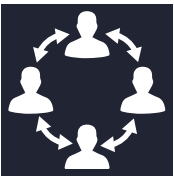


# CHESAPEAKE MONITORING COOPERATIVE

2015–2021  
Program  
Achievements



Photo: ALLARM



Over the last six years, the Chesapeake Monitoring Cooperative (CMC) has connected monitoring initiatives across the region to enhance our understanding of the health of the Chesapeake Bay watershed. To accomplish this, we have provided technical, programmatic, and outreach support to over 100 community and volunteer-based monitoring groups. We have worked with local groups to begin or maintain monitoring programs by providing certification trainings, quality control services, and study design, data interpretation, and science communication workshops. We have also integrated data into the Chesapeake Data Explorer, our centralized data hub. There are currently over **365,000 volunteer-based water quality and macroinvertebrate monitoring data points** in the Data Explorer. These data are publicly available and used to enhance our understanding of the health of the Chesapeake Bay watershed.



## OUR MISSION

The Chesapeake Monitoring Cooperative works with diverse partners to collect and share new and existing water quality data. Through this collaboration, we aim to develop a comprehensive understanding of Chesapeake Bay watershed health.

## OUR VISION

We envision a Chesapeake community where all data of known quality are used to inform watershed management decisions and restoration efforts.

## OUR TEAM

Alliance for the Chesapeake Bay (ACB)  
Izaak Walton League of America (IWLA)  
Dickinson College's Alliance for Aquatic Resource Monitoring (ALLARM)  
University of Maryland Center for Environmental Science (UMCES)  
Chesapeake Bay Program (CBP)

# The evolution of the Chesapeake Monitoring Cooperative (CMC)

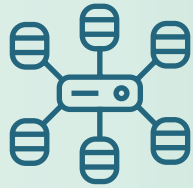
## 2015

The Chesapeake Bay Program (CBP) expanded their monitoring program to improve data density by using non-traditional data sources. The additional data are needed to better assess watershed health.

Cooperative Agreement signed by partner organizations—the Chesapeake Monitoring Cooperative was formed!



Database contractor selected to begin work on the Chesapeake Data Explorer.



Collaborative stakeholder engagement via a prioritization process developed CMC priorities and building blocks.



Photo: CMC

## BUILDING PARTNERSHIPS

In 2020, the CMC team partnered with Booz Allen Hamilton and their Women in Data Science and 501 Green Team to host Hack the Bay, a six-week virtual hackathon aimed at answering questions about the health of the Chesapeake Bay watershed.

We had over 400 participants from around the world sign up for the event, resulting in 10 completed submissions and 10 creative, partially scoped solutions across four challenges:

- Challenge 1: Develop a Restoration Case Study,
- Challenge 2: Identify Data Gaps,
- Challenge 3: Modeling Water Pollution, and,
- Challenge 4: Design a Water Quality Report Card.

The CMC team is incredibly grateful to everyone who participated and for all the hard work that went into completing each submission! By exploring the Chesapeake watershed's water quality and benthic observations and their intersection with other geospatial, temporal, environmental, and demographic data, we hope to further empower decision-making and inspire action for watershed restoration.

## 2016

The CMC team fostered relationships to establish a cohesive Bay-wide monitoring program. Database development began using tiered data classes based on collection method.



CMC created umbrella Quality Assurance Project Plans to support existing and new data collection.

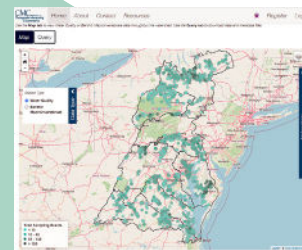
Monitoring training and onboarding groups began.



First Tier 3 tidal data (from Nanticoke Watershed Alliance) approved by CBP. <https://www.chesapeakemonitoringcoop.org/tiered-framework/>

## 2017

The CMC hit its stride in 2017 as we shifted from foundational program development to on-boarding monitoring groups. Water quality and benthic monitoring trainings and data interpretation workshops were held throughout the year. The CMC began integrating data into the Chesapeake Data Explorer, the database developed for the CMC.



First data entered into the Chesapeake Data Explorer.

## 2018

In addition to continued efforts to onboard monitoring groups, the CMC team successfully built support within the Chesapeake Bay Program partnership for an unprecedented Memorandum of Understanding (MOU). This MOU marked an important milestone in forging a deeper understanding of, and commitment to, the use of citizen-based monitoring data in monitoring health and tracking restoration progress of the Chesapeake Bay and its watershed.



Memorandum of Understanding signed in spring.

100,000 data points in the Chesapeake Data Explorer.

Launched Stream Team, a collaborative water quality monitoring program in Pennsylvania, that supports county watershed implementation plans and promotes monitoring where additional data are needed.

## 2019

The CMC continued to build momentum—new monitoring groups were formed in areas of the watershed previously lacking monitoring data and established monitoring groups were integrated into the CMC framework. The Chesapeake Data Explorer continued to grow, reaching 100,000 data points.

The CMC team had a strong presence at both the Citizen Science Association conference and the National Water Monitoring conference. This set the stage for national recognition of our successful model, while gaining new knowledge to bring back to the CMC community.

## 2020

Due to the COVID-19 pandemic, we had to quickly adjust our volunteer engagement strategies and monitoring support techniques to ensure the safety of all participants. Efforts focused on supporting established monitoring groups by creating virtual training videos and certification programs, and implementing new safety protocols for monitors in the field. The CMC partnered with Booz Allen Hamilton to host Hack the Bay, a hackathon to analyze data in the Chesapeake Data Explorer. By August 2020, there were over 250,000 data points available for use by hackathon teams.

Additionally, the CMC became a successful global case study and worked with organizations in the United Kingdom looking to better incorporate citizen science efforts in assessing waterway health.

Virtual training videos and certification programs developed and implemented.

Booz Allen Hamilton's Hack the Bay—dozens of teams from around the world worked on four challenges using CMC data.



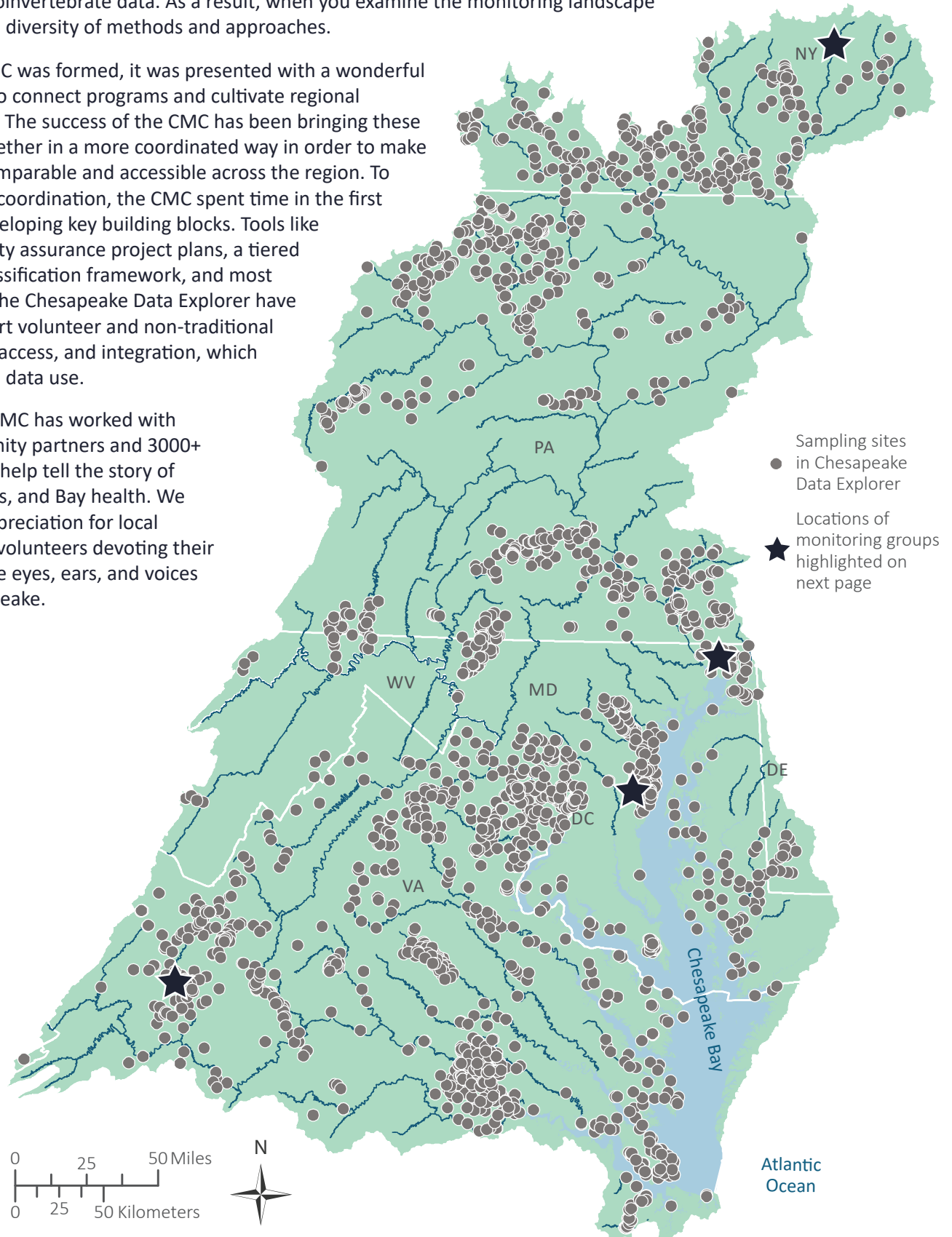
[chesapeakemonitoringcoop.org](https://chesapeakemonitoringcoop.org)

# Monitoring groups are the foundation of the CMC

Community volunteers and partners are the backbone of the CMC. With the support of generous individuals donating their days, evenings, and weekends, the CMC has increased temporal and spatial data collection throughout the watershed. Whether it is an individual monitor participating in a regional program or a community partner, everyone has their individual reasons motivating them to collect water quality and benthic macroinvertebrate data. As a result, when you examine the monitoring landscape you will find a diversity of methods and approaches.

When the CMC was formed, it was presented with a wonderful opportunity to connect programs and cultivate regional collaboration. The success of the CMC has been bringing these programs together in a more coordinated way in order to make data more comparable and accessible across the region. To facilitate this coordination, the CMC spent time in the first few years developing key building blocks. Tools like regional quality assurance project plans, a tiered data-rigor classification framework, and most importantly, the Chesapeake Data Explorer have helped support volunteer and non-traditional data storage, access, and integration, which has facilitated data use.

To date, the CMC has worked with 100+ community partners and 3000+ volunteers to help tell the story of streams, rivers, and Bay health. We have deep appreciation for local partners and volunteers devoting their time being the eyes, ears, and voices of the Chesapeake.



## VOLUNTEER STORIES FROM AROUND THE WATERSHED

**Head of the Bay Alliance (PA and MD)** formed in 2019 to foster collaboration and mutual support to protect the upper Bay's ecosystem. The CMC team facilitated a study design workshop with regional partners to identify key aspects of a program that would be consistent across all partners. This process was unique because the reach of some partner organizations passed across state boundaries; some had existing monitoring programs; and, some were starting brand new monitoring programs. In the end, all groups agreed to follow CMC protocols to create a consistent and cohesive dataset across the region, illustrating the power of regional collaboration.



Photo: Head of the Bay

**Ostego County Conservation Association (NY)** partnered with ALLARM in 2017 to explore monitoring opportunities in the area. Together, they created a study design team. Made up of a variety of organizations, the team decided to focus on re-establishing a baseline understanding of stream health using sites previously monitored by the county. Since 2017, sampling has taken place on a monthly basis at 8 sites in Ostego County. In December 2020, after three years of baseline data collection, the Ostego County Conservation Association volunteers participated in a data interpretation workshop to explore trends and findings.



Photo: ALLARM

**Arundel Rivers Federation (MD)** works daily to protect, preserve, and restore the South, West, and Rhode Rivers on the western shore of the Chesapeake Bay. The Federation pursues its mission through advocacy, watershed restoration, rigorous scientific monitoring, and outreach and education with the diverse communities in the area. Federation staff and volunteers refined and improved their monitoring of water quality to include Tier 3 (CBP-equivalent) dissolved oxygen in the tidal portion of the South River. The Federation works with the CMC, the Chesapeake Bay Program, and a variety of diverse partners to collaboratively solve local watershed problems.



Photo: Arundel Rivers Federation

**Rockbridge Water Monitors (VA)**, a new monitoring group working under the Virginia RiverTrends umbrella program, is located in the Lexington area. This region has historically lacked citizen science data and is a high priority area for monitoring due to bacteria impairments and a regulatory Total Maximum Daily Load created in 2015. Their main focus is bacteria monitoring, but they are also collecting other water quality data on a monthly basis. Additionally, volunteers within the program are monitoring benthic macroinvertebrates through the IWLA's Virginia Save Our Streams program.



Photo: Rockbridge Monitors/RiverTrends

Visit [chesapeakemonitoringcoop.org](https://chesapeakemonitoringcoop.org) for more water monitoring champions!

## STREAM TEAM

A central goal of the CMC is to not only integrate existing data into the Chesapeake Data Explorer but to also promote monitoring where additional spatial and temporal data are needed throughout the region. When looking at key tributaries in Pennsylvania and New York, there are significant data gaps. To help fill these gaps, ALLARM brought together county conservation district watershed specialists, Master Watershed Stewards coordinators, and Riverkeepers to develop a stream monitoring effort to meet baseline water quality data needs, resulting in the program Susquehanna Stream Team.

Stream Team has taken off in six Pennsylvania and two New York counties, with over 130 volunteers and 50 sites. Data are collected in some streams that haven't been assessed for over a decade. Volunteers have expressed excitement at understanding the quality of their waterways and using data locally to determine potential restoration project locations. Another goal of Stream Team is use of their data at the state and regional levels to inform progress on Bay goals.



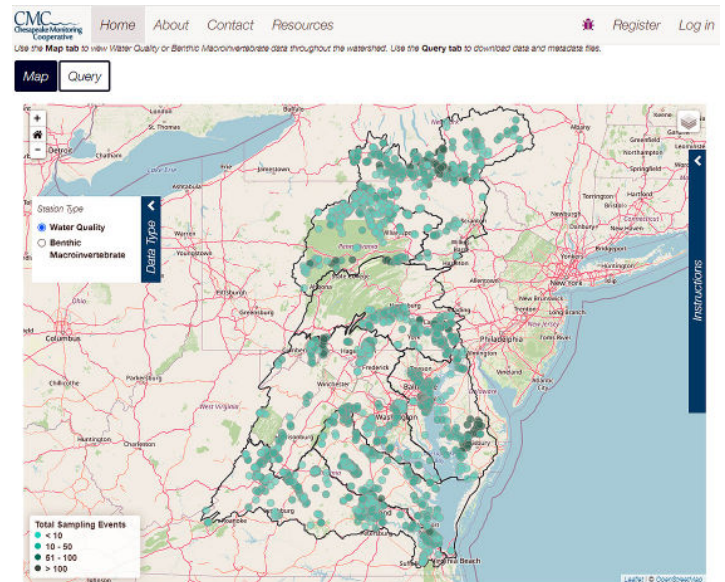
Photo: ALLARM



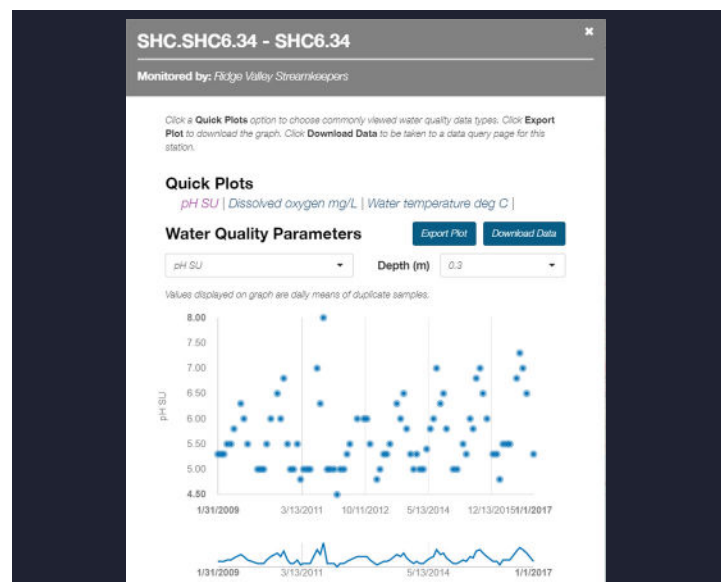
Photo: ALLARM

## CHESAPEAKE DATA EXPLORER

Creating a database that meets the individual needs of each monitoring group, while creating consistency across the watershed has been the true test of the CMC's mission. The Chesapeake Data Explorer officially launched in the fall of 2017, and since then we have integrated 91 groups. The Data Explorer now has over 365,000 data points, including data from all seven Bay jurisdictions, with several large historical datasets that go back to the 1990s and early 2000s. This success is a testament to the reputation and trust that the CMC has built, and the excitement monitoring groups have about finally having a central hub to share their data with a broader audience.



With close help from the CMC service providers, monitoring groups upload their data to the Data Explorer through a secured data upload portal. Once published, these data are available on the publicly accessible homepage, where anyone can view and download it. It is exciting to build a data source that is not only useful to our monitoring groups, but also to new audiences.



## STATE AGENCY DATA USE

The CMC is such a unique initiative in the country because it is the first time a regional effort has taken place to integrate water quality data and promote data collection across state lines. At the outset of the partnership, there were varied state perspectives on the utility of non-agency data. Some states had codified laws for community collected data to be used, while other states were new to the idea of incorporating volunteer data in their assessments.

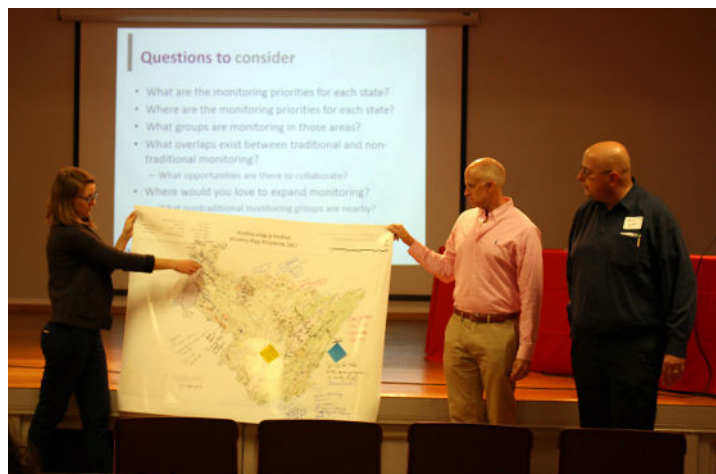


Photo: CMC

The CMC took great strides to develop tools and resources to ensure that data in the Chesapeake Data Explorer had the necessary metadata for potential users to decide if it met their needs; created umbrella QAPPs to provide data credibility guidance across protocols and the region; and also passed an unprecedented MOU, signed by the Bay jurisdictional leadership, that data from this initiative would be used to inform Bay goal progress. This MOU and a Tiered framework that grouped comparable methodologies facilitated data integration and use by all states. Some states, like Pennsylvania and Maryland, have adopted CMC tools to inform this process.

## LOCAL WIP PROCESS USING DATA

When Pennsylvania developed its Chesapeake Bay Phase 3 Watershed Implementation Plan, it was decided to break down the nutrient and sediment pollution reduction goals by using a county-by-county framework. Taking a localized approach has created new opportunities for diverse partners to play a role in achieving goals. A key question that will be tackled by these local partnerships is how progress can be tracked and documented. CMC is teaming up with partners in Centre and Cumberland Counties to engage community monitoring in priority HUC 12 tributaries as well as using existing data in the Bay Program's CAST model to assess progress. Data use is facilitated by the building blocks CMC created to ensure that the necessary metadata accompanies data points allowing data users, like the County WIP partners, to use the data for tracking progress.

## CHESAPEAKE BAY PROGRAM CHAMPIONS VOLUNTEER MONITORING EFFORTS

The CBP has supported a long-term water quality monitoring program (1984–present) that obtains critical environmental data annually from across the watershed, throughout the tidal tributaries, and in the mainstem Chesapeake Bay. The CBP partnership continues to evolve in its resource management approach to address updated restoration goals by investing in and supporting volunteer and non-traditional based monitoring efforts.



**Chesapeake Bay Program**  
*A Watershed Partnership*

Information needs have increased beyond the scope of the original monitoring strategy and new sources of data are needed to fill gaps in CBP's assessments. The CBP partnership invested in the CMC program to target volunteer monitoring activities to provide data consistent with analysis needs of the partnership related to tidal water quality standards in the bay and stream health assessment in the watershed. Creating an MOU signed by all watershed jurisdictions in 2018, the CBP partnership committed to using volunteer-based data of known quality to fill gaps in assessments (image below). The MOU firmly established the foundation for improved understanding of the status of our resources with the contributions from CMC-coordinated data collections.



## IT IS AN HONOR TO WORK WITH YOU

Over the last six years, the CMC team has been honored to work with all of our community volunteers to assess water quality throughout the watershed! Together we have built a monitoring network that is providing robust, high quality data to inform not only local decisions, but state and federal decisions as well. We have been able to help numerous groups start new monitoring programs in a consistent and cohesive way in areas that previously lacked data. And, we have supported established monitoring programs and worked together to incorporate these robust datasets into the Chesapeake Data Explorer. We look forward to continuing this valuable work in the future!

## 2015–2021 Program Achievements

*"The CMC fills a valuable role for volunteer monitoring in Virginia and the entire Bay watershed. We would not be able to provide water quality data to state and federal partners without support from the CMC. We are so grateful for what they do!"*

*--Friends of the Rappahannock*



**ALLIANCE**  
for the Chesapeake Bay



University of Maryland  
CENTER FOR ENVIRONMENTAL SCIENCE



This project has been funded wholly or in part by the United States Environmental Protection Agency under Page 20 of 29 assistance agreement CB96334901 to the Alliance for the Chesapeake Bay. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.



Chesapeake Data Explorer total data points, accessed 01/20/2021. <https://cmc.vims.edu>  
Top row photos: P. Bergstrom, IWLA, S. Droter/CBP  
Bottom row photos: ALLARM, CMC, W. Parson/CBP