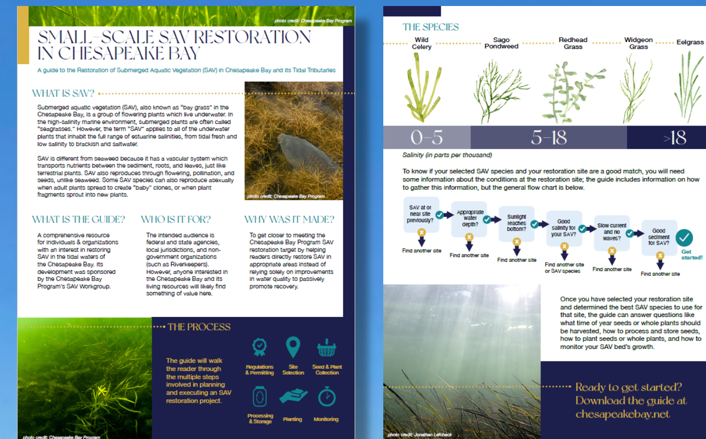
www.chesapeakebaysavwatchers.com

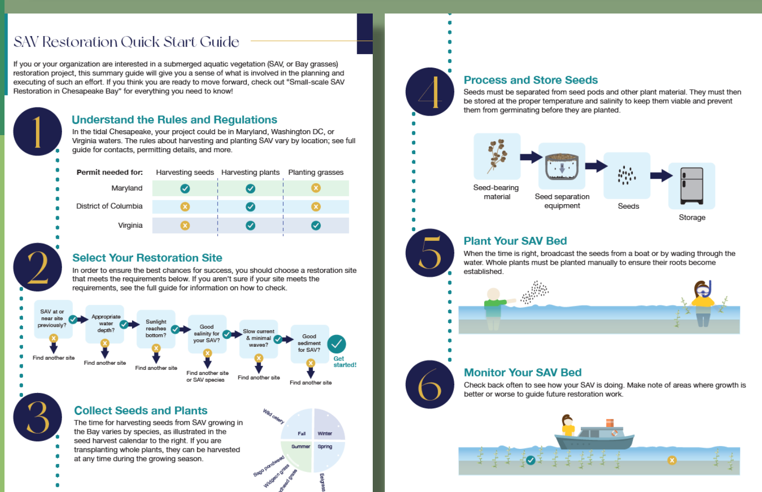
Chesapeake Bay Program
Science. Restoration. Partnership.

Learn about our overall monitoring effort

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

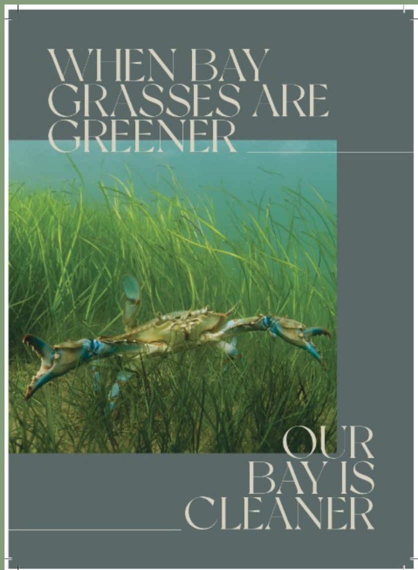
Chesapeake Bay SAV Restoration Protocol and Technical Guidance Manual

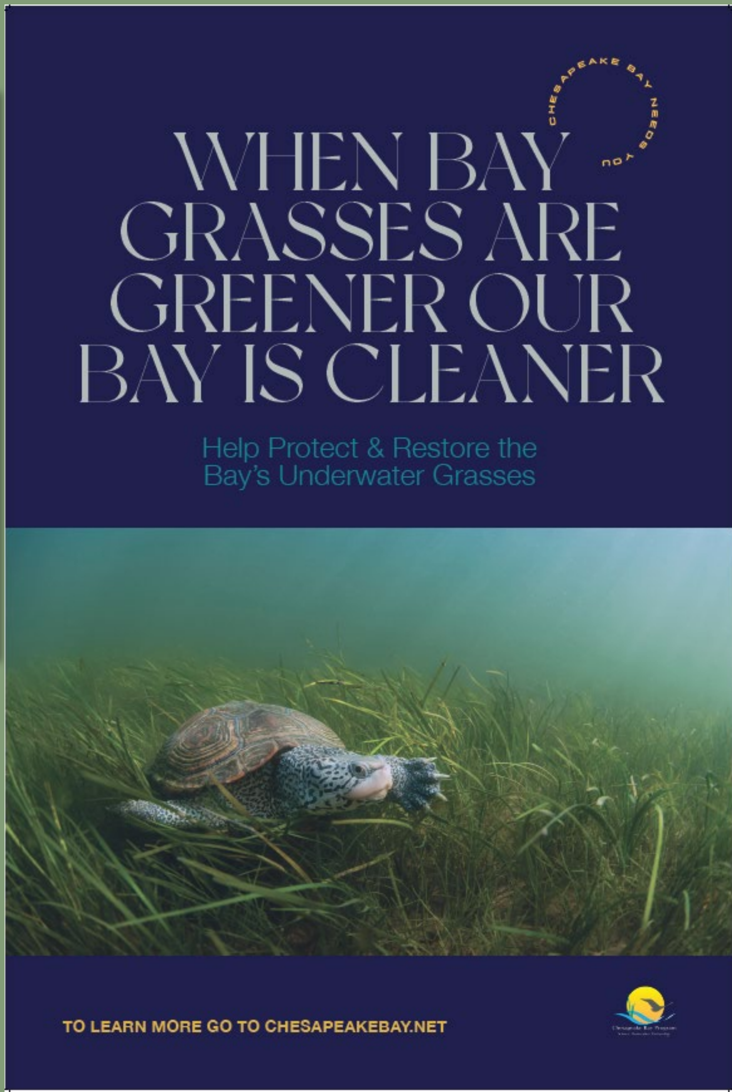


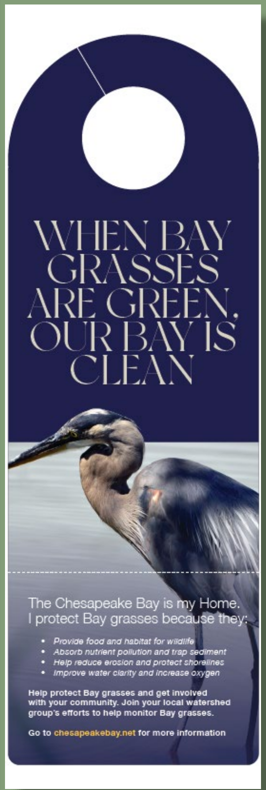


https://www.chesapeakebay.net/who/group/submerged_aquatic_vegetation_workgroup

Be an SAV Advocate – Join our upcoming CBSM campaign to protect SAV!







Questions?

brooke.landry@maryland.gov

Chesapeake Bay SAV Workgroup
Recent Efforts and Campaigns

-Chesapeake Bay Submerged Aquatic Vegetation – A Third Technical Synthesis

-Chesapeake Bay SAV Watchers – Volunteer Monitoring Program

-SAV Sentinel Site Monitoring Program

-Community Based Social Marketing Campaign

-Technical Guidance Manual and Protocol for Small-scale SAV Restoration

-Modeling Climate Impacts of Chesapeake Bay SAV (SAV Syn 2.0)

-SAV Fact Sheets (for each river)

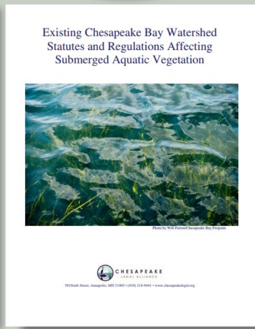
-Regulatory and Legislative Review

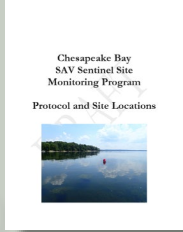
-STAC Workshop on Microplastic Impacts to Chesapeake Bay (and SAV)

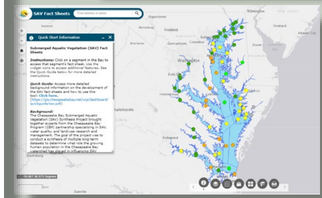
-STAC Workshop to explore satellite data integration into CB SAV Monitoring Program

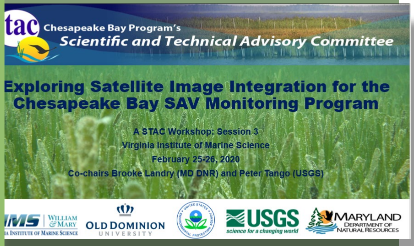
-International Seagrass Biology Workshop and World Seagrass Conference: Chesapeake Bay 2022

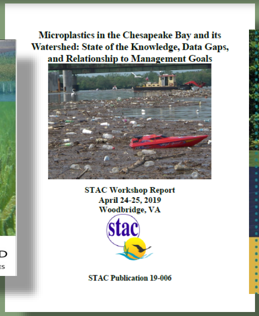
-Updated 2022-2023 SAV Work plan and Management Strategy

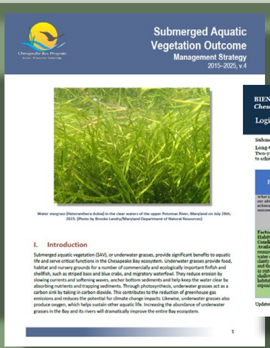


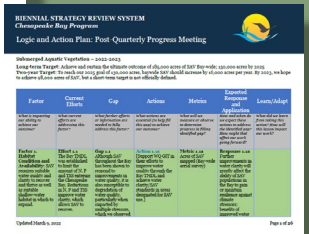












Chesapeake Bay SAV Monitoring: A 3-Tiered Hierarchical Integrated and Coordinated Monitoring Approach

Chesapeake Bay Program
Science. Restoration. Partnership.

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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

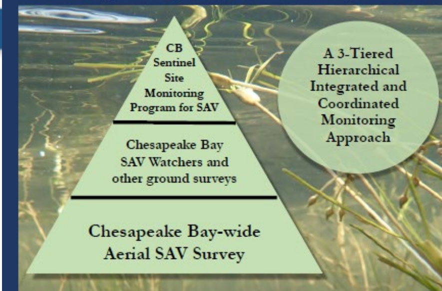
Programs & Projects

Modeling

Monitoring SAV in the Chesapeake Bay

~

A Chesapeake Bay Program Partnership Endeavor



1. Bay-wide Aerial Survey: characterizes SAV acreage and density. Useful for quantifying SAV habitat distribution and density throughout the Bay and its tributaries.
2. SAV Watchers Program: monitors a limited number of SAV habitat characteristics at a large number of locations throughout the Bay and its tributaries. Useful for broad-scale condition assessment and for identifying and quantifying driver/response relationships.
3. Sentinel Site Program: monitors multiple parameters in greater detail at a ~20 locations throughout the Bay and its tributaries. Focuses on identifying causal relationships by intensively monitoring drivers of change, ecosystem responses, and ecological processes.

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 colle[...] used to report SAV acreage and density throughout the Bay and its tidal tributar[...]

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

Chesapeake Bay SAV Sentinel Site Monitoring Program

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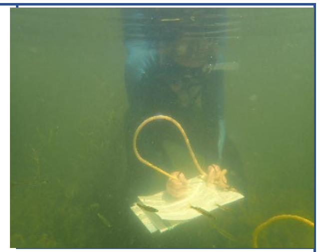
Tier III: Chesapeake Bay SAV Sentinel Site Program

Chesapeake Bay SAV Sentinel Site Program



Several federal, state and local agencies, academic institutions and other organizations seek to establish and independently monitor permanent SAV transects throughout the widely studied Chesapeake Bay. The Chesapeake Bay SAV Sentinel Site Program (the Program), which forms the third tier of the Chesapeake Bay SAV Monitoring Program, will organize Bay-wide SAV surveying efforts by establishing long-term monitoring stations, or SAV sentinel sites, that are monitored using a standardized, in-depth data collection protocol. The Program will establish permanent transects at 20 locations throughout the Bay—five in each of the Bay's four salinity zones (tidal fresh, oligohaline, mesohaline, and polyhaline)—to monitor changes in SAV habitat characteristics and resilience indicators. It is possible that several existing long-term monitoring stations could be re- or co-designated as Chesapeake Bay SAV Sentinel Sites.

SAV Sentinel Site Adoption

Organizations with dedicated staff, time, and equipment for long-term SAV monitoring are invited to adopt a SAV Sentinel Site. Participation in the Chesapeake Bay SAV Sentinel Site Program is strictly voluntary as no funding to support these monitoring efforts currently exists. Interested organizations should refer to the map of potential sites that can be found under the resources section.

SAV Sentinel Site Selection Criteria

- Sites should be adjacent to natural shorelines.
- Sites should not be in areas intersected by docks or piers.
- Sites should not be in areas with active or potential future aquaculture activity.
- Sites should have had SAV present for the last five years [link].
- Sites should be located near continuous water quality monitoring stations if possible.
- Sites should be easily accessible by boat or shore for ease of sampling.
- Sites should have an agency or organization willing to maintain long-term monitoring of the site.
- Sites should be within a reasonable distance to the agency or organization responsible for the monitoring of the site.

SAV Sentinel Site Data Collection Protocol

A detailed pdf version of the Chesapeake Bay SAV Sentinel Site Monitoring Protocol can be found under the Resources section of this page.

Timing and Frequency of Data Collection

- Monthly during the growing season. At minimum, once annually during peak biomass and at low tide.

Equipment Needed for Data Collection

- Chesapeake Bay SAV Sentinel Site Monitoring Program data sheet.
- Pencil.
- GPS-enabled device.
- Watch.

-Transects surveyed three times throughout growing season

- Starting in 2023

- 15 sites, 5 for each SAV community

- Conducted by CB researchers and trained watershed organizations

-In-depth data: SAV species, density, canopy height, epiphyte loading, shoot count, indications of disease, water quality and physical parameters, chemical parameters, etc.

-Identifies causal relationships by intensively monitoring drivers of change, ecosystem responses, and ecological processes