

Chesapeake Bay Program | Indicator Analysis and Methods (A&M) Document

Bay Grass Abundance

Each Indicator update must include an Analysis and Methods document that explains how the data are collected, analyzed, interpreted, and communicated to ensure transparency and consistency. Outcome Representatives and subject-matter experts complete the document during an Indicator's first iteration—addressing analytical methods, trends, and data quality—and update it with each new data release. The document is posted on [ChesapeakeProgress](#) with the associated data file, which contains more detailed metadata and reported metrics, for internal and external audiences across the Chesapeake Bay Program.

Relevant Chesapeake Bay Watershed Agreement Outcome(s): Submerged Aquatic Vegetation (SAV) Outcome

Relevant Outcome Target(s):

- Measure progress against the following targets for each salinity zone:
 - Tidal Fresh: 21,700 acres.
 - Low Salinity: 13,100 acres.
 - Medium Salinity: 126,000 acres.
 - High Salinity: 35,800 acres.
- Measure progress toward this Outcome against interim targets of 90,000 acres by 2030, 95,000 acres by 2035 and 100,000 acres by 2040.

Link to Management Strategy: The Management Strategy will be developed by Summer 2027.

Location within Indicators Framework (i.e., Output or Performance): Performance

A. Analysis and Methods Document Metadata

Additional supporting metadata for this document is available in the associated Indicator data file; this document and the data file should be updated together to remain consistent.

1. **Originator:** [David Wilcox, Virginia Institute of Marine Science, William & Mary, \(VIMS\), \[dwilcox@vims.edu\]\(mailto:dwilcox@vims.edu\), 804-684-7088](#)
2. **Resource Date:** [June 13, 2026](#)

B. Analysis and Interpretation

Where appropriate, please provide references or location(s) of documentation (e.g., link to downloadable dataset, story map, tool, report).

1. Briefly describe the dataset. What parameters are directly measured? What parameters are derived through calculation? For what purpose(s) are the data used? [Acreage distribution and percent coverage of submerged aquatic vegetation in Chesapeake Bay and its tributaries are measured and calculated from photo-interpreted aerial imagery taken during surveys conducted in the](#)

growing season. Satellite imagery is used to augment the aerial imagery when necessary to complete the dataset. Data are collected for tracking, research, and long-term monitoring purposes.

2. What methods are used to collect, process, model, analyze, and/or transform raw data into the Indicator? Please cite methods, analytical tools, modeling programs, and relevant documentation. [Please refer to https://www.vims.edu/research/units/programs/sav/reports](https://www.vims.edu/research/units/programs/sav/reports) for methods and tools used to develop Orthorectification and Mosaic Production, Photo Interpretation and Bed Delineation in the 2025 report.
3. Are there established targets, thresholds, reference conditions, or desired-state values for this Indicator? If yes, describe them and how they were derived. [The targets for this Indicator are directly aligned with the language in the SAV Outcome and targets in the *Chesapeake Bay Watershed Agreement*.](#)

Outcome: Sustain and increase the habitat and ecosystem benefits of SAV in the Chesapeake Bay. Achieve and sustain the outcome of 196,600 acres of SAV Bay-wide necessary for a restored Bay.

- Measure progress against the following targets for each salinity zone:
 - Tidal Fresh: 21,700 acres.
 - Low Salinity: 13,100 acres.
 - Medium Salinity: 126,000 acres.
 - High Salinity: 35,800 acres.
 - Measure progress toward this Outcome against interim targets of 90,000 acres by 2030, 95,000 acres by 2035 and 100,000 acres by 2040.
4. Have there been any changes to targets, thresholds, data sources, methodology, or analytical approaches since the last reporting period? If yes, describe what changed and why. [The interim targets and salinity zone targets for SAV abundance were updated in 2025 and are reflected in the revised SAV Outcome.](#)

C. Communicating the Data

Where appropriate, please provide references or location(s) of documentation (e.g., link to downloadable dataset, story map, tool, report).

1. Define the Outlook¹ toward achieving the Outcome as On Course, Off Course, Mixed Results, Limited Data, or Complete. [While the 2025 total is only 45% of our ultimate abundance goal—and overall acreage remains relatively low in the low- and medium-salinity waters of the Oligohaline and Mesohaline Salinity Zones—we have achieved 99% of our 2030 target and are approaching our targets for the tidal freshwater and Polyhaline zones. Therefore, progress toward this outcome is currently considered mixed.](#)

2. What do the most recent data show compared to the previous reporting period? Are there any short-term trends? In 2025, an estimated 89,385 acres of SAV were reported for the Chesapeake Bay, including additional estimated acres. This is a 7.4% increase from the 2024 total of an estimated 83,252 acres.

- **Tidal Fresh Salinity Zone:** decreased from 20,221 acres in 2024 to an estimated 18,653 acres in 2025.
- **Oligohaline Salinity Zone:** decreased from 4,731 acres in 2024 to an estimated 4,712 acres in 2025.
- **Mesohaline Salinity Zone:** increased from 33,033 acres in 2024 to an estimated 37,879 acres in 2025.
- **Polyhaline Salinity Zone:** increased from 25,266 acres in 2024 to an estimated 28,142 acres 2025.

Please note that these acreages are estimated and the Bay-wide and zone areas were not fully mapped in 2025.

3. What is the long-term trend since data collection began?
- **Bay-wide:** Since 1984, SAV acreage has increased from 38,958 acres to an estimated 89,385 acres in 2025. This is above the long-term average of 70,978 acres which has fluctuated between 38,958 acres and 108,078 acres over this period.
 - **Tidal Fresh Salinity Zone:** Since 1984, acreage has increased from 6,911 to an estimated 18,653 acres in 2025, which is above the long-term average of 14,428 acres. This zone has fluctuated between 6,900 acres and 25,481 acres over this same period.
 - **Oligohaline Salinity Zone:** Since 1984, acreage has increased from 653 to an estimated 4,712 acres in 2025, which is below the long-term average of 7,063 acres. This zone has fluctuated between 653 acres and 13,919 acres over this same period.
 - **Mesohaline Salinity Zone:** Since 1984, acreage has increased from 15,636 to an estimated 37,879 acres in 2025, which is above the long-term average of 31,519 acres. This zone has fluctuated between 15,636 acres and 62,933 acres over this same period.
 - **Polyhaline Salinity Zone:** Since 1984, acreage has increased from 15,027 to an estimated 28,142 acres in 2025, which is above the long-term average of 17,943 acres. This zone has fluctuated between 9,960 acres and 28,142 acres over this same period. The 2025 acreage marks a new maximum for this zone.

Please note that these acreages are estimated and the Bay-wide and zone areas were not fully mapped in 2025.

4. What is the key story told by this Indicator? Explain the “why” behind the data in clear, plain language. (e.g., Are there specific geographic areas of concern? Are there broader factors influencing the results?) [Underwater grasses, or submerged aquatic vegetation \(SAV\)](#), provide major ecological benefits in the Chesapeake Bay and its tributaries: they shelter young striped bass, blue crabs, and other species; improve water clarity by helping suspended sediments settle; add oxygen to the water; and reduce shoreline erosion.

Because SAV depends on good local water quality, scientists expect acreage to expand as nutrient and sediment pollution decrease and water clarity improves. Experts closely monitor SAV for this reason, and its abundance serves as a strong indicator of overall Bay health.

Trends in SAV distribution and abundance help reveal water quality trends: loss of SAV indicates poor water quality, while increases indicate improvement. Photographic evidence from multiple sites dating back to 1937 suggests that, historically, 200,000 to 600,000 acres of SAV occurred along the Bay’s shoreline. By 1984, SAV had declined to about 38,000 acres. Today, SAV abundance is included in the water quality standards in Maryland and Virginia.

- i. What management actions or strategies have most influenced trends in the data? [N/A](#)
- ii. Are there any projects or case studies that showcase successful examples of progress? Provide contact information for individual projects or case studies, if possible. [N/A](#)
- iii. What obstacles or challenges (e.g., resources, capacity, funding) currently limit progress? [N/A](#)

D. Data Quality

Where appropriate, please provide references or location(s) of documentation (e.g., link to downloadable dataset, story map, tool, report). For more information on metadata standards, see [Chesapeake Bay Program Metadata Specification document](#).

1. Were the data collected and processed under an EPA-approved Quality Assurance Project Plan (QAPP)?
 - i. If yes, provide the link and date of last approval. [Data collection, analysis, and management methods are described in the Quality Assurance Project Plan \(QAPP\) on file for the EPA grant to the Virginia Institute of Marine Sciences \(VIMS\) and available at the VIMS web site \(\[http://mobiack.vims.edu/sav/VIMS_SAV_QAPP_2021.pdf\]\(http://mobiack.vims.edu/sav/VIMS_SAV_QAPP_2021.pdf\)\). See Chesapeake Bay SAV special reports at <https://www.vims.edu/research/units/programs/sav/pubs/special-reports/> and bibliography at \[https://www.vims.edu/research/units/programs/sav/pubs/sav_biblio\]\(https://www.vims.edu/research/units/programs/sav/pubs/sav_biblio\).](#)

2. Were sampling and analytical procedures consistent throughout the data record? Note any deviations, transitions, or merging of datasets that may affect interpretation. Some technical improvements (e.g., photo-interpretation tools) were made over the 30 years of the annual SAV survey in Chesapeake Bay. Surveyors and analysts have carefully evaluated the effect of methodological changes along the way and made corrections to adjust for any known effects. Some areas in the 2018 - 2025 reports were surveyed using satellite imagery. In some areas, this resulted in a loss of detail that may have a slight impact on the area calculations, particularly where the SAV cover was very sparse. Metadata are included with the data set at the VIMS web site <https://www.vims.edu/research/units/programs/sav/reports>.

E. Additional Information (Optional)

Where appropriate, please provide references or location(s) of documentation (e.g., link to downloadable dataset, story map, tool, report). While the data presented here are geographically focused on the Chesapeake Bay, the data provider also collects information about SAV in Maryland's Coastal Bays, available at https://www.vims.edu/research/units/programs/sav/access/tables/segment_area_stat e.

2025: For 2025, 33,576 hectares (82,969 acres) of SAV were mapped in Chesapeake Bay and its tributaries. However, extended poor weather conditions, access restrictions, equipment failure, and the Federal government shutdown prevented timely acquisition of imagery for a portion of the Bay. The area that was not fully mapped in 2025 supported 2,597 hectares of SAV in 2024 (6,417 acres, 7.7% of the Bay total).

2023: For 2023, 32,259 hectares (79,716 acres) of SAV were mapped in Chesapeake Bay and its tributaries. However, security restrictions prevented timely acquisition of imagery for a portion of the Potomac River. The area that was not fully mapped in 2023 supported 1,498 hectares of SAV in 2022 (3,703 acres, 4.8% of the Bay total).

2021: For 2021, 27,304 hectares (67,470 acres) of SAV were mapped in Chesapeake Bay and its tributaries. However, weather conditions prevented acquisition of useable imagery for a portion of the Mattaponi and Pamunkey rivers. The area that was not fully mapped in 2021 supported 27 ha of SAV in 2020 (66 acres, 0.1% of the 2020 Bay total).

2018: For 2018, 40,270 hectares (99,511 acres) of SAV were mapped in Chesapeake Bay and its tributaries. However, highly turbid water, weather conditions, and security restrictions in the DC area, over Patuxent Air Base and associated mid-Bay areas prevented acquisition of useable imagery for a portion of the tidal fresh and mesohaline Potomac River; the Bohemia, Choptank, and Mattaponi rivers. The area that was not fully mapped in 2018 supported 3,467 ha of SAV in 2017 (8,567 acres, 9% of the 2017 Bay total).

2016: For 2016, 97,668 acres of SAV were mapped in Chesapeake Bay and its tributaries. However, weather conditions and security restrictions in the DC area, over Patuxent Air Base and associated mid-Bay areas prevented acquisition of useable imagery for a portion of the tidal fresh and mesohaline Potomac River, including Piscataway Creek and St. Mary's River. A small portion of this area was covered by NAIP imagery under conditions that were appropriate for mapping SAV. The area that was not fully mapped in 2016 supported 1,951 acres of SAV in 2015, 2% of the 2015 Bay total. The full report located at <https://www.vims.edu/research/units/programs/sav/reports/2016> will contain more details.

2011: Only 57,964 acres were mapped Bay-wide in 2011. It is estimated that an additional 5,119 acres may have been present (for an estimated Bay-wide total of 63,083), however, they could not be mapped since SAV signatures were masked by excess turbidity present months after the passage of Hurricane Irene and Tropical Storm Lee. The regions that were not mapped are contained within nine CBP segments, including the Middle, Upper and Western Branch of the Patuxent River; the Middle and Upper Potomac River; Piscataway Creek; and the Anacostia River. The estimated additional acreage is based on acreages mapped in those regions in 2010. Zone and density totals do NOT include estimated additional acreage.

2003: Only 61,695 acres were mapped Bay-wide in 2003. It is estimated that an additional 1,832 acres may have been present (for an estimated Bay-wide total of 63,527), however, they could not be mapped since some portions of the Bay were not flown due to adverse weather in the spring and summer and Hurricane Isabel in the fall. These regions, including Tavern and Swan creeks; lower Chester River; upper Wicomico River; Prentice, Dividing, and Ball Creeks; Dameron Marsh; and Great Wicomico River were not fully mapped in 2003. The estimated additional acreage is based on acreages mapped in those regions in 2002. Zone and density totals do NOT include estimated additional acreage.

2001: Only 77,889 acres were mapped Bay-wide in 2001. It is estimated that an additional 7,525 acres may have been present (for an estimated Bay-wide total of 85,415), however, they could not be surveyed due to flight restrictions following September 11. The estimated additional acreage is based on acreages mapped in those regions in 2000. Zone and density totals do NOT include estimated additional acreage.

1999: Only 64,718 acres were mapped baywide in 1999. It is estimated that an additional 3,382 acres may have been present (for an estimated baywide total of 68,100), however, they could not be mapped due to the following: either flown too late in 1999, due to poor atmospheric conditions and severe storm events, or not flown until after an early seasonal die-back in freshwater SAV species, possibly a result of increased salinity during the drought and severe storm events. Those areas include Spesutie Narrows, the Bush, Gunpowder, upper Patuxent, lower Magothy, upper York and upper James rivers, and the Swan Point and Tavern Creek area. The estimated additional

acreage is based on acreages mapped in those regions in 1998. Zone and density totals do NOT include estimated additional acreage.

1986: Only 47,414 acres were mapped Bay-wide in 1986. It is estimated that an additional 276 acres may have been present (for an estimated Bay-wide total of 47,690), however, they could not be mapped due to flight restrictions around Aberdeen Proving Grounds. Where available, the previous and subsequent year's data were averaged to generate estimated additional acreage. Please refer to "SAV Area Estimates for Missing 1984 and 1986 Quadrangles Technical Note 12/15/97" for details. Zone and density totals do NOT include estimated additional acreage.

1984: Only 38,228 acres were mapped Bay-wide in 1984. It is estimated that an additional 731 acres may have been present (for an estimated Bay-wide total of 38,958), however, they could not be mapped due to flight restrictions around Patuxent Naval Air, camera malfunction and missing digital files. Where available, the previous and subsequent year's data were averaged to generate estimated additional acreage. Please refer to "SAV Area Estimates for Missing 1984 and 1986 Quadrangles Technical Note 12/15/97" for details. Zone and density totals do NOT include estimated additional acreage.

¹*Outlook:* Outlook is the forecasted trajectory for whether the Chesapeake Bay Program is on course to achieve the Outcome. An Outcome's Outlook may be On Course, Off Course, Uncertain, or Completed.