Strategic Approaches for Maintaining Core Partnership Monitoring Networks in the Chesapeake Bay Program

Prepared by the Monitoring Strategy Team
for the Policy Steering Committee

October 8, 2026



The Shenandoah River (Jefferson County, WV) is one of the major nontidal rivers in the watershed and is included as part of the Chesapeake Bay Program partnership nontidal monitoring network. (Photo by Marielle Scott/Chesapeake Bay Program with aerial support by SouthWings)

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Executive Summary

Sustained, long-term monitoring is a keystone of any effective ecosystem restoration effort, especially one at the scale of the Chesapeake Bay Program. Long-term monitoring and analysis help to document current and changing water quality, habitat and living-resources conditions and underpin the development of effective implementation, conservation and land-use strategies. The 2025 Chesapeake Bay Watershed Agreement emphasizes the importance of the monitoring program with an outcome and core principle: "Maintain and enhance a coordinated watershed-wide monitoring, modeling and research program to support decision-making, track progress and assess the effectiveness of management actions."

Robust monitoring data are critical for calibration of the watershed model, evaluating the effects of management actions and providing the foundation for data-driven decision making by local, state and federal natural resources agencies. Further, these data ensure the best use of taxpayer resources as jurisdictions possess real-time information on where they should target their limited resources to maximize nutrient and sediment reductions. However, sustaining these long-term monitoring networks has become increasingly challenging due to shifting partner capacities and the need to balance multiple natural-resource priorities.

Most recently, within the Chesapeake Bay Program, short-term funding support from the Infrastructure Investment and Jobs Act has been critical for maintaining several long-term monitoring networks. With federal fiscal year 2026 (i.e., October 1, 2026 – September 30, 2027) representing the final allocation of Infrastructure Investment and Jobs Act funding, the Policy Steering Committee (formally Principals' Staff Committee) empaneled the Monitoring Strategy Team to address the impending challenges related to support of the Program's long-term monitoring networks.

The goal of the Monitoring Strategy Team is to collaborate with a broad cross section of Chesapeake Bay Program partners to gather perspectives, learn about monitoring program vulnerabilities and better understand the range of potential strategies to support the core partnership monitoring networks.

This report and supplemental material will support Policy Steering Committee members as they work with their respective partners and legislatures on a coordinated approach for Chesapeake Bay Program monitoring funding.

The Policy Steering Committee Monitoring Strategy Team has developed the following list of 10 recommended sequential strategies for maintaining the partnership's core monitoring networks into the future:

1. Build and Strengthen Partnerships Rooted in a Shared Vision

Sustaining long-term monitoring requires proactive, well-coordinated partnerships built around a clear shared vision, enabling early identification of challenges, consistent communication and collaborative support that strengthens network resilience and reduces the risk of widespread monitoring disruptions. This necessitates clear communication across PSC members when a partner has the capacity to increase funding for monitoring or when a partner must make a targeted disinvestment.

2. Maintain Investments in Standardized Protocols

Maintaining standardized methods and robust infrastructure is essential to ensuring long-term data consistency, enabling reliable trend analyses and preventing unintended technical consequences when network protocols evolve.

3. Seek to Innovate in Ways That Preserve Data Consistency, While Increasing Efficiency

As part of these investments, the partnership must look to the future and dedicate resources to new monitoring technologies and analytical tools, such as continuous sensors and Artificial Intelligence/Machine Learning methods, to improve efficiency while ensuring innovations are carefully integrated to maintain the consistency and reliability of long-term data sets.

4. Conduct Routine Network Assessment to Ensure Network Composition Meets Partnership Needs

Regular, structured evaluations of monitoring network composition ensure that each site continues to provide unique value, align with evolving partnership priorities and maintain the efficiency and scientific integrity needed to strategically support long-term restoration and decision making.

5. Develop Individual Core Monitoring Network Support Strategies

Establishing tailored, repeatable funding and coordination strategies for each core monitoring network helps partners identify needs, address vulnerabilities and sustain long-term monitoring efforts that no single entity can maintain alone.

6. Match Monitoring Strategies to the Size and Type of the Vulnerability

The partnership should tailor monitoring strategies and responses to the scale and nature of each funding vulnerability, addressing large gaps with long-term or multi-partner investments while using targeted jurisdictional support or short-term mechanisms to efficiently bridge smaller gaps and prevent loss of critical monitoring capacity.

7. Plan Proactively and Adaptively for Partner Timelines and Emerging Challenges

The partnership must plan early and stay flexible, coordinating partner resources and timelines across agencies and adapting quickly to unexpected disruptions, to keep long-term monitoring running smoothly and protect the reliability and value of monitoring datasets. The Monitoring Strategy Team will continue to engage the Policy Steering Committee to ensure its members have information to understand how best to prioritize resources on the monitoring network as needs evolve.

8. Prioritize Long-Term Solutions While Leveraging Short-Term Solutions

By pairing flexible short-term funding tools with stable long-term investments, the partnership can maintain continuous monitoring capacity, reduce vulnerability to funding volatility and ensure that core networks remain strong enough to support long-term restoration goals.

9. Communicate Monitoring Results to Show Network Value

Regularly sharing monitoring results and success stories across the partnership strengthens transparency, highlights emerging conditions and vulnerabilities and demonstrates the essential value of core monitoring networks by providing actionable insights that inform management decisions and sustain long-term restoration efforts. These stories should emphasize how timely investments in the monitoring network create cost-savings as jurisdictions can better target their limited resources.

10. Integrate Monitoring Priorities into Policy and Restoration Strategies

Embedding monitoring priorities into long-term policy and restoration frameworks ensures sustained support for core networks by directly linking monitoring data to management decisions, strengthening accountability and safeguarding resources during periods of uncertainty. To accomplish this, the Monitoring Strategy Team will provide annual briefings to the PSC to ensure investments and management decisions remain agile.

Background



Nontidal water quality monitoring is one of the CBP partnership's four core monitoring networks. (Photo by Will Parson/Chesapeake Bay Program)

The Chesapeake Bay Program (CBP) partners invest significantly in multiple monitoring networks across the watershed. These high-quality monitoring data are critical for evaluating management effectiveness through status and trend assessments, tracking progress towards shared restoration goals, addressing regulatory requirements, assessing living resource response to management and changing conditions and improving modeling efforts. These investments include the following four core CBP partnership monitoring networks: Nontidal Water Quality, Tidal Water Quality (including long-term monitoring and water column hypoxia monitoring), Submerged Aquatic Vegetation (SAV) and Tidal Benthic (Figure 1). These core monitoring networks are supported by the

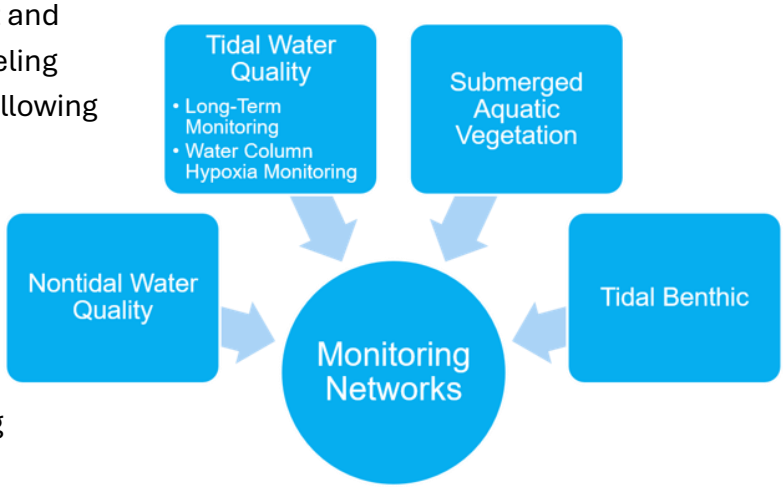


Figure 1: Chesapeake Bay Program partnership core monitoring networks

Environmental Protection Agency (EPA) as well as multiple federal, state and local entities.

In March 2021, the Policy Steering Committee (PSC, formerly the Principals' Staff Committee) requested a report on how to improve the quality of CBP partnership monitoring networks. As a response to this PSC request, *Enhancing the Chesapeake Bay Program Monitoring Networks: A Report to the Principals' Staff Committee* was published in October 2022. This report documented the status of the CBP partnership monitoring networks, priority needs for enhancements and monitoring resource gaps. The final report included 31 recommendations for maintaining, growing and adapting the CBP partnership monitoring networks.

While *Enhancing the Chesapeake Bay Program Monitoring Networks: A Report to the Principals' Staff Committee* was being completed, the Infrastructure Investment and Jobs Act (IIJA), which was signed in November 2021, provided the EPA with $236 million in supplemental funding through federal FY 2026 (i.e., September 30, 2027) to support monitoring and other Chesapeake Bay restoration activities. When combined with annually appropriated funding, the supplemental resources supported over 90% of recommendations identified in the report. These funds were used to sustain and enhance the existing partnership monitoring network operations.

EPA and partners were able to leverage IIJA and base appropriation resources to maintain the robust monitoring networks through September 30, 2027. Beginning October 2027, an additional $3.2 million is needed from partners to maintain the core monitoring networks and avoid disruption in ongoing monitoring activities (Table 1). If not filled, consequences of this resource gap may be felt across portions of the four core partnership monitoring networks. The Monitoring Strategy Team was established to address this potential resource challenge as well as emerging challenges.

Table 1: Infrastructure Investment and Jobs Act (IIJA) funding supporting Chesapeake Bay Program (CBP) partnership monitoring from federal fiscal year (FY) 2022 through 2027

Federal FY	FY22	FY23	FY24	FY25	FY26	FY27
IIJA Funding Supporting CBP Partnership Monitoring	$2 million	$2.2 million	$2.4 million	$3.1 million	$3.2 million	$0

Charge

In June 2024 the PSC charged the CBP leadership to assign a team to address monitoring vulnerabilities and protect investments in CBP partnership monitoring networks through collaboration, assessment and partner coordination. The Monitoring Strategy Team was formed and is charged with developing strategies to support long-term CBP partnership monitoring networks. A critical part of this work is better understanding the vulnerabilities affecting both federal and jurisdictional monitoring resources that are essential for maintaining core monitoring efforts. A report was requested by October 2026 to inform planning efforts for the core partnership monitoring networks.

Purpose

The Monitoring Strategy Team collaborated with a broad cross section of CBP partners to gather varied perspectives, learn about core monitoring vulnerabilities and better understand the range of potential options to continue and further support the core partnership monitoring networks. This work builds on recent partnership efforts and longstanding monitoring expertise, reflecting the substantial institutional knowledge contributed by federal, state, academic and local partners. In addition, this report is intended to serve as a practical planning tool. Partners should use the report to understand risks to maintaining the existing monitoring networks, proactively coordinate timelines and internal funding requests with their respective legislatures, and identify opportunities to strengthen monitoring capacity while maximizing limited resources. Integrating these insights into annual planning, budgeting and staffing cycles can help partners anticipate and mitigate risks before they emerge and better align Chesapeake Bay Program needs across the partnership.

The role of the Monitoring Strategy Team included:

- Understanding the partnership's current monitoring networks.
- Describing the key role each monitoring network plays.
- Estimating current partnership monitoring vulnerabilities, including the post-September 2027 impact when the partnership has fully used all IIJA and supplemental funding.
- Ensuring that partnership monitoring networks remain aligned with the 2025 Chesapeake Bay Watershed Agreement (Watershed Agreement).
- Identifying strategies to sustain core partnership monitoring networks through continued federal, state, academic and local collaboration.

Core Monitoring Network Summaries

To effectively manage and restore the Chesapeake Bay, the partnership relies on an extensive network of monitoring efforts that span the full breadth and depth of the watershed. These activities include site planning, developing and following sampling plans, conducting field data collection, performing laboratory analyses, implementing quality assurance and quality control procedures, managing and validating databases, analyzing data, summarizing results, and preparing reports. Monitoring programs collectively generate long-term, high-quality data needed to understand ecosystem conditions, evaluate progress, guide adaptive management and inform policy decisions. While monitoring across the Bay and its watershed is wide-ranging and conducted by many different partners including federal and state agencies, academic institutions, river basin commissions, nonprofits and volunteer groups, the Monitoring Strategy Team intentionally narrowed the scope of this report to focus on the four core CBP monitoring networks that form the scientific backbone of the partnership and serve as the basis for assessing water quality in line with commitments expressed in the Watershed Agreement. Please see Table 2 for a summary of the core partnership monitoring networks.

These foundational monitoring networks—the Nontidal Water Quality, Tidal Water Quality, SAV and Tidal Benthic—provide critical, sustained observations that underpin model development, trend assessments, criteria attainment evaluations and habitat and water quality analyses. Centering the report on these four networks allows the team to highlight their essential roles, identify vulnerabilities and support strategic planning to ensure their long-term continuity. In addition to the core monitoring networks, the Chesapeake Bay Program leverages the extensive monitoring conducted across the Bay and its watershed by federal and state agencies, academic institutions, river basin commissions, nonprofits, and volunteer groups. Community science programs—such as the Chesapeake Monitoring Cooperative, which contributes data to the nontidal and tidal water-quality networks, and the Chesapeake Bay SAV Watchers Program, which provides supplementary data for the SAV Monitoring Program—further expand the information used to support Bay restoration efforts.

Table 2: Summary of the four core CBP partnership monitoring networks. See report text for acronym definitions.

Network	What It Does	Why It's Essential	Who Is Involved
Nontidal Water Quality	Measures nitrogen, phosphorus, and sediment across 123 river stations; monthly and stormflow sampling; provides nutrient and sediment loads/trends every two years.	Identifies nutrient and sediment delivery patterns; supports watershed modeling inputs, informs restoration and management decisions directly tied to the Bay TMDL for nutrients and sediment, and Watershed Agreement.	25 partner entities; 7 field-sampling partners; USGS leads analysis.
Tidal Water Quality – Long-Term Monitoring Network	Collects physical, chemical, and biological samples at 156 tidal stations that are sampled 1–2 times per month, continuous shallow water monitoring sites, and longitudinal surveys.	Supports tidal water-quality standards assessments, Bay health evaluation, trend reporting, environmental change analysis, and the implementation of the Bay TMDL and Watershed Agreement.	EPA; VA DEQ, MD DNR and DC Health conduct sampling.
Tidal Water Quality – Water Column Hypoxia Monitoring Network	Measures real-time dissolved oxygen, salinity and temperature with buoys and vertical sensor arrays to capture short-term hypoxia dynamics.	Fills gaps in short duration monitoring needs; supports 4D interpolator development and water quality criteria assessment; improves model calibration.	NOAA, EPA and CBNERR-VA.
Submerged Aquatic Vegetation (SAV)	Provides annual SAV distribution and cover via VIMS aerial survey; supplemented by on water volunteer observers, detailed in-water observations and emerging satellite methods.	Tracks progress toward the 196,600-acre SAV restoration goal; supports Clean Water Act, Bay TMDL and Watershed Agreement requirements; essential for habitat health evaluations.	VIMS, Virginia Coastal Zone Program, MDE, MD DNR, EPA, Chesapeake Bay SAV Watchers Program volunteers.
Tidal Benthic	Tracks benthic community health through fixed stations and randomized stations; summer sampling season.	Assesses benthic biological condition, supports long-term trend analysis, and informs Chesapeake Bay restoration goal progress; cost-effective Bay health evaluation	MD DNR, VA DEQ, EPA, academic/contractor partners.

Nontidal Water Quality: The Nontidal Network (NTN) is designed to monitor river flow, nitrogen, phosphorus and sediment delivery throughout the major nontidal rivers in the watershed and provides a detailed understanding of current and changing water-quality conditions across the nontidal rivers in the watershed. The present network of 123 stations, formed in 2004, includes locations across all jurisdictions as well as nine river-input monitoring sites, which cumulatively represent nearly two-thirds of the riverine flow above the fall line, where the Piedmont meets the Atlantic Coastal Plain. 25 entities, representing local, state and federal agencies as well as other partners, support the operation of the NTN. Seven of the partners perform the monthly and stormflow field work to collect NTN monitoring samples using consistent protocols and methodologies.

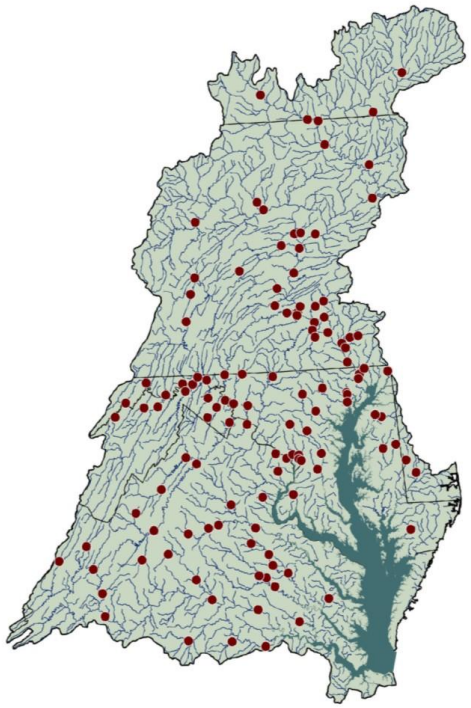


Figure 2: Map of Nontidal Network monitoring stations (red circles) in the Chesapeake Bay watershed.

As part of this network, the partnership delivers information regarding nutrient and sediment loads and trends computed every two years, additional water-quality parameters, streamflow data and multiple critical watershed modeling inputs. The United States Geological Survey (USGS) leads the analysis of the network samples, collected from NTN stations, to produce these monitoring-based insights of both current condition and change. These analyses illustrate complex factors affecting nutrients and sediment delivery, highlight opportunities for reductions and ultimately inform local and regional watershed management by providing decision makers with essential information for restoration and conservation actions, in addition to informing restoration and management decisions tied to the Chesapeake Bay Total Daily Maximum Load (Bay TMDL) and Watershed Agreement.

Tidal Water Quality: The Tidal Water Quality monitoring network is supported by two sub-networks: 1) the Chesapeake Bay Long-Term Water Quality Monitoring Network, which monitors physical, chemical and biological measures throughout the tidal Bay and provides the needed information to evaluate tidal water quality and evaluate Bay health and the 2) Water Column Hypoxia Monitoring Network, which monitors dissolved oxygen at

a high frequency across depth and provides real-time information on hypoxia or low oxygen conditions that negatively impact fish and other aquatic organisms in the tidal Bay.

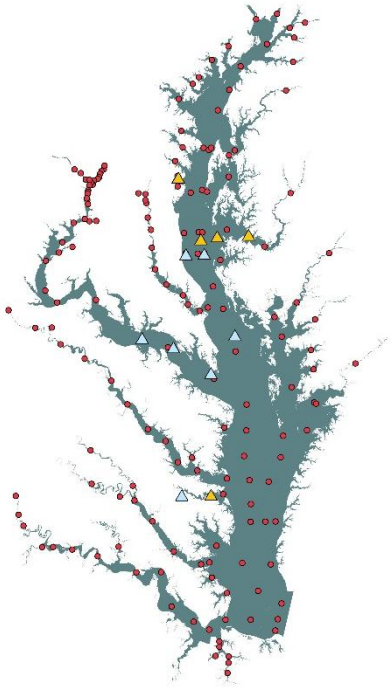


Figure 3: Map of Tidal Network monitoring stations including long-term monitoring sites (red circles), previously deployed hypoxia sites (blue triangles) and currently deployed (2026) hypoxia sites (yellow triangles) in the Chesapeake Bay and its tidal tributaries.

Long -Term Water Quality Monitoring Network:

The current tidal monitoring network has three components. It includes 156 active stations, shallow water quality monitoring sites, and longitudinal surveys. Activities are managed by the Department of Environmental Quality (VA DEQ), the Maryland Department of Natural Resources (MD DNR) and the District of Columbia Department of Health (DC Health). Discrete samples are collected from each of the 92 Chesapeake Bay segments once or twice per month depending on season and location for physical, chemical and biological measures throughout the water column using Bay-wide consistent collection and analysis protocols. Additionally, continuous water quality data from the shallow water monitoring stations are collected at fixed locations while longitudinal surveys are conducted to conduct continuous water quality data from moving boats. Data from this monitoring network—including dissolved oxygen, temperature, salinity, clarity, nitrogen, phosphorus, chlorophyll *a* and total suspended solids—are essential for assessing water quality standards. These data also support reporting of annual and seasonal trends, advanced statistical analyses and approaches used to evaluate Bay health and track changes due to resource management decisions and changing environmental conditions, as well as in addition to informing restoration and management decisions tied to the Bay TMDL and Watershed Agreement.

Water Column Hypoxia Monitoring Network:

Real-time continuous monitoring occurs at strategic locations in the tidal Chesapeake Bay from National Oceanic and Atmospheric Administration (NOAA) buoys equipped with vertical sensor arrays where water quality data (i.e., dissolved oxygen, salinity and temperature) are collected multiple times per hour at multiple depths from roughly April-November. Developed from a 2003 partnership vision and implemented beginning in 2019, the Hypoxia Monitoring Network addresses historically unmonitored short-duration habitat conditions with vertical sensor arrays to capture fine-scale dissolved oxygen dynamics that are critical for understanding hypoxic events. The Chesapeake Bay National Estuarine Research Reserve in Virginia (CBNERR-VA) is a critical partner in this work. The resulting

data inform the development of the CBP Four Dimensional (4D) Interpolator, support watershed and estuarine model calibration and verification, fill long-standing programmatic gaps and ultimately provide annual status and trends along with continuous, vertically resolved data needed for tidal water quality standards and other decision-making needs.



Jay Lazar, left, and a team from the National Oceanic and Atmospheric Administration (NOAA) retrieve a hypoxia monitoring buoy for maintenance at the mouth of the Choptank River near Talbot County, Md. (Photo by Marielle Scott/Chesapeake Bay Program)

Submerged Aquatic Vegetation: The Chesapeake Bay SAV Monitoring Program is one of the most recognized large-scale, long-term annual SAV monitoring programs in the world. It utilizes several methods to collect annual data on the distribution of SAV acres and cover throughout the shallow water habitats of the Bay and its tidal tributaries. This monitoring is required by Congress under the Clean Water Act Section 117 and is essential to tracking habitat health and progress toward the Chesapeake Bay tidal water 196,600-acre SAV restoration goal, which is critical to support tidal living resources.

Current SAV monitoring toward this goal relies primarily on the Bay-wide annual aerial survey conducted by the Virginia Institute of Marine Science (VIMS). The annual surveys, consisting of over 180 flight lines, collect SAV distribution data from small aircraft, most of which is derived from high-resolution digital imagery. Since 2018, acreage estimates are supplemented by satellite-imagery to address survey gaps. Additional SAV Monitoring

Program data are gathered by the Chesapeake Bay SAV Watchers Program and the Chesapeake Bay SAV Sentinel Site Program. The Chesapeake Bay SAV Watchers is a volunteer program that helps ground truth the aerial survey data by collecting more detailed, on the water information about which underwater plant species are present and what their habitats look like. Biologists collect even more detailed, in-the-water SAV data through the SAV Sentinel Site Program. Together, these datasets provide a detailed understanding of the health of our SAV habitats across the Chesapeake Bay. This three-tiered SAV monitoring effort supports the Chesapeake Bay Program partnership's broader monitoring efforts, which also track tidal bottom-dwelling organisms and tidal and nontidal water quality. Additional efforts include emerging work where researchers at Old Dominion University (ODU) are working to develop new tools that use high-resolution, multispectral satellite imagery to identify and map SAV.

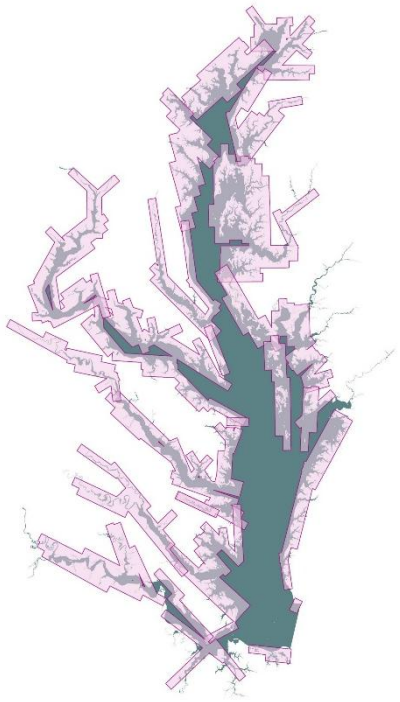


Figure 4: Map of submerged aquatic vegetation flight lines (purple polygons) in the Chesapeake Bay and its tidal tributaries.

This network of SAV monitoring partners—including EPA, VIMS (with match support), the Virginia Coastal Zone Management Program, the Maryland Department of the Environment (MDE) and MD DNR—collectively provides SAV bed delineation and habitat information needed for annual reporting, management decisions and assessing progress toward restoration goals, in addition to supporting the Clean Water Act and informing efforts tied to the Bay TMDL and Watershed Agreement.

Tidal Benthic: The Chesapeake Bay long-term Tidal Benthic Monitoring Program began in Maryland in 1984 and Virginia in 1985 and is designed to monitor and track benthic biotic integrity, which provides information on Bay living resource habitat conditions. The current summer monitoring season typically runs from July 15 through September 30. The program has historically been conducted through a partnership between MD DNR, VA DEQ and EPA.

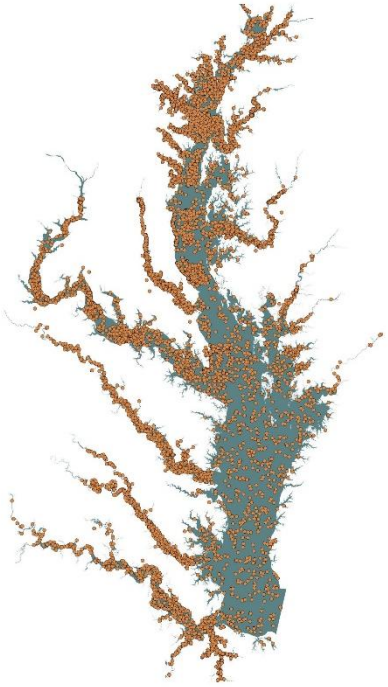


Figure 5: Map of Tidal Benthic Monitoring Program stations (brown circles) in the Chesapeake Bay and its tidal tributaries.

Benthic refers to the plants and animals that live in the mud, sand or sediments that make up the bottom of the Bay. Because these plants and animals respond to the water quality conditions of the Bay, their presence, abundance, and communities provide a useful measure of habitat health. Monitoring also includes measurements of water quality and sediment conditions, providing important context for understanding factors that influence these communities.

The Tidal Benthic Monitoring program consists of two major elements: a fixed site monitoring effort that is used to document status and identify long-term trends in benthic condition and a probability based sampling effort of randomly selected sites used to assess Bay health, which is used to assess aquatic life conditions and show how bottom-dwelling plant and animal communities are changing over time. Together, these efforts constitute a network of more than 250 monitoring sites across the tidal Bay. Collectively, this information provides insights into living resource conditions and how the Bay is changing in response to management and changing environmental conditions.

Status of the Chesapeake Bay Program Partnership Monitoring Networks

Core Partnership Monitoring Network Funding

Currently, the CBP partnership's core monitoring networks rely on a mix of funding sources, including annual federal appropriations distributed through interagency agreements, categorial grants and competitive and noncompetitive grants authorized under Section 117e of the Clean Water Act, funding made available through federal supplemental appropriations, jurisdictional dollars, and other sources that include grant matching dollars, local government contributions, private industry, coastal management programs and river basin commissions. Figure 6 provides summarized information on the funding levels, funding sources and funding partners for each of the core partnership monitoring networks. While the exact financial allocations to each component are not detailed here, the overall funding picture highlights unique financial support frameworks for each of the core partnership monitoring networks.

Nontidal Water Quality: Operating the nontidal water quality core monitoring network costs about $9.4 million per year in 2026 dollars. Funding comes from four sources: annual federal appropriations, IIJA funds, state and local dollars. These funds are provided by 25 partners, including federal agencies (i.e., EPA, USGS, United States Army Corps of Engineers [USACE]), state agencies, river basin commissions, local governments, private industry, and others.

Seven partners collect nontidal water quality monitoring data as part of the NTN. The funding supports monthly monitoring during normal conditions and storms, as well as quality assurance, equipment maintenance, lab analysis, data analysis, data sharing, and communication of results.

Tidal Water Quality: Operating the tidal water quality core monitoring network costs about $4.4 million per year in 2026 dollars, funded through annual federal appropriations, IIJA funds, and state dollars. Federal and state agencies make up the four main funding partners.

The Chesapeake Bay Long-Term Water Quality Monitoring Network is supported by annual EPA appropriations and state funding from DC Health, MD DNR and VA DEQ. This funding covers activities such as monthly or bi-monthly tidal water quality monitoring (using boats and large research vessels), shallow water continuous monitoring network and underway water quality mapping by boat, quality assurance and control, equipment maintenance, lab analysis of water samples, data analysis, data sharing, and communication of results.

The Water-Column Hypoxia Monitoring Network is funded by annual federal appropriations from NOAA and IIJA resources from EPA. These funds support continuous data collection, quality assurance and control, equipment maintenance (also requiring boats), water quality sample analysis, data analysis, data sharing, and communication.

Submerged Aquatic Vegetation: The Bay-wide annual aerial survey component of the SAV Monitoring Program costs about $890,000 per year in 2026 dollars. Funding comes from annual federal appropriations, IIJA funds, state/jurisdictional dollars, and other sources. Partners include EPA, VA DEQ, MDE, MD DNR and VIMS.

The program supports aerial surveys to collect imagery needed to map SAV beds and report acres of cover, along with data processing and analysis, quality assurance, equipment and program maintenance, and sharing results with partners. Additional funding from EPA and ODU has supported the development of new satellite-based methods that will allow for more frequent SAV mapping throughout the year.



Brooke Landry of Maryland Department of Natural Resources (DNR) collects data while diving at the Susquehanna Flats in the Chesapeake Bay near Havre de Grace, Md. (Photo by Rhiannon Johnston/Chesapeake Bay Program)

Tidal Benthic: The tidal benthic monitoring network costs about $727,000 per year in 2026 dollars. Funding has traditionally come from annual federal appropriations and state/jurisdictional dollars, mainly from EPA, VA DEQ, and MD DNR. However, MD DNR will no longer be able to fund Maryland's portion in future years.

Running the network involves identifying randomly-selected monitoring sites, coordinating sampling schedules, conducting summer fieldwork (which requires boats), performing quality assurance, maintaining equipment, analyzing samples (including water quality and benthic organisms), analyzing data, and sharing results.

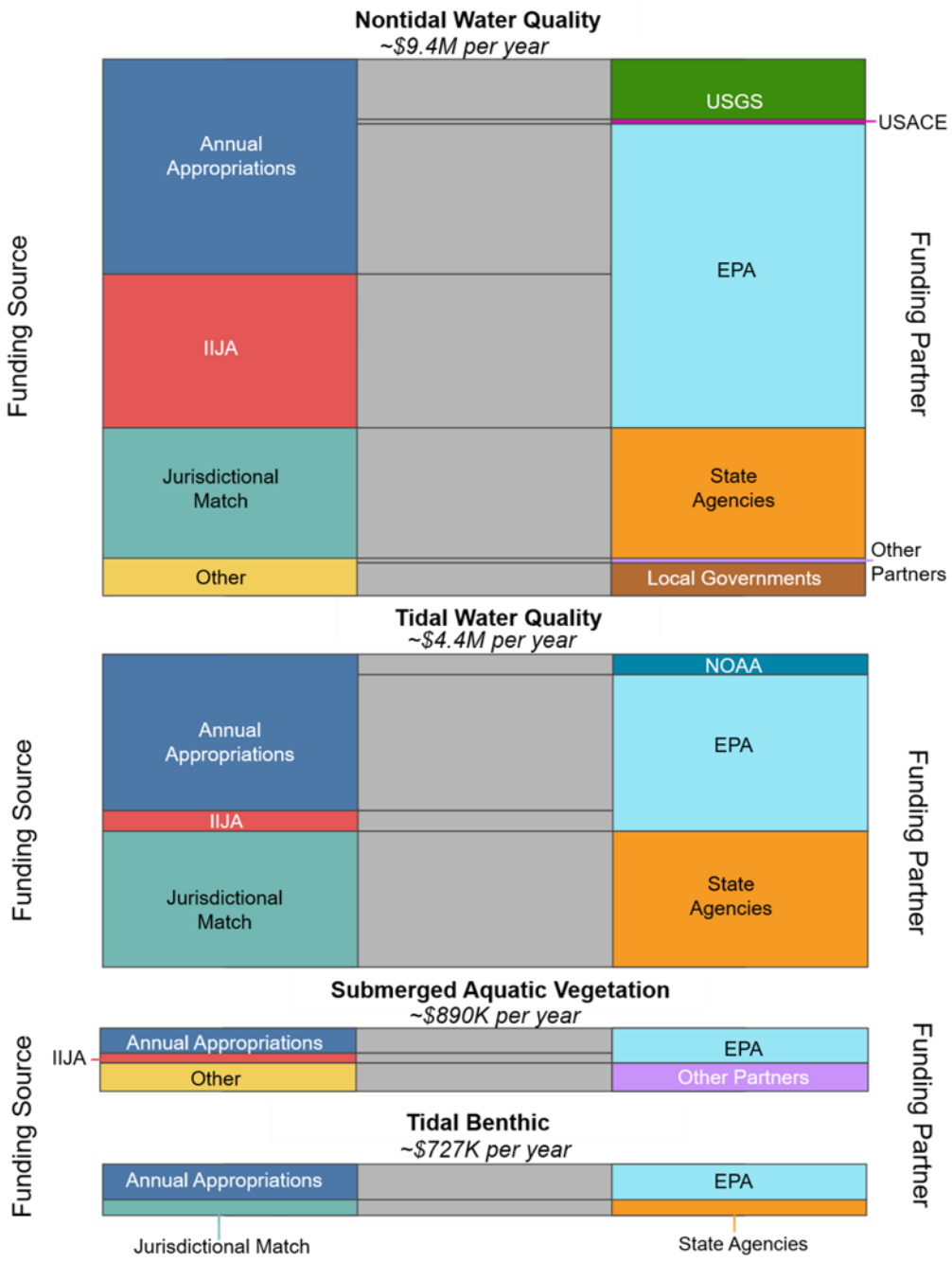


Figure 6: Funding sources and funding partners that make up each of the core partnership monitoring networks based on FY25 information. See the report for acronym definitions. Funding flows from the listed sources to the partners the operations of each monitoring network. Note that the listed funding levels are approximate and may vary from year to year, as well as the number of funding sources and partners for each monitoring network. IIJA funding will support the networks only through the 2026 federal appropriations cycle and will be expended by October 2027, after which new resources will be needed to prevent contractions in core monitoring activities.

Monitoring Strategy Team-Identified Vulnerabilities

In evaluating the long-term sustainability of the CBP partnership's core monitoring networks, the Monitoring Strategy Team identified several vulnerabilities across monitoring support systems. These vulnerabilities vary in scope, scale and potential impact but collectively highlight areas where resource limitations could impede the partnership's ability to maintain its agreed upon monitoring priorities.

The Monitoring Strategy Team explored monitoring vulnerabilities for each jurisdiction and federal partner, working to identify urgent or high-priority vulnerabilities. While year-to-year uncertainty persists for many jurisdictions the most frequently cited vulnerability was of the end of federal supplemental IIJA funds. While partners expressed uncertainty related to IIJA funding, this risk remains largely perceived as jurisdictions do not receive IIJA funds to support the partnership monitoring networks. However, when IIJA funding ends as scheduled, with significant impacts expected by October 2027, the partnership anticipates substantial gaps in support for core monitoring efforts without backfilling interventions. Interagency Agreements supporting USGS monitoring and staffing, as well as NOAA's contributions to water-column hypoxia monitoring rely extensively on EPA's IIJA funding.

A central challenge is the number of monitoring networks that rely on a small number of funding sources. For example, the NTN benefits from contributions from more than 20 partners, while the Tidal Benthic program relies on only two to three funding partners. Networks with fewer partners have less flexibility to absorb funding shifts and are more exposed to fluctuations in federal or state contributions, which is why it is critical for PSC members that support core monitoring activities openly communicate on their longer-term plans to support monitoring.

In addition, the partnership depends on a mix of long-term and short-term agreements to fund monitoring networks. Some rely on stable, longstanding mechanisms such as Interagency Agreements, competitive or noncompetitive grants, categorical grants or recurring jurisdictional match funds, while others depend more heavily on short-term grants or time-limited appropriations.

Some funding sources have strict limitations that further contribute to network vulnerabilities. For example, appropriated dollars, IIJA funds and other categorical funding each carry unique constraints and timelines and the authorizing authority for each funding source often dictates what activities can be supported. These source-specific rules may limit flexibility to respond to emerging needs or shifting program priorities.

The vulnerabilities explored by the Monitoring Strategy Team underscore a broader message: maintaining the CBP partnership's core monitoring networks will require sustained support and proactive strategies. Acknowledging resource limitations and unmet needs that pose risks to the continuity of current monitoring activities will help the partnership plan network specific monitoring strategies for the short- and long-term. Further, the Chesapeake Bay Program's extensive longitudinal water quality data that is collected from the core partnership monitoring networks represents a hallmark of science within the global estuary restoration space. Continued attention to these potential vulnerabilities will be critical to ensure the partnership can maintain its core monitoring priorities and meet the information needs of decisionmakers across the watershed.

Recommendations



Amy Imirie of the Maryland Department of Natural Resources (DNR) pours a water sample into a beaker during monthly tidal water quality monitoring on the mainstem of the Chesapeake Bay in. Maryland (Photo by Ethan Weston/Chesapeake Bay Program)

The Monitoring Strategy Team recommends a set of coordinated strategies to help the CBP partnership sustain its core monitoring networks and navigate the potential vulnerabilities

identified in this report (Figure 7). These recommended strategies emphasize proactive planning, strong partnerships and structured approaches to matching needs with appropriate solutions and are presented in a step-by-step sequence, where each strategy builds on the previous one. Additionally, these recommended strategies may be of value for monitoring that happens across the Chesapeake Bay watershed outside the four core partnership monitoring networks.

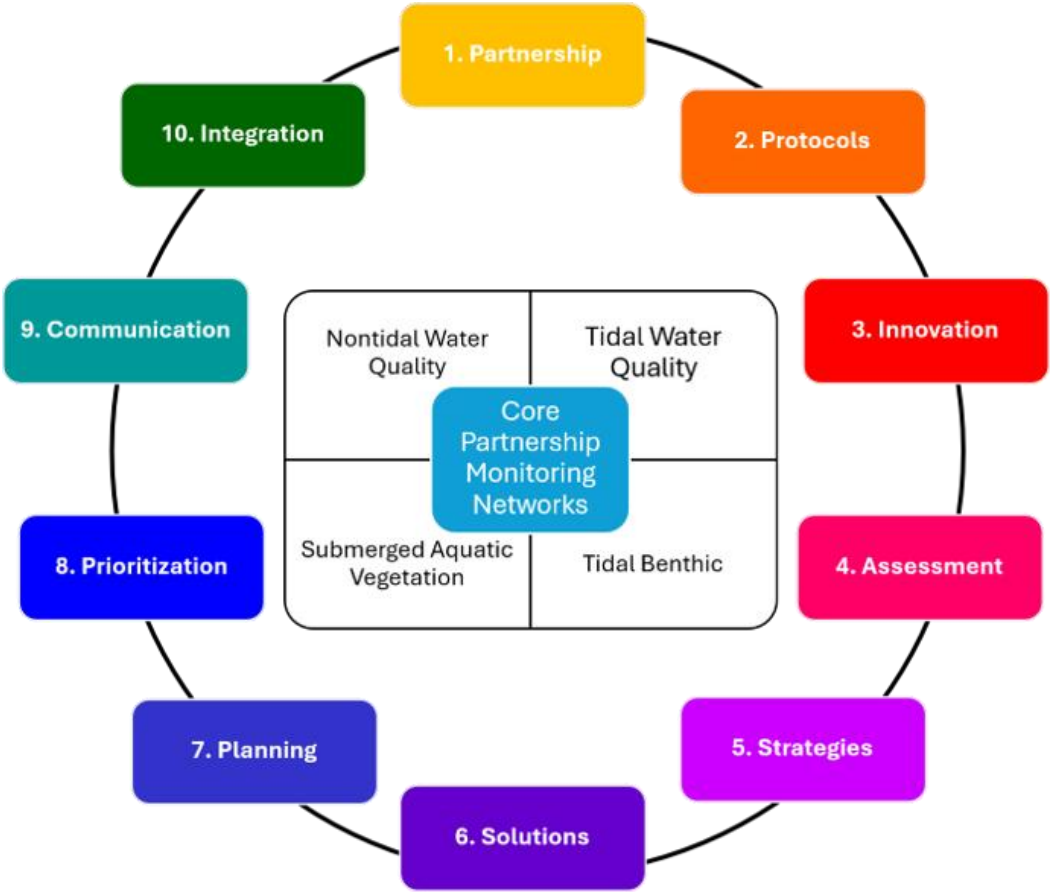


Figure 7: The 10 recommended sequential strategies for the CBP partnership to sustain its core monitoring networks and navigate potential vulnerabilities.

1. Build and Strengthen Partnerships Rooted in a Shared Vision

Long-term monitoring sustainability depends on strong, proactive relationships across agencies, jurisdictions and organizations. The partnership should ensure a shared vision for its long-term monitoring networks that each partner can work to support. Each core monitoring network partner should consider:

- Routinely discussing the monitoring-support landscape for each partner, with the goal of identifying challenges early - before acute vulnerabilities emerge.
- Aligning messaging across partners to maintain consistent communication about monitoring needs and priorities.
- Explore opportunities for co-supporting networks or monitoring sites, providing shared infrastructure and allocating in-kind contributions.

Maintaining robust partnerships and clear communication across PSC members increases resilience and reduces the risk of sudden, widespread monitoring disruptions.

As an example, the CBP Hypoxia Collaborative set clear vision for a water column hypoxia monitoring program that included specificity regarding the numbers of stations, geographic distribution and general cost estimates, prior to large-scale implementation. NOAA then conducted a phased implementation of the system to both collect DO data as well as gather preliminary lessons about system maintenance. NOAA worked with EPA and VIMS to demonstrate the applicability and value of the data to grow the network of potential funding partners. After initial positive results, NOAA is now partnering with other organizations, including the Chesapeake Bay National Estuarine Research Reserve-Virginia to maintain arrays in both Maryland and Virginia.

Additional examples include core monitoring programs that partner and leverage community science monitoring programs. The Chesapeake Monitoring Cooperative (CMC) is one such example which supports the Tidal Monitoring Program by providing additional water quality data from across the Chesapeake Bay tidal Bay. CMC further supports the Chesapeake Bay SAV Watchers Program which aids the success of partnership's SAV program with local-scale data on SAV species diversity and habitat conditions.

2. Maintain Investments in Standardized Protocols

The monitoring methods, sampling protocols and laboratory analyses for many of these networks have been standardized and harmonized over the decades of monitoring. These harmonized methods ensure long-term data comparability between stations as well as over time. Maintaining our common data collection protocols, methods and quality assurance procedures enables detailed data analyses and technical interpretations that reduce overall uncertainty. While changes to these long-term networks are inevitable as priorities and technologies evolve, the partnership should remain sensitive that modifications to network protocols can result in future technical implications; as such, partners should consult with subject matter experts before implementing methodological changes to understand these downstream implications.

For example, the field work and sampling for the nontidal water quality network is performed by seven different partners. In 2004, all sampling partners agreed to use similar sampling protocols (i.e., depth and width integrated sampling), sampling frequencies (i.e., monthly samples, plus eight storm samples) and consistent laboratory analyses for nutrient and sediment components. This harmonized approach results in a consistent data set across time/space and reduces administrative burden on partners and taxpayer costs to conduct monitoring. As the monitoring data are analyzed for loads and trends, the results are then comparable across the watershed. Any proposed changes to protocols should be carefully reviewed to prevent unintended consequences.

3. Seek to Innovate in Ways That Preserve Data Consistency, While Increasing Efficiency and Keep Partnership Monitoring Networks Operational

These watershed-wide, long-term networks are designed to provide the monitoring data needed to address specific partnership priority questions. However, newer monitoring and data-analysis tools are increasingly available. Newer innovations could drive efficiency while continuing to meet or better address the data needs and priority questions facing the partnership. Embracing innovation needs to remain a priority of the monitoring and analysis community.

Multiple examples exist to highlight how innovation is being included in the core networks:

- The integration of digital data loggers with continuous water-quality sensors has further revolutionized the monitoring landscape. These data collection systems allow the measurement of nearly real-time water-quality information for extended periods, significantly reducing the cost per data point collected.
- Increasingly, Artificial Intelligence (AI) and Machine Learning (ML) are used to interpret large, complex monitoring data sets. These tools efficiently identify patterns and support model development, informing technical analyses across the partnership, from assessing streamflow dynamics in small systems to improving understanding of nutrient behavior, and can ultimately help reduce long-term monitoring costs.
- NOAA and EPA are testing different sensors in the hypoxia monitoring network to assess which sensors require less maintenance and therefore decrease costs and level of effort for the same high-frequency water quality information.
- Community science-based initiatives and non-traditional environmental monitoring programs, supported by nonprofits, volunteer groups, and local partners, bring additional observations, local knowledge, and on-the-ground capacity that complement core monitoring networks. Leveraging these efforts can test new low-cost tools, broaden spatial coverage, increase sampling frequency, and

strengthen community connection to water-quality data. When paired with standardized methods and quality-assurance procedures, community-science contributions enhance network resilience, accelerate data collection during resource-limited periods, and build public support for the partnership's long-term monitoring goals. Current examples include the work of the Chesapeake Monitoring Cooperative for the nontidal and tidal water quality networks and the Chesapeake Bay SAV Watchers Program component for the SAV Monitoring Program.

4. Conduct Routine Network Assessment to Ensure Network Composition Meets Partnership Needs

Ongoing evaluation of monitoring network composition and operation is essential to ensure that each core monitoring network continues to meet partnership needs efficiently and effectively. Partners emphasized the importance of adopting a regular, structured process to assess whether individual monitoring sites remain necessary, provide unique value and align with evolving management priorities. Routine assessments help identify redundant or lower-priority sites, ensure that monitoring resources are being used strategically and maintain the scientific integrity of long-term datasets that support the partnership's decision-making and modeling frameworks.

To operationalize this strategy, the partnership can task the relevant workgroups with conducting periodic reviews of network composition at an agreed upon frequency. These reviews would evaluate whether existing sites remain a priority for the partnership and identify opportunities to update or adjust the network based on current science needs, emerging pressures or shifts in management focus.

As an example, the NTN undergoes a systemwide evaluation approximately once per decade to ensure that all monitoring stations continue to serve a defined purpose and fill a necessary role in understanding nutrient and sediment dynamics across the watershed. This decadal review provides a natural opportunity not only to confirm the relevance of current stations, but also to document network gaps that could be filled if additional resources become available, strengthening the ability of the NTN to support trend analysis, load estimation and model calibration.

Institutionalizing this type of periodic assessment across all core monitoring networks will help maintain network efficiency, improve transparency in how sites are prioritized and ensure ongoing alignment with the partnership's restoration goals.

5. Develop Individual Core Monitoring Network Support Strategies

Creating partnership funding strategies for each core monitoring network will provide partners with a clear, repeatable process for assessing funding needs, identifying vulnerabilities and pursuing appropriate funding pathways. Network-specific strategies outline the core steps involved in sustaining a monitoring network, from defining needs and timelines to identifying suitable funding partners and mechanisms.

The reason for individual strategies is that not all aspects of these overarching recommendations will apply to every monitoring network. Core monitoring network strategies reinforce the shared vision for tracking ecosystem recovery from the long-term partnership monitoring networks and highlight examples where partners successfully filled funding gaps in the past. They also underscore the importance of strong partnership coordination, as no single entity can independently maintain the full monitoring portfolio for the partnership

For example, recognizing the increasing costs associated with the annual SAV aerial survey, the SAV Workgroup proactively evaluated more cost-efficient and comprehensive alternatives. They strategized and designed a draft three-tiered, hierarchical monitoring framework consisting of the Tier I Chesapeake Bay-wide aerial survey, a Tier II volunteer-based program (Chesapeake Bay SAV Watchers Program) to ground-truth imagery and collect additional detail, and a Tier III Chesapeake Bay SAV Sentinel Site Program that includes approximately 15 representative SAV sites through the Bay. In parallel, grant funding was awarded to evaluate satellite-based imagery as a potential cost-effective replacement for expensive, contractor-based flights. These network-specific approaches met the need for ground-truthing traditional SAV aerial monitoring data as well as paved the way to evaluate greater integration of satellite-based imagery into the long-term SAV Monitoring Program.

6. Match Monitoring Strategies to the Size and Type of the Vulnerability

Funding gaps vary significantly in size, duration and required type of funding. Obviously, smaller gaps are significantly easier to fill than larger ones. The partnership should tailor solutions based on these characteristics:

- **Large funding gaps** may require federal appropriations, long-term commitments or highly coordinated multi-partner investments.
- **Moderate gaps** may be addressed through targeted jurisdictional contributions, partner match or coordinated agreements.
- **Smaller gaps** can often be filled through short-term mechanisms such as grants or better leveraging or realigning existing program capacities.

This structured approach enables efficient alignment of needs with partners best positioned to address them.

As an example, during the last decade of NTN monitoring, individual stream gages occasionally experienced gaps in funding. In response, USGS and EPA provided "bridge funding" designed to temporarily support a site while another funding partner was identified or until the existing funding partner was able to work though funding limitations. A relatively modest level of interim funding ($10,000 to $20,000 per site for one to two years) prevented the loss of NTN monitoring sites and protected decades of previous partnership investment in the long-term data set.

7. Plan Proactively and Adaptively for Partner Timelines and Emerging Challenges

To maintain resilient, long-term monitoring networks, the partnership must plan early, strategically, and flexibly, recognizing both the varied timelines of partner agencies and the inevitability of emerging challenges. Because monitoring is supported by multiple federal, state, academic, and local partners, success depends on anticipating and communicating differences in funding cycles, preparing well in advance for expiring resources (such as federal supplemental appropriations), and coordinating across federal and state appropriations processes to ensure continuity. Early action and clear communication are essential; for example, maintaining monitoring continuity through calendar year 2028 may require delivering funds to certain federal partners in 2027, while others can receive funds in 2028 and still carry out monitoring effectively.

At the same time, even the strongest plans will encounter unforeseen disruptions. Staff turnover, built-infrastructure modifications (e.g., bridge rebuilds), shifting resource availability, and large-scale events like the COVID-19 pandemic can interrupt monitoring activities. The partnership must remain nimble—ready to adjust schedules, reconfigure field or laboratory operations, and adapt logistics as needed. Long-term datasets naturally build resilience, balancing out short-term noise, but only if monitoring continues consistently over many years. Flexibility in responding to unexpected challenges is therefore as critical as early planning.

With strategic preparation, open and regular communication, and adaptive, responsive problem-solving, partners can better sustain long-term monitoring networks, mitigate risks, and protect the value of datasets. This proactive and adaptive posture ensures monitoring continuity even amid funding volatility or operational disruptions and reinforces shared responsibility for safeguarding the partnership's core monitoring capacity. The Monitoring Strategy Team will continue to engage the PSC to ensure PSC members have information to understand how best to prioritize resources on the monitoring network as needs evolve.

8. Prioritize Long-Term Solutions While Leveraging Short-Term Solutions

A balanced approach is essential to maintain the stability and continuity of the partnership's core monitoring networks. Short-term and one-time grants, contracts and cooperative agreements play an important role in bridging temporary gaps, supporting urgent needs or sustaining individual monitoring sites while longer-term solutions are pursued. These flexible tools can prevent the loss of critical capacity during periods of uncertainty or transition within the partnership's funding landscape.

However, short-term mechanisms alone cannot provide the predictability required for long-term monitoring. Sustained federal appropriations, multi-year agreements, consistent jurisdictional commitments and other durable funding pathways remain the foundation for reliable data collection. Long-term solutions align with the principles and outcomes of the Watershed Agreement and enable partners to maintain the staffing, infrastructure and analytical capacity needed to keep monitoring programs operating year after year. By providing stability across budgets, agencies and funding cycles, these durable investments safeguard the continuity of monitoring activities, ensuring that data collection is not disrupted when short-term funds expire or partner resources shift.

Both strategies have essential roles. By intentionally combining short-term opportunities with long-term investments, partners can stabilize core monitoring networks, mitigate funding volatility and ensure that monitoring programs remain aligned with the partnership's long-term restoration goals.

9. Communicate Monitoring Results to Show Network Value

Routinely communicating monitoring results, whether annually or on another cycle, is essential for maintaining transparency across the partnership and demonstrating the continued value of the core monitoring networks. Sharing analyses and management implications helps partners understand emerging conditions, identify where resources may be needed, showcase opportunities for cost-savings and incorporate lessons learned into their decision-making. These communications also provide opportunities to clearly articulate network gaps, limitations, or vulnerabilities—information partners may need to develop solutions and support the long-standing bipartisan recognition that environmental monitoring underpins efforts to protect and restore water quality.

In addition to conveying data and technical needs, the partnership should more intentionally highlight how monitoring benefits people and communities. This includes sharing success stories that connect monitoring findings to tangible improvements, such as cleaner local waterways, healthier habitats, reduced pollution loads, or restored shoreline areas. Success stories can also demonstrate how monitoring helps jurisdictions

deliver reliable, science-based protections for residents. Telling these stories through a variety of formats (e.g., community-focused summaries, infographics, social media features, local partner spotlights, or short videos) helps illustrate why monitoring matters beyond station counts or trend lines: it shows what the data reveal, how they are used, and why they make a difference in communities across the watershed. Communicating this work across the partnership underscores both the adaptability of the monitoring community and the need to support and sustain these critical data streams.

Such communications should also "connect the dots" between long-term datasets and local actions by explaining how monitoring informs restoration strategies, supports regulatory compliance, guides investments, and provides early signals of change. Linking monitoring insights to community-level outcomes, such as improved recreational waters, healthier fisheries, or more resilient habitats, strengthens public understanding of the partnership's work and reinforces the importance of sustained monitoring.

For example, the partnership's routine calculation and dissemination of annual and biannual tidal and nontidal water-quality trends allow partners to track where conditions are improving or declining across the Bay and its watershed. This consistent reporting not only reinforces the importance of long-term monitoring and provides managers with actionable insights but also creates opportunities to tell localized stories about progress and challenges, helping communities see how long-term data support healthier ecosystems, informed planning, and more effective restoration.

10. Integrate Monitoring Priorities into Policy and Restoration Strategies

To ensure sustained support for the partnership's core monitoring networks, monitoring priorities should be intentionally embedded within long-term policy frameworks and restoration strategies, as well as annual discussions at the PSC. Aligning monitoring needs with policy considerations strengthens the connection between observed conditions, management actions and restoration outcomes, while also helping safeguard funding during periods of uncertainty. Key approaches include integrating monitoring requirements into the PSC prioritization process, where possible, and major planning and restoration documents, developing clear and effective indicators that communicate whether conditions are improving or degrading and conducting more detailed analyses that assess how well management actions are working across the watershed.

For example, NTN loads data are routinely used to calibrate the watershed model and to identify the basins where implementation efforts will have the greatest impact, demonstrating how monitoring information directly informs policy, prioritization and restoration decision making.

Conclusion

This report brings together the partnership's collective understanding of the challenges, opportunities and strategic pathways needed to sustain CBP core monitoring networks into the future. By outlining shared vulnerabilities, highlighting examples of effective collaboration and providing a coordinated set of strategies, the Monitoring Strategy Team offers a unified framework to guide long-term planning, investment, decision-making and partnership action. It also builds upon recent efforts across the partnership, reflecting the substantial expertise, institutional knowledge and lessons learned that partners have contributed through ongoing monitoring, coordination and adaptive management.

In addition to defining these strategic directions, the report is intended to serve as an active tool for partners as they plan and make decisions across their organizations. The information compiled here provides a clear view of current monitoring network conditions and vulnerabilities, helping partners anticipate potential resource shortfalls and incorporate those needs into upcoming budget and staffing cycles. It also supports improved coordination by aligning internal requests and timelines across programs, reducing duplication and strengthening efficiency.

Finally, by identifying where existing monitoring programs, partnerships or alternative resources can be leveraged, the report helps partners recognize opportunities to enhance their monitoring capacity while maximizing limited resources. Continued attention to these recommendations will help ensure that the partnership implements, maintains and enhances the high-quality monitoring networks essential for tracking watershed health, informing management actions and supporting restoration progress across the Chesapeake Bay region.

As next steps, PSC members are encouraged to periodically review the strategies through the lens of their own organizational priorities, identify specific actions they can take within upcoming planning cycles, and coordinate with one another to align monitoring network investments and timelines for short- and long-term planning. By actively applying the recommendations in this report and revisiting them regularly, the partnership can move forward with a shared commitment to strengthening and sustaining monitoring capacity for years to come. To aid in this effort, the Monitoring Strategy Team will provide annual briefings to the PSC to ensure investments and management decisions remain agile.

Chesapeake Bay Program Monitoring Networks:
Nontidal Network

Chesapeake Bay Program
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Photo by Will Parson, Chesapeake Bay Program.

What is the Nontidal Network?

The Nontidal Network (NTN) tracks the condition of streams and rivers that flow into Chesapeake Bay by measuring river flow and the amount of nitrogen, phosphorus, and sediment in the water. These data help document how water quality looks today and how it is changing over time. The NTN includes 123 monitoring sites, which monitor two-thirds of the river flow entering the Bay. The NTN supports the Chesapeake Bay Program partnership's broader monitoring efforts, which also track tidal water quality, underwater grasses and tidal bottom-dwelling organisms.



Water quality monitoring technology is deployed all over the Watershed, including the instrument pictured above in Difficult Run. Photo by Rowan Johnson, USGS.

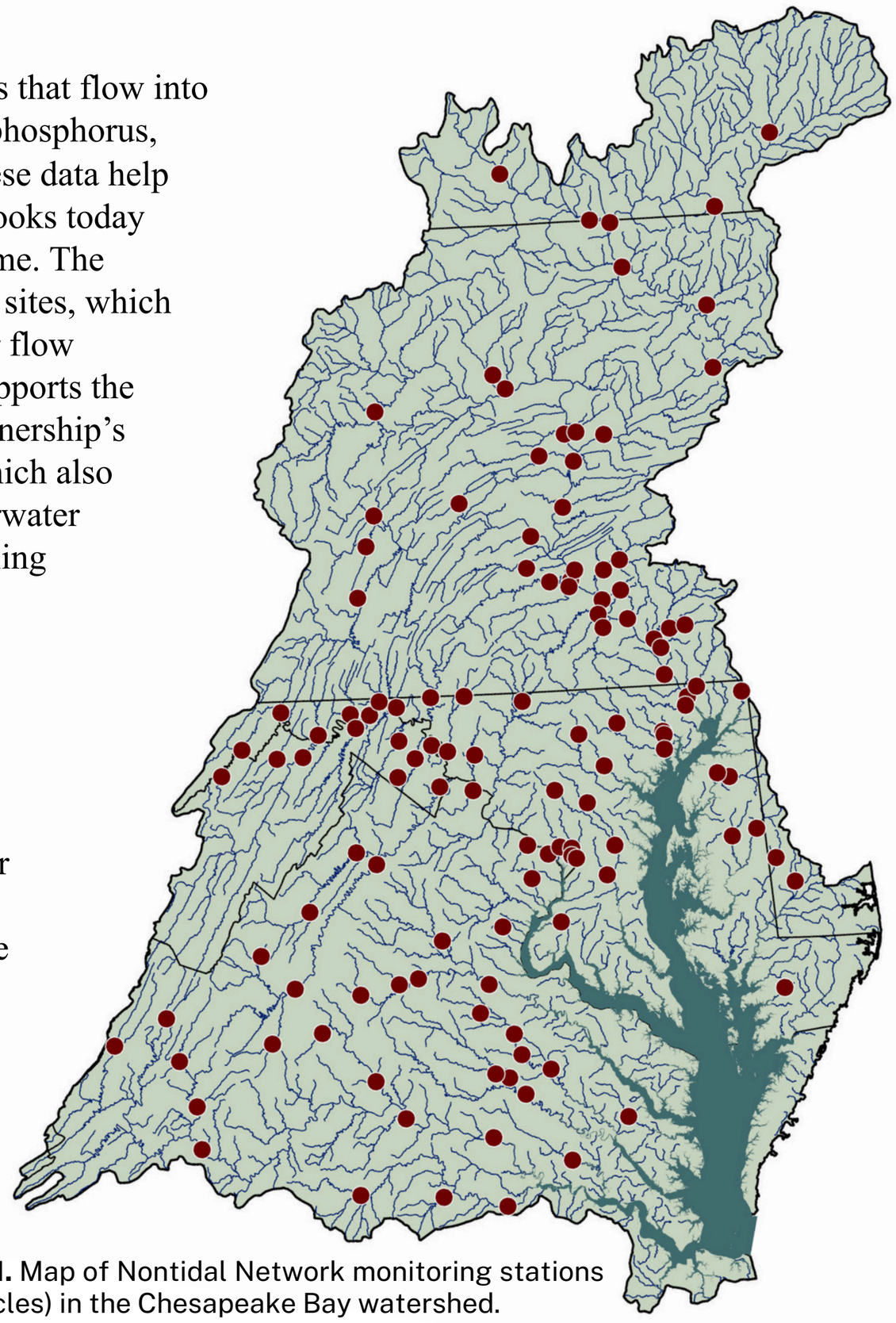


Figure 1. Map of Nontidal Network monitoring stations (red circles) in the Chesapeake Bay watershed.

Why is the Nontidal Network Important?

The NTN provides an understanding of what is happening in freshwater rivers and streams throughout the Chesapeake Bay watershed. Samples collected as part of the NTN are analyzed and used to understand where nutrient and sediment levels are higher or lower across the watershed. Additionally, the water-quality monitoring data are analyzed by USGS to show how the amount of nutrients and sediment are changing over time and whether conditions are improving or degrading in these streams and rivers. This information helps explain what is affecting nutrient and sediment delivery, where improvements are occurring, and where management actions may make the biggest difference for local and regional watershed health.



Nontidal Network sites are funded and maintained by many organizations, including USGS. Photo by Rowan Johnson, USGS

How is the Nontidal Network funded?

Funding for the NTN has traditionally come from yearly funding approved by Congress, jurisdictional and partner match programs, and, recently, the Infrastructure Investment and Jobs Act (IIJA). There are 25 unique funding partners that support NTN monitoring and analysis with these varied funding sources. Seven of these partners collect NTN water-quality samples, including monthly and storm samples, using consistent sampling methods.

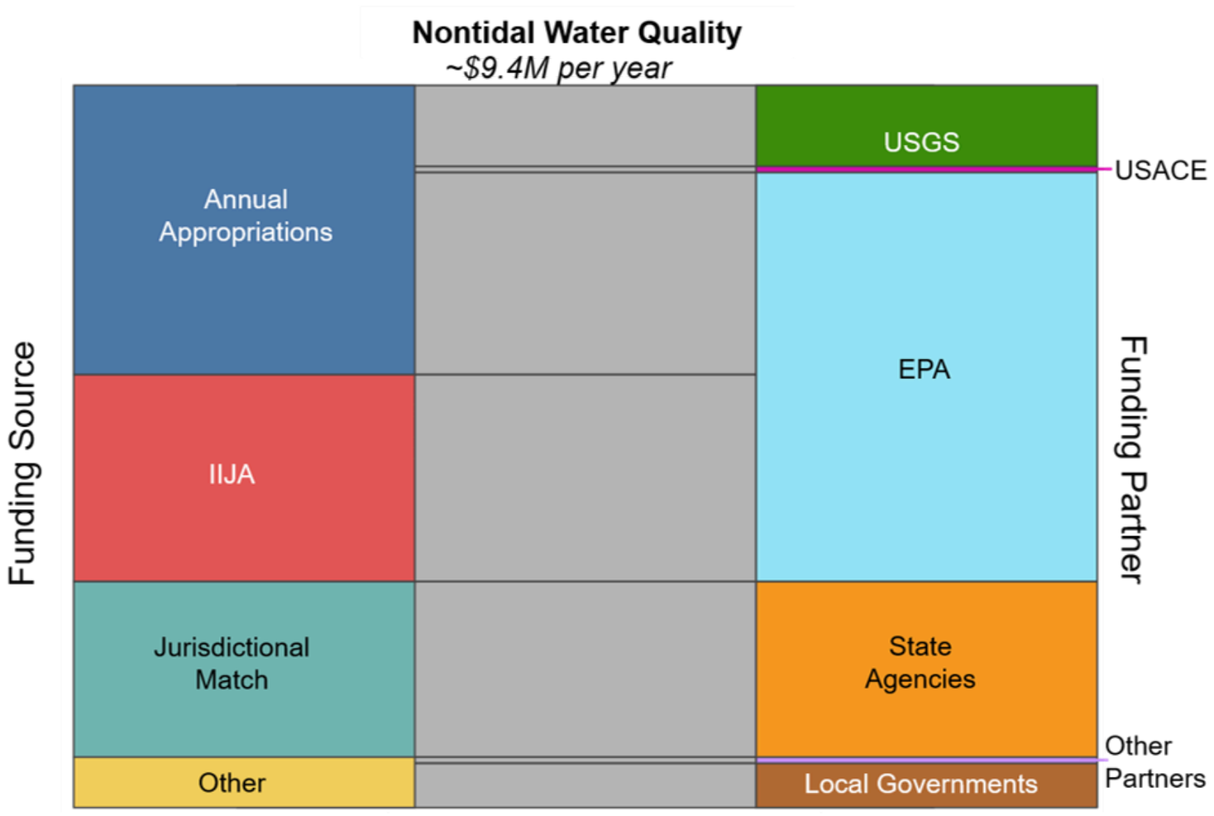


Figure 2. Diagram of Funding Sources and Partners for the Nontidal Network.

This summary is a supplement to the Chesapeake Bay Program's PSC Monitoring Strategy Report.
To access this report, please scan this QR code.

FAKE QR CODE

Developed by the PSC Monitoring Strategy Team, November 2026.

Acronym Guide
NTN: Nontidal Network, USGS: United States Geological Survey, EPA: Environmental Protection Agency
USACE: United States Army Corps of Engineers, IIJA: Infrastructure Investment and Jobs Act, PSC: Policy Steering Committee

Nontidal Network monitoring data, loads and trends are available online at usgs.gov. Please scan this QR code to access.

FAKE QR CODE

Chesapeake Bay Program Monitoring Networks: Tidal Water Quality

Photo by Charlie Nick/Chesapeake Bay Program.

What are the networks that make up the Chesapeake Bay Program tidal water quality monitoring activities?

As part of the Chesapeake Bay Program's core monitoring program, two distinct networks collect water quality data from the tidal waters of the Chesapeake Bay. These are the Chesapeake Bay Long-Term Water Quality Monitoring Network and the Water Column Hypoxia Monitoring Network. These networks support the Chesapeake Bay Program partnership's broader monitoring efforts, which also track nontidal water quality, underwater grasses and tidal bottom-dwelling organisms.

Chesapeake Bay Long-Term Monitoring Network

The Chesapeake Bay Long-Term Monitoring Network is made up of three distinct programs that include shallow water monitoring sites, surveys via boat and 156 tidal monitoring sites that span across the Chesapeake Bay. These programs are managed by DC Health, MD DNR and VA DEQ. Data collected include water quality parameters such as dissolved oxgyen, chlorophyll a, water clarity, nutrients, suspended solids and temperature. Samples for the 156-site network are collected once or twice a month. Partners gather continuous data at selected shallow water monitoring sites from surveys that utilize boat-mounted sensors that measure water quality in real-time. Water quality data from these three programs are used to evaluate tidal water quality and better understand overall Bay health.

Data from the Chesapeake Bay Long-Term Monitoring Network are used for partnership and state water quality assessments, which track whether each section of the Bay is healthy or not. These evaluations are based on different factors like the level of oxygen in the water, the presence or absence of underwater grasses and how Bay conditions change over time and track the health of the Bay, which helps partners make decisions on conservation and restoration as they work to improve the health of the Chesapeake Bay.



Monitoring is performed by agencies, like MD DNR. Photo by Ethan Weston/Chesapeake Bay Program.

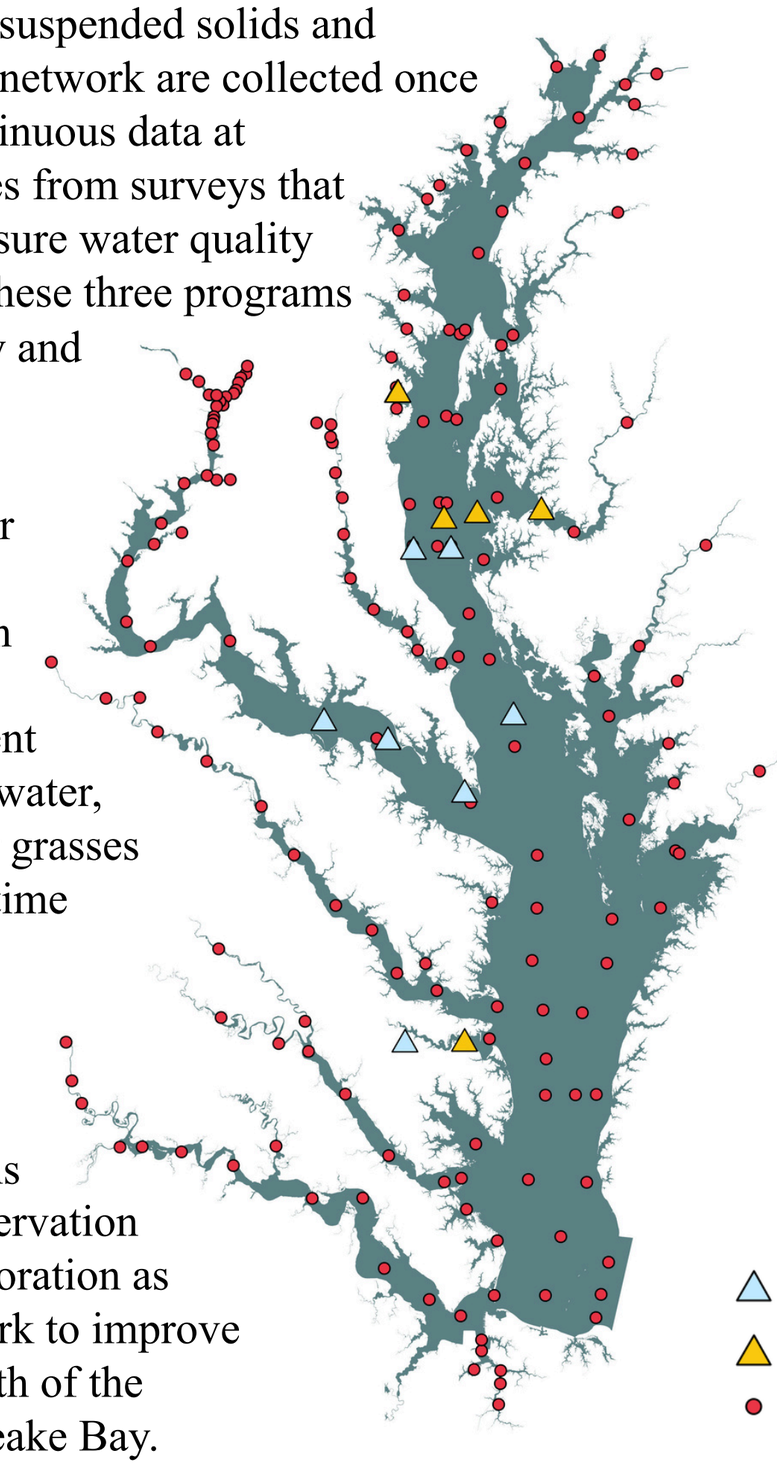


Figure 1. Map of CBP Tidal Monitoring.

Water Column Hypoxia Monitoring Network

Sites that make up the Water Column Hypoxia Monitoring Network consist of buoys outfitted with multiple sensors that continuously dissolved oxygen, salinity and temperature data at several depths throughout the water column. These data are transmitted several times per hour from approximately April to November, allowing for near real-time monitoring of water column conditions at select locations. The maintenance for this network is conducted by NOAA with support from the Chesapeake Bay National Estuarine Research Reserve in Virginia.

This network, launched in 2019, was created because of the need for high-frequency dissolved oxygen data from multiple depths in Chesapeake Bay waters. These data improve our understanding of dissolved oxygen dynamics and low oxygen events across various habitats and seasons. This information is also used to develop and test new tools at the Chesapeake Bay Program that will be used to predict future environmental conditions and help plan which restoration and conservation methods will be most effective in improving tidal water quality.



Hypoxia monitoring buoys collect data throughout the water. Photo by Charlie Nick/Chesapeake Bay Program.

How is Chesapeake Bay tidal monitoring funded?

Funding for the partnership's Chesapeake Bay Long-Term Monitoring Network and Water Column Hypoxia Monitoring Network have historically come from yearly funding approved by Congress, jurisdictional and partner match programs and, more recently, the Infrastructure Investment and Jobs Act (IIJA). The work for both networks has been funded by federal agencies, including EPA and NOAA, and state agencies.

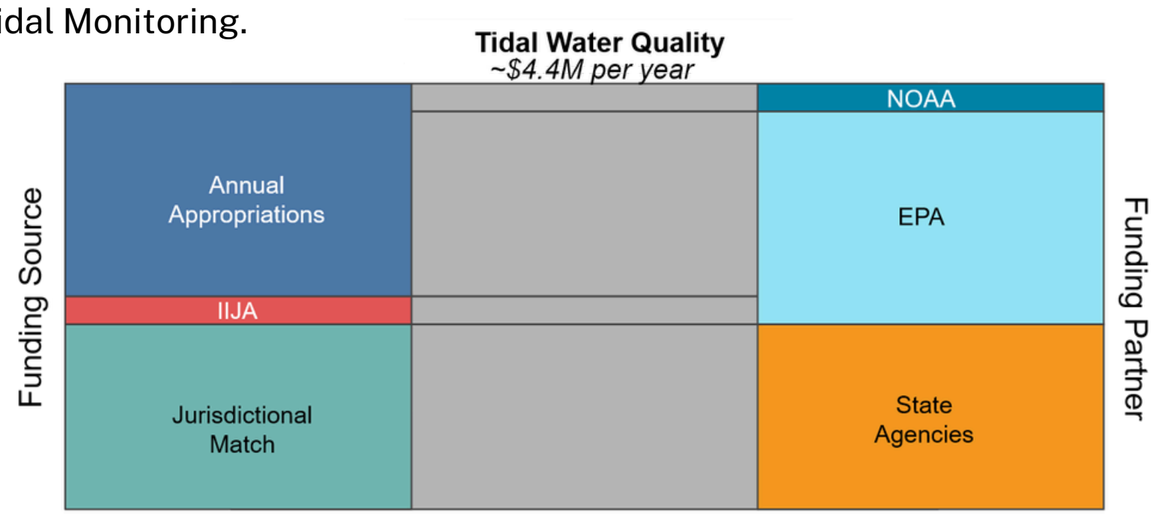


Figure 2. Diagram of Funding Sources and Partners for Tidal Monitoring.

Developed by the PSC Monitoring Strategy Team, November 2026.

Acronym Guide

DC Health: District of Columbia Department of Health, MD DNR: Maryland Department of Natural Resources, VA DEQ: Virginia Department of Environmental Quality, NOAA: National Oceanic and Atmospheric Administration, IIJA: Infrastructure Investment and Jobs Act, EPA: U.S. Environmental Protection Agency, PSC: Policy Steering Committee

This summary is a supplement to the Chesapeake Bay Program's PSC Monitoring Strategy Report. To access this report, please scan this QR code.

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Chesapeake Bay Program Monitoring Networks:
Submerged Aquatic Vegetation

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Photo by Will Parson, Chesapeake Bay Program.

What is the Chesapeake Bay Submerged Aquatic Vegetation (SAV) Monitoring Program?

The Chesapeake Bay Submerged Aquatic Vegetation (SAV) Monitoring Program is one of the most successful large-scale, long-term annual SAV monitoring programs in the world. This three-tiered program uses several methods to collect data on the distribution and cover of SAV throughout the shallow water habitats of the Bay and its tidal tributaries. The Virginia Institute of Marine Science (VIMS) annually surveys over 180 flight lines to collect these data from small aircrafts, most of which is derived from high-resolution digital imagery. To potentially improve program efficiency and sustainability, researchers at Old Dominion University (ODU) are developing new tools that use detailed satellite imagery to identify and map underwater vegetation.

Additional SAV Monitoring Program data are gathered by the Chesapeake Bay SAV Watchers Program and the Chesapeake Bay Sentinel Site Program. SAV Watchers is a volunteer-based program that helps ground truth the aerial survey data by collecting more detailed, on the water information about the underwater plant species present and what their habitats look like. Biologists collect even more detailed, in-the-water SAV data through the SAV Sentinel Site Program. Together, these datasets are used to provide a detailed understanding of the health of our SAV habitats across the Chesapeake Bay. This three-tiered SAV monitoring effort supports the Chesapeake Bay Program partnership's broader monitoring efforts, which also track tidal bottom-dwelling organisms and tidal and nontidal water quality.

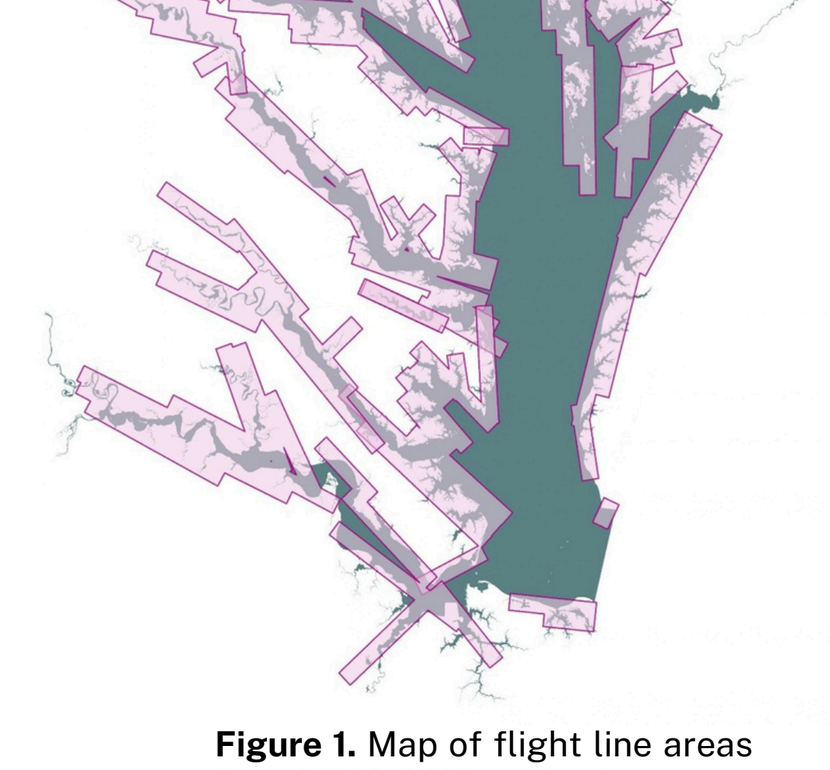


Figure 1. Map of flight line areas from VIMS SAV monitoring.



Underwater grasses provide food and habitat, add oxygen to the water, absorb nutrient pollution, trap sediment and reduce erosion. Photo by Rhiannon Johnston/Chesapeake Bay Program.

Why is the Chesapeake Bay SAV Monitoring Program Important?

Data collected by the Chesapeake Bay SAV Monitoring Program is used to understand the health of the Bay and measure the effectiveness of restoration projects on underwater grasses. Currently, the 2025 Chesapeake Bay Watershed Agreement has a goal of restoring the tidal Bay to 196,600 acres of SAV, which is the amount of SAV needed to achieve partnership water clarity goals. Data collected through the Chesapeake Bay SAV Monitoring Program are vital in measuring progress towards that goal. These data are used to protect vital habitat, inform management decisions and provide information needed for reporting.

How is the Chesapeake Bay SAV Monitoring Program funded?

Funding for the Chesapeake Bay SAV Monitoring Program has traditionally come from yearly funding approved by Congress, state and local organizations, and more recently, the Infrastructure Investment and Jobs Act (IIJA). The program is currently funded by the EPA, VA DEQ, MDE, MD DNR and VIMS.

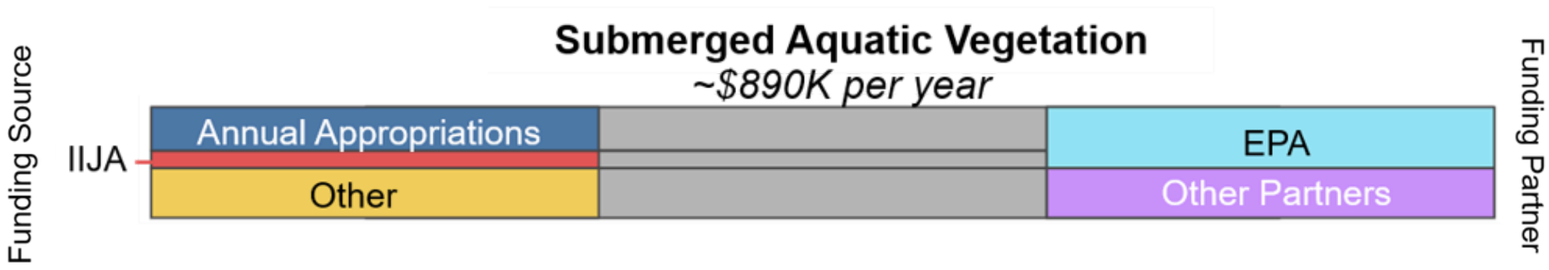


Figure 2. Diagram of Funding Sources and Partners for the Chesapeake Bay SAV Monitoring Program.



In-the-water monitoring is made possible by SAV Watchers volunteers and Sentinel Site Program biologists. Photo by Rhiannon Johnston/Chesapeake Bay Program.

Developed by the PSC Monitoring Strategy Team, November 2026.

Acronym Guide
SAV: Submerged Aquatic Vegetation, VIMS: Virginia Institute of Marine Science, ODU: Old Dominion University, IIJA: Infrastructure Investment and Jobs Act, EPA: U.S. Environmental Protection Agency, VA DEQ: Virginia Department of Environmental Quality, MDE: Maryland Department of the Environment, MD DNR: Maryland Department of Natural Resources, PSC: Policy Steering Committee

This summary is a supplement to the Chesapeake Bay Program's PSC Monitoring Strategy Report. To access this report, please scan this QR code.

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Chesapeake Bay Program Monitoring Networks:
Tidal Benthic Water Quality

Chesapeake Bay Program
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Photo by Rachel Felver, Chesapeake Bay Program.

What is the Tidal Benthic Monitoring Program?

The Chesapeake Bay Tidal Benthic Monitoring Program is a long-term monitoring effort that assesses the health of the Bay's bottom habitats and the organisms that live there. The program collects and analyzes information about benthic macroinvertebrates, the small animals that live in or on the Bay's bottom sediments, to provide a consisent picture of environmental conditions and biological health over time for the Bay's bottom and tidal tributaries.

Because benthic macroinvertebrates respond to the water quality conditions of the Bay, the presence, abundance and communities provide a useful measure of habitat health. Monitoring also includes measurements of water quality and sediment conditions, providing important context for understanding the factors that influence benthic communities.



Sediment samples are removed from the bottom of the tidal Bay, which contain macroinvertebrates. Photo by Michelle Donahue/Smithsonian Marine Station.

Data for the Chesapeake Bay Tidal Benthic Monitoring Program are collected at fixed monitoring sites that have been sampled since 1984, providing a long-term record of Bay health. Sampling also occurs at randomly selected sites each year, and these data are used to provide a representative assessment of Bay-wide benthic health. This monitoring effort supports the Chesapeake Bay Program partnership's broader monitoring efforts, which also track underwater grasses and tidal and nontidal water quality.

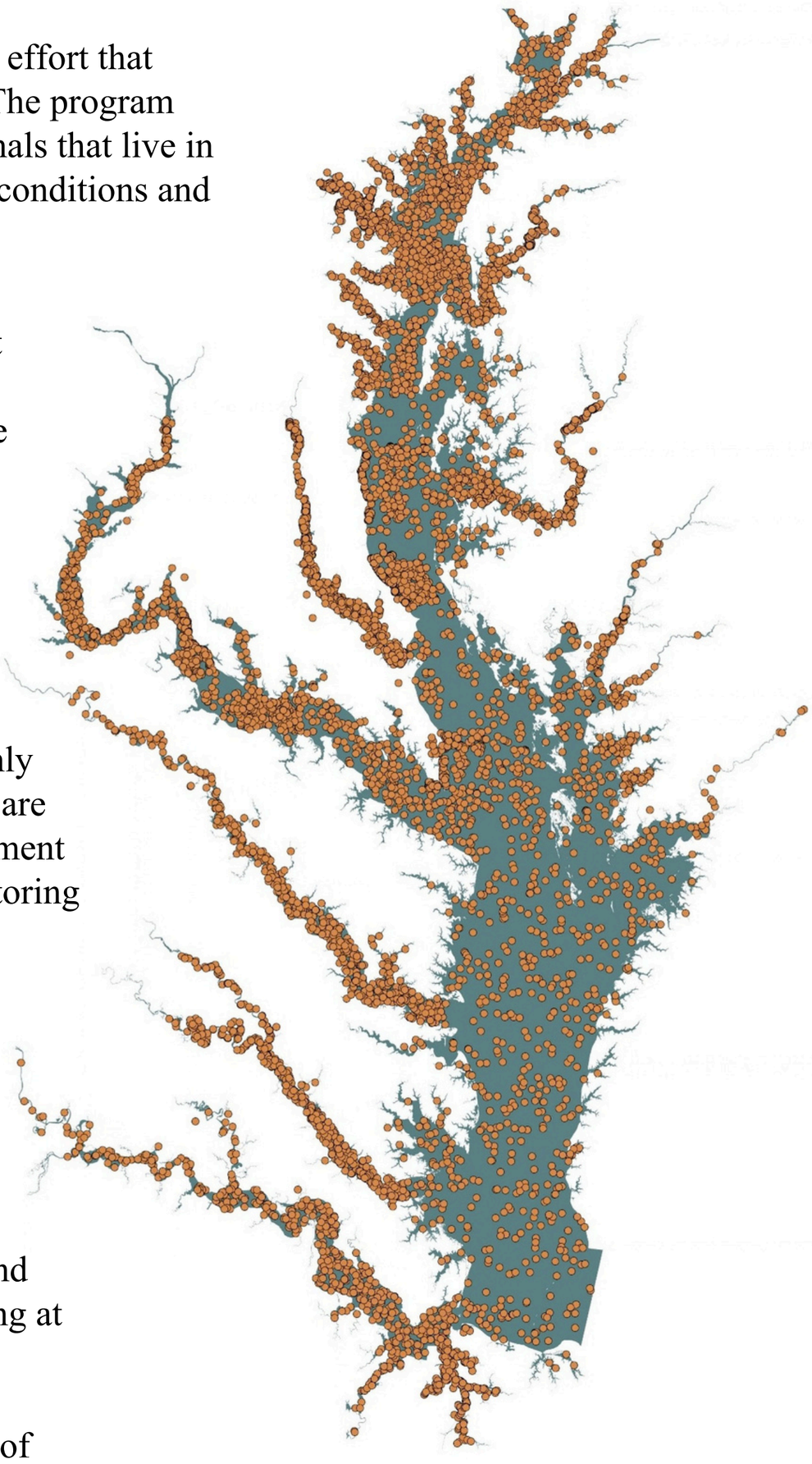


Figure 1. Map of tidal benthic monitoring sites.

Why is the Tidal Benthic Monitoring Program Important?

Information from the Tidal Benthic Monitoring Program is used to better understand conditions of Bay tidal waters, especially when it comes to plants and animals living at the bottom of the Bay. Data are used to calculate Bay health scores that help the partnership understand current and past habitat conditions. Collectively, this information provides important insights for living resources and how the recovery of Bay habitats is changing in response to management and changing environmental conditions.



Macroinvertebrates species, like the bristle worm pictured above, vary in pollution tolerance therefore monitoring them can provide helpful insights into water quality. Photo by Jim Aguilar/Smithsonian Environmental Research Center.

Developed by the PSC Monitoring Strategy Team, November 2026.

How is the Tidal Benthic Monitoring Program funded?

Funding for the Tidal Benthic Monitoring Program has traditionally come from yearly funding approved by Congress and jurisdictional matching programs. The program has historically been supported through partnerships between MD DNR, VA DEQ and CBPO and is funded by the EPA and state agencies.

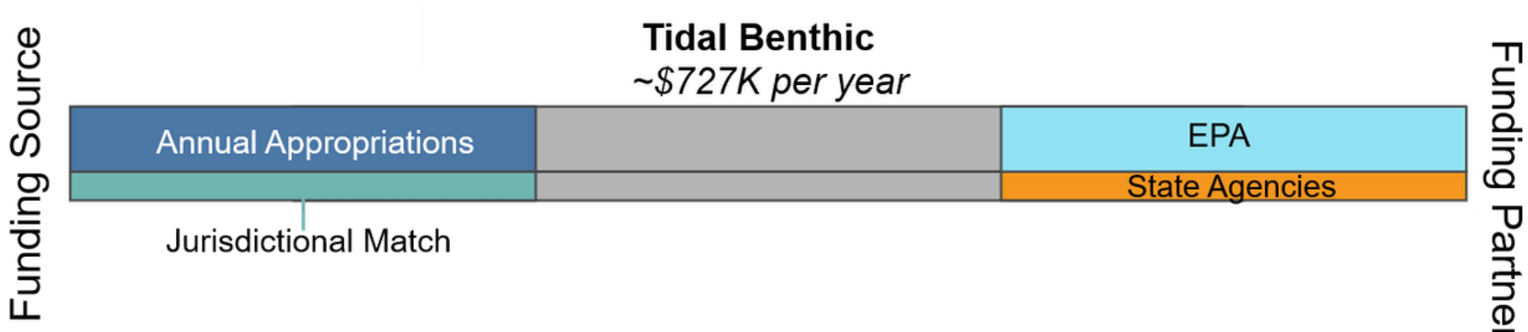


Figure 2. Diagram of Funding Sources and Partners for the Tidal Benthic Monitoring Program.

Acronym Guide
MD DNR: Maryland Department of Natural Resources, VA DEQ: Virginia Department of Environmental Quality, CBPO: Chesapeake Bay Program Office, EPA: U.S. Environmental Protection Agency, PSC: Policy Steering Committee

This summary is a supplement to the Chesapeake Bay Program's PSC Monitoring Strategy Report. To access this report, please scan this QR code.

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