Citizen Science and Nontraditional Partner Monitoring MOU Update

Peter Tango – USGS@CBPO
Emily Bialowas - Izaak Walton League
Liz Chudoba – Alliance for the Chesapeake Bay

September 11, 2018
CBP STAC Meeting

Outline

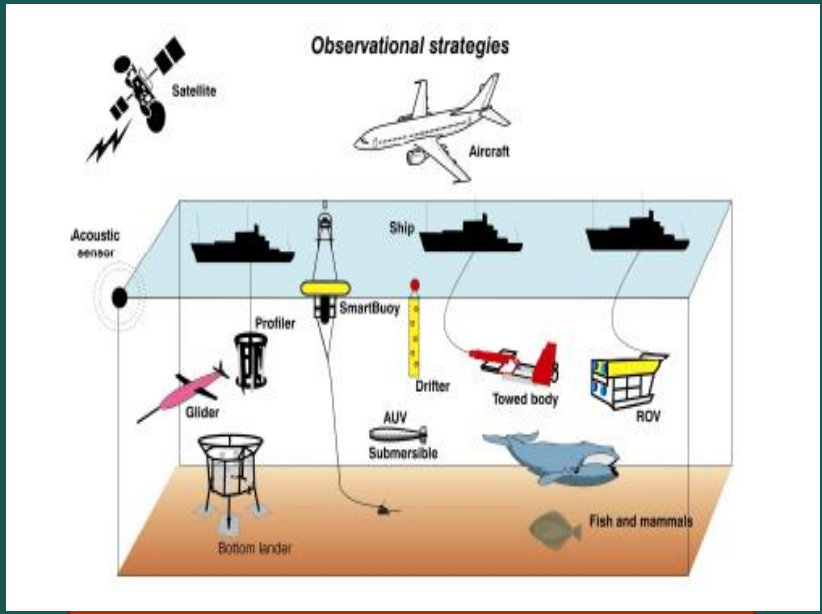
- Data Needs, Citizen Science and links to Chesapeake Bay Agreement Goals and Outcomes
- The Memorandum and the Chesapeake Monitoring Cooperative
- Active program integration and developing opportunities
- Memorandum of Understanding Commitments
- Path to approval by the CBP

Chesapeake Bay Program
Science. Restoration. Partnership.

Water Quality Standards Attainment and Monitoring Outcome

Peter Tango
USGS@CBPO
Chair - Criteria Assessment Protocol WG
STAR Coordinator

Through the 2014 Chesapeake Bay Watershed Agreement, *the Chesapeake Bay Program has committed to…*



Goal: *Reduce pollutants to achieve the water quality necessary to support the aquatic living resources of the Bay and its tributaries and protect human health.*

Outcome:

Continually improve the capacity to monitoring and assess the effects of management actions being understand to implement the TMDL and improve water quality. Use the monitoring results to report annually to the public on progress made in attaining established water quality standards and trends in reducing nutrients and sediment in the watershed.

What is our progress?

Our capacity to Monitor

Watershed loads and trends: Adequate

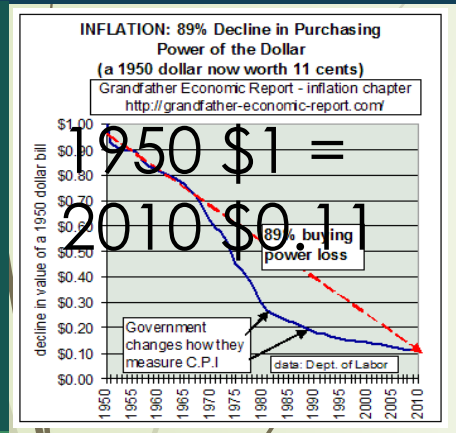
Bay Water Quality Standards Attainment: Marginal

Under present support, both program elements show that we are experiencing erosion and decline.

Capacity to Monitor (USEPA 2003 scale):

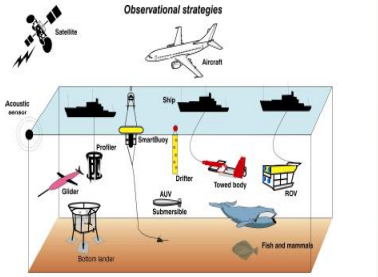
1. Recommended
2. Adequate
3. Marginal

What is our progress?



- (-) Inflation impacts with level funding
- (-) Aging out of the infrastructure
- (-) Lost monitoring partnerships

Creative Program Management for Sustaining and Growing Capacity To Fill Gaps



- (+) Use of Citizen-based and nontraditional partner data.
- (+) Updated assessment protocols (USEPA 2017)
- (+) Partnership adapting of existing monitoring resources

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Monitoring & Assessment, Adaptation Outcomes

Climate Resiliency Working Group
Mark Bennett, USGS
Co-Chair

What We Want

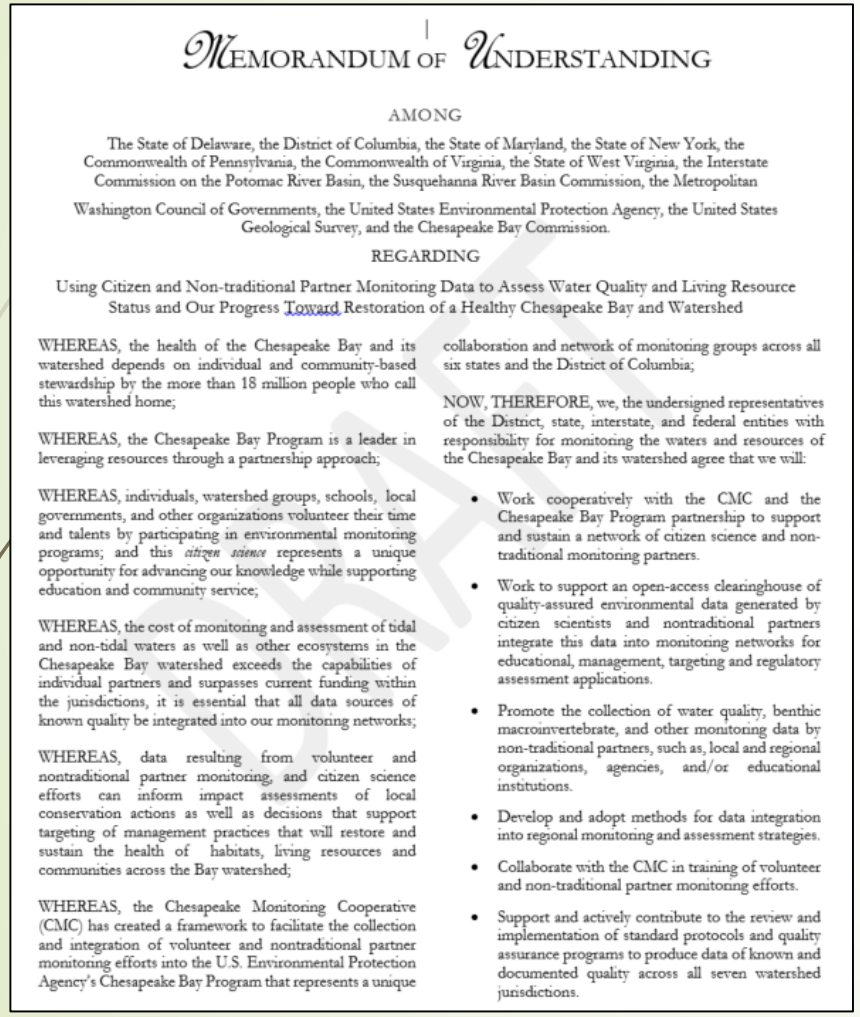
To have the Management Board support our efforts in:

- Addressing recommendations for BMP Siting and Design data/research needs
- Developing a prioritized list of specific data needs for use by Citizen Science Programs
- Promoting utilization of the Chesapeake Bay Program Climate Smart Framework & Decision-Support Tool
- Incorporating climate change into the Phase III WIPs

Connecting to Chesapeake Bay Agreement Goals

Bay Agreement Goal	Outcomes
Stewardship Goal	Citizen Stewardship Outcome
Water Quality Goal	• 2017 WIP Outcome • 2025 WIP Outcome • Water Quality Standards Attainment and Monitoring Outcome
Healthy Watersheds Goal	Healthy Watersheds Outcome
Vital Habitats Goal	Stream Health Outcome

Memorandum of Understanding



MEMORANDUM OF UNDERSTANDING

AMONG

The State of Delaware, the District of Columbia, the State of Maryland, the State of New York, the Commonwealth of Pennsylvania, the Commonwealth of Virginia, the State of West Virginia, the Interstate Commission on the Potomac River Basin, the Susquehanna River Basin Commission, the Metropolitan Washington Council of Governments, the United States Environmental Protection Agency, the United States Geological Survey, and the Chesapeake Bay Commission.

REGARDING

Using Citizen and Non-traditional Partner Monitoring Data to Assess Water Quality and Living Resource Status and Our Progress Toward Restoration of a Healthy Chesapeake Bay and Watershed

WHEREAS, the health of the Chesapeake Bay and its watershed depends on individual and community-based stewardship by the more than 18 million people who call this watershed home;

WHEREAS, the Chesapeake Bay Program is a leader in leveraging resources through a partnership approach;

WHEREAS, individuals, watershed groups, schools, local governments, and other organizations volunteer their time and talents by participating in environmental monitoring programs; and this *citizen science* represents a unique opportunity for advancing our knowledge while supporting education and community service;

WHEREAS, the cost of monitoring and assessment of tidal and non-tidal waters as well as other ecosystems in the Chesapeake Bay watershed exceeds the capabilities of individual partners and surpasses current funding within the jurisdictions, it is essential that all data sources of known quality be integrated into our monitoring networks;

WHEREAS, data resulting from volunteer and nontraditional partner monitoring, and citizen science efforts can inform impact assessments of local conservation actions as well as decisions that support targeting of management practices that will restore and sustain the health of habitats, living resources and communities across the Bay watershed;

WHEREAS, the Chesapeake Monitoring Cooperative (CMC) has created a framework to facilitate the collection and integration of volunteer and nontraditional partner monitoring efforts into the U.S. Environmental Protection Agency's Chesapeake Bay Program that represents a unique collaboration and network of monitoring groups across all six states and the District of Columbia;

NOW, THEREFORE, we, the undersigned representatives of the District, state, interstate, and federal entities with responsibility for monitoring the waters and resources of the Chesapeake Bay and its watershed agree that we will:

- Work cooperatively with the CMC and the Chesapeake Bay Program partnership to support and sustain a network of citizen science and non-traditional monitoring partners.
- Work to support an open-access clearinghouse of quality-assured environmental data generated by citizen scientists and nontraditional partners integrate this data into monitoring networks for educational, management, targeting and regulatory assessment applications.
- Promote the collection of water quality, benthic macroinvertebrate, and other monitoring data by non-traditional partners, such as, local and regional organizations, agencies, and/or educational institutions.
- Develop and adopt methods for data integration into regional monitoring and assessment strategies.
- Collaborate with the CMC in training of volunteer and non-traditional partner monitoring efforts.
- Support and actively contribute to the review and implementation of standard protocols and quality assurance programs to produce data of known and documented quality across all seven watershed jurisdictions.

DRAFT

Goal

- Use of data of known quality and the Chesapeake Data Explorer

Tools

- Tiered framework
- Standardized QAPPs and monitoring protocols
- Training

CMC Chesapeake Monitoring Cooperative

Citizen and Nontraditional Monitoring
ACB CB96334901
Management Board Presentation
June 14, 2018

Photo courtesy of the Chesapeake Bay Program

Chesapeake Monitoring Cooperative

A partnership that aims to provide technical, logistical, and outreach support for the integration of volunteer-based and nontraditional water quality and benthic macroinvertebrate monitoring data into the Chesapeake Bay Program (CBP) partnership.

Cooperative Agreement:

Alliance for the Chesapeake Bay

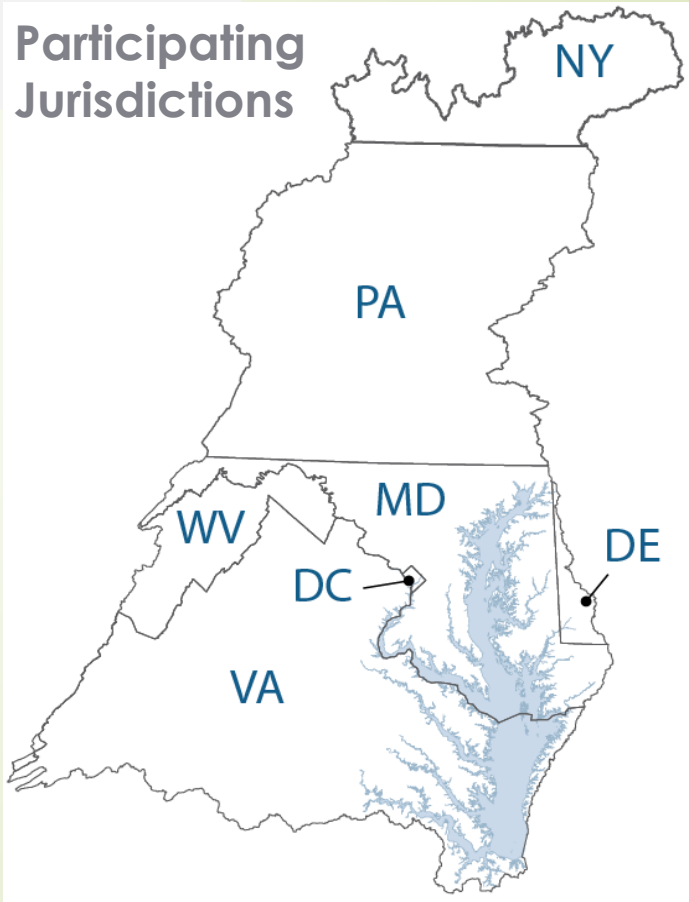
Chesapeake Bay Program
Science. Restoration. Partnership.

CMC development team partners & service providers

The Izaak Walton League of America — Defenders of Soil, Air, Woods, Waters and Wildlife

ALLARM — Alliance for Aquatic Resource Monitoring — est. 1986

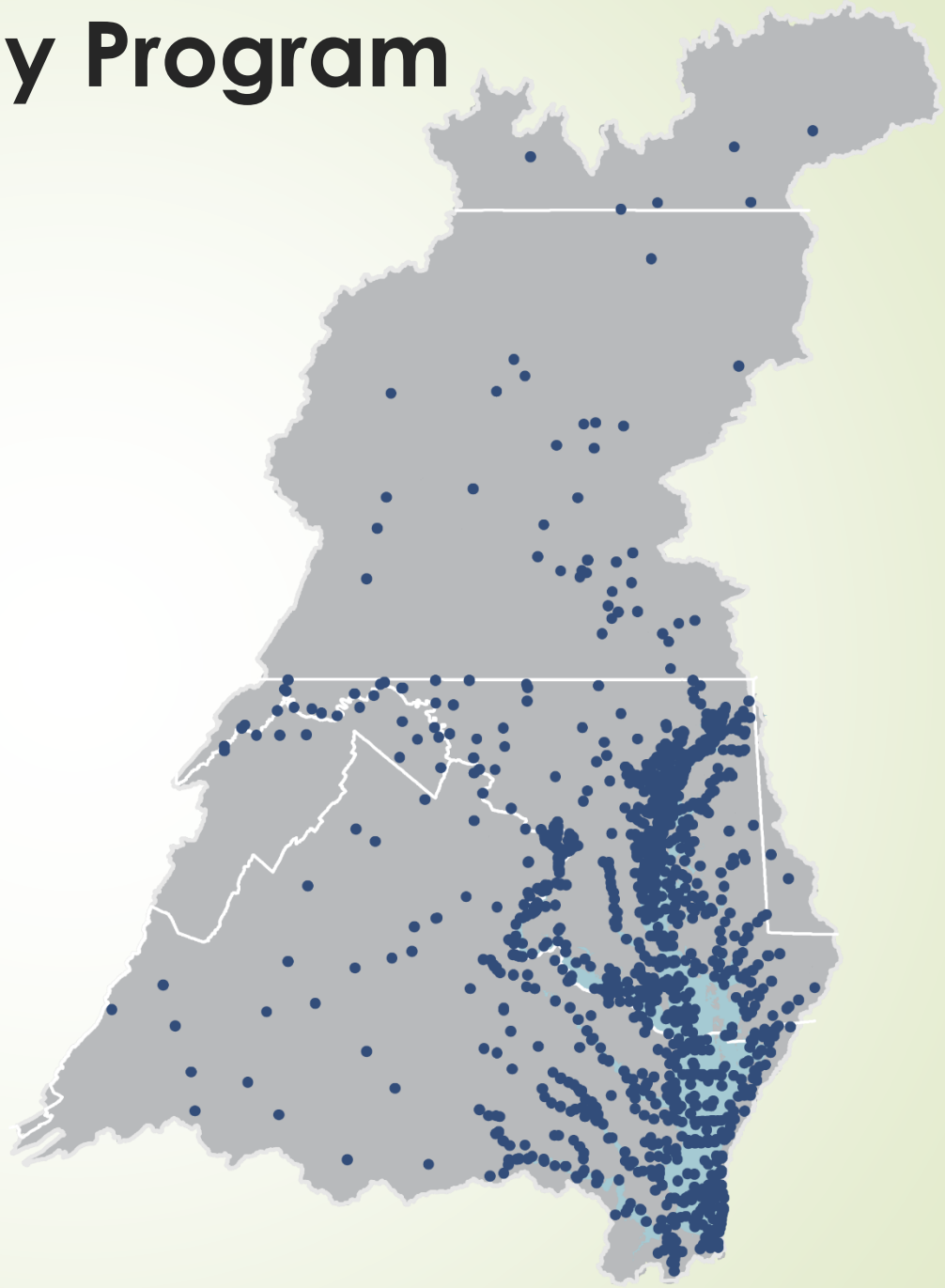
University of Maryland
Center for Environmental Science



Chesapeake Bay Program Monitoring Sites

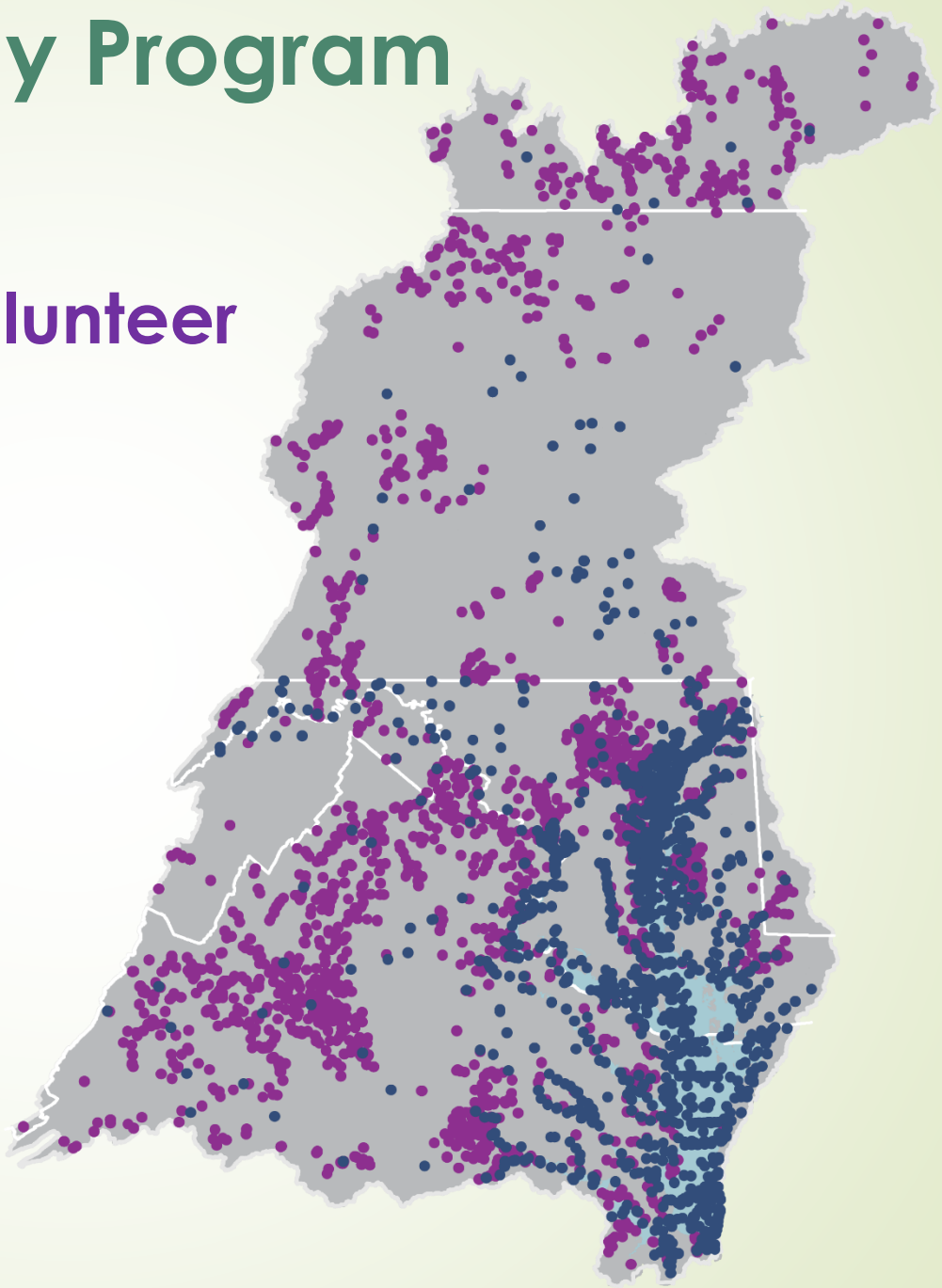
Coverage Includes

- Tidal water quality
- Benthic
- Non-tidal network



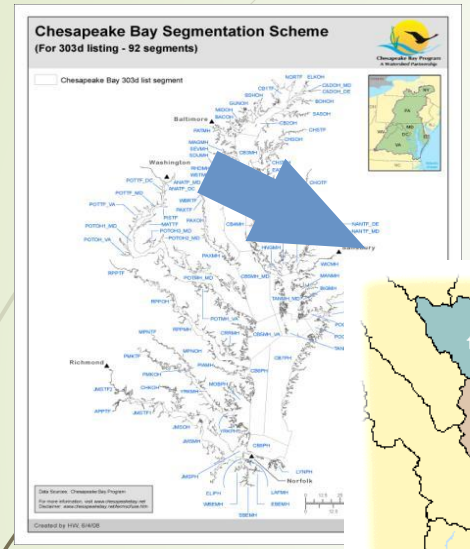
Chesapeake Bay Program Monitoring Sites

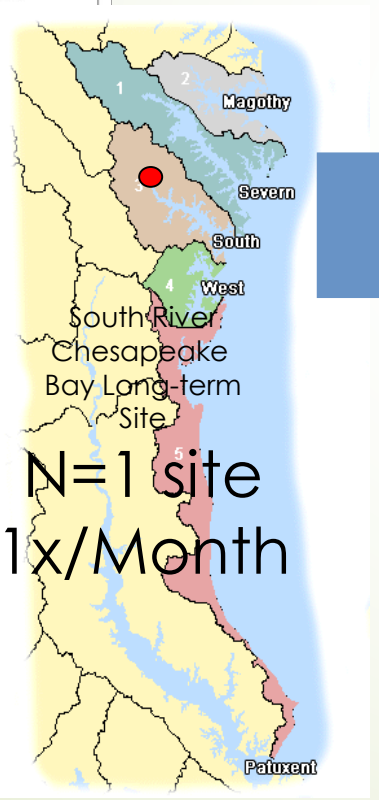
Chesapeake Bay Volunteer and Nontraditional Monitoring Sites



Data Examples

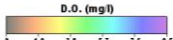
South River Federation



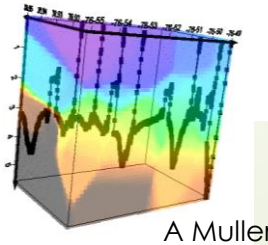


South River Federation

Increasing resolution

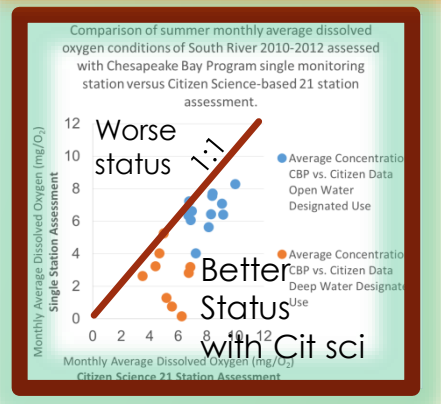


Reducing uncertainty



A Muller. USN

Results comparison shows <u>better</u> conditions with 21 sites than 1 site



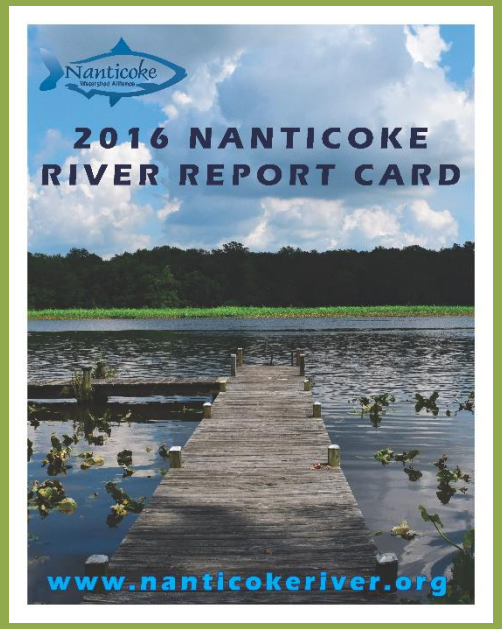
Putting the Band Together: Citizen Scientists are the Rock Stars of the Monitoring World

Beth Wasden, Volunteer and Outreach Coordinator, Nanticoke Watershed Alliance

Nanticoke Creekwatchers Program

Field:
DO, Secchi depth and total water depth, salinity, and water temp

Lab:
TP, TN, chlorophyll a, and bacteria



- 2017=tenth year
- Volunteer-driven program that obtains scientifically-credible, long-term data
- EPA-approved QAPP | Tier 3 (Tidal)
- 36 sites
- 40 Creekwatchers/ over 1,000 hours annually

I want to volunteer all night, and Creekwatch every day!

The ROCKSTAR Method

- **R**ealize the program vision
- **O**rganize effectively
- **C**ommunicate
- **K**ick it off right!
- **S**upport
- **T**rain, train, and train again
- **A**ssess and adapt
- **R**etain your volunteers!

Data Examples

VA Save our Streams

Monitoring Goals

- Get volunteers to be the "eyes and ears" for their stream
- Document changes in stream health over time
- Pass data to VADEQ for decision-making

TIER	Methodology
1	Macroinvertebrates

Data Examples

VA Save our Streams

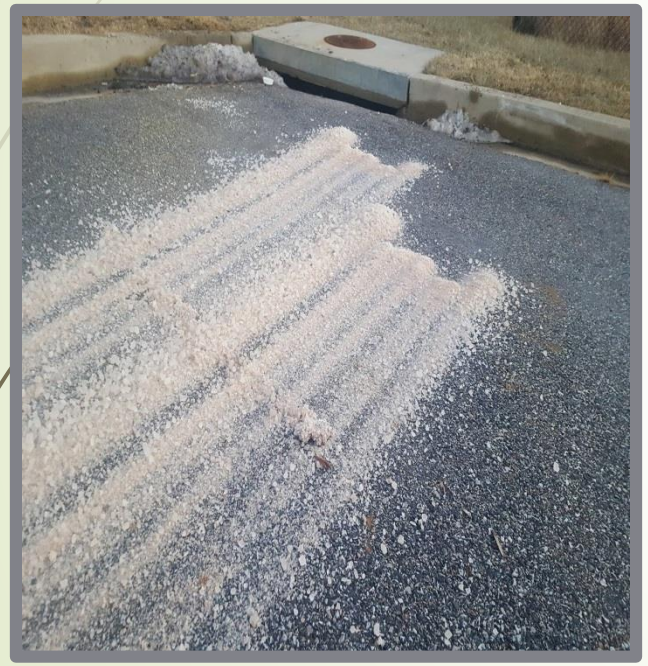
DEQ uses VA SOS to

- Prioritize follow up monitoring by state biologists
- Identify potentially impaired streams
- Educate the public on stream health

Data Examples

Winter Salt Watch

Issues of Emerging Concern

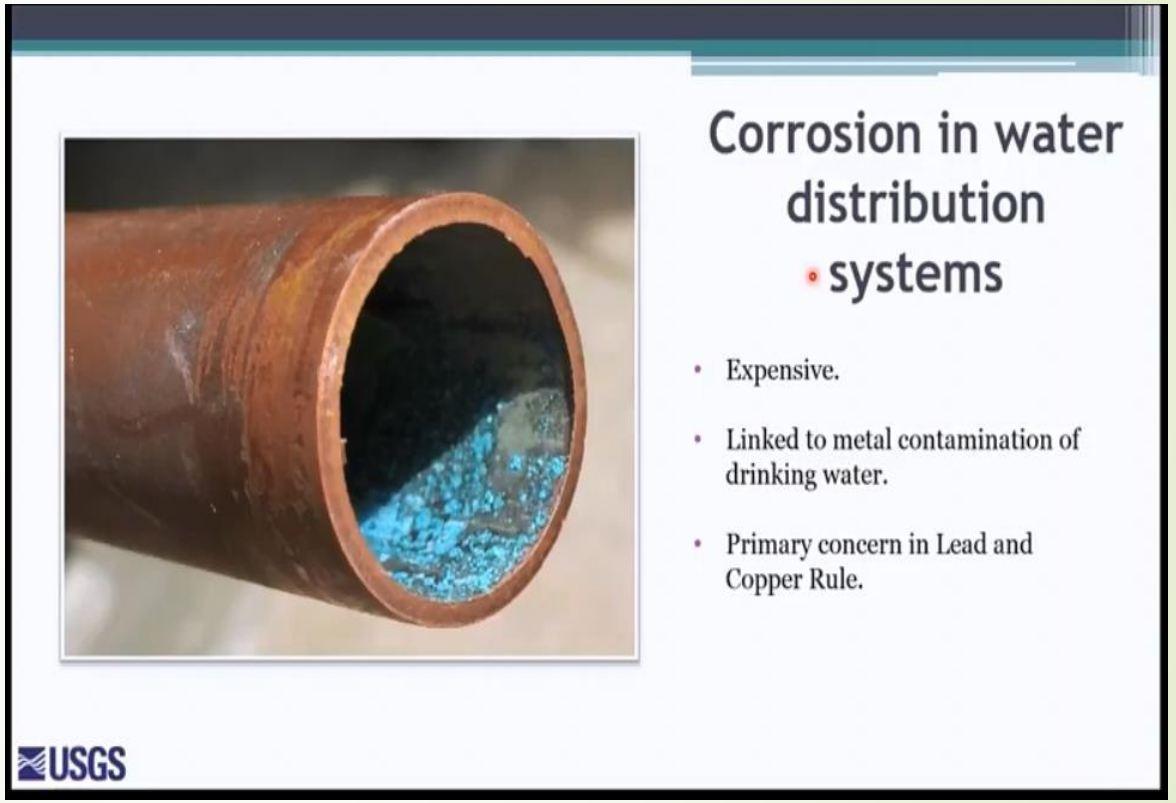


Data Examples

Winter Salt Watch

WINTER SALT WATCH
IZAAK WALTON LEAGUE OF AMERICA

- Toxic to aquatic life
- Linked to corrosion in water distribution systems $36B annually nation wide



Memorandum of Understanding

Commitments

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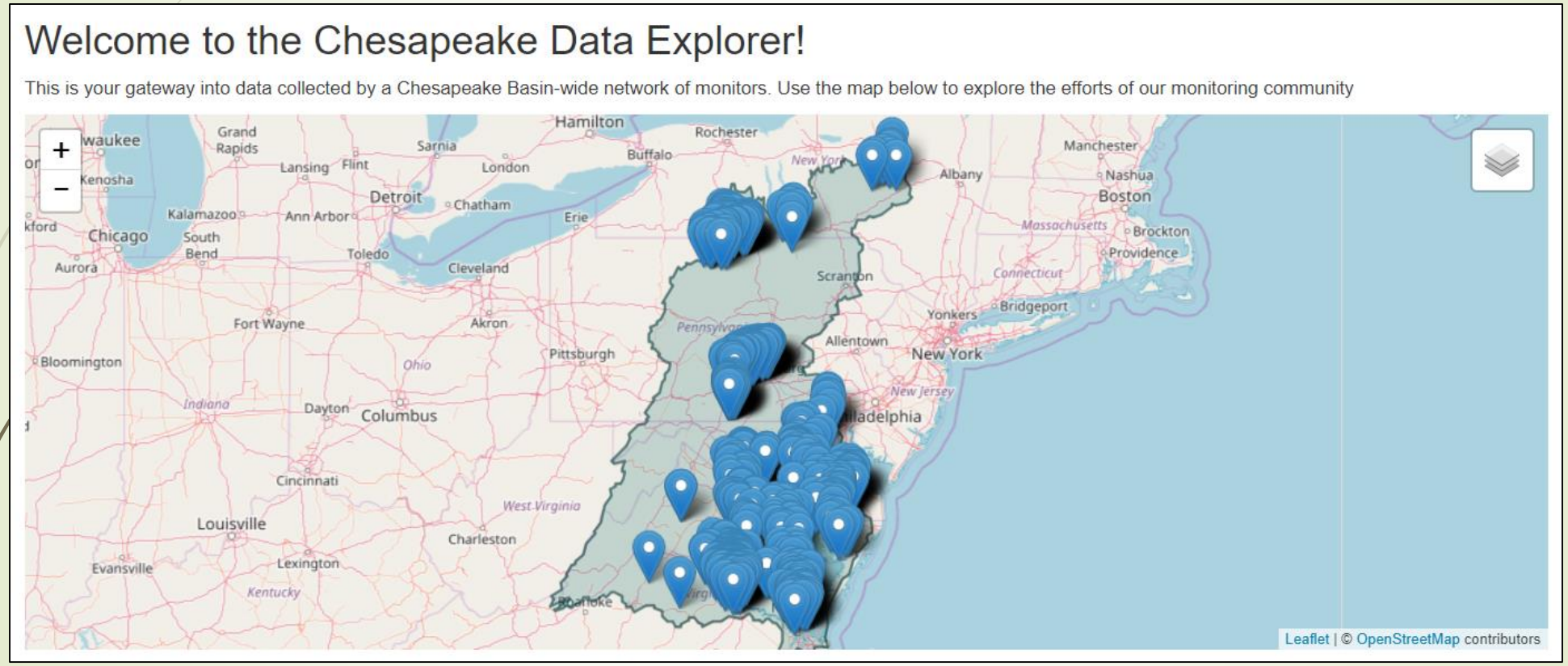
Chesapeake Data Explorer
Consolidate Data



https://cmc.vims.edu

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- Promote the collection of water quality, benthic macroinvertebrate, and other monitoring data that can inform the Bay Program to adaptively manage and track progress toward the Watershed Agreement by non-traditional partners, such as, local and regional organizations, agencies, and/or educational institutions.

- Develop and adopt methods for data integration into regional monitoring and assessment strategies.

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Commitments

- Collaborate with the CMC in training with diverse, equitable and inclusive volunteer and non-traditional partner base for monitoring efforts.

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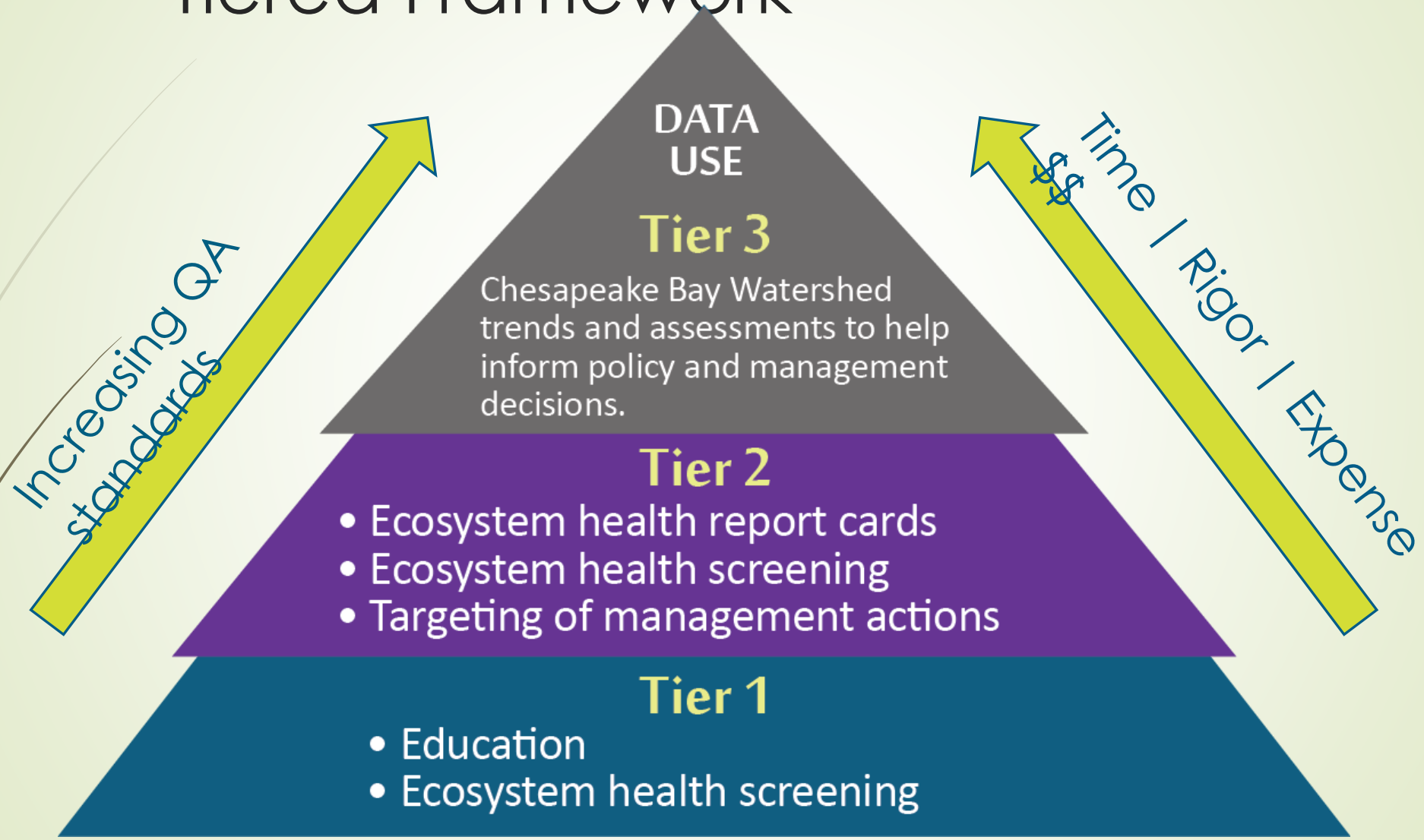
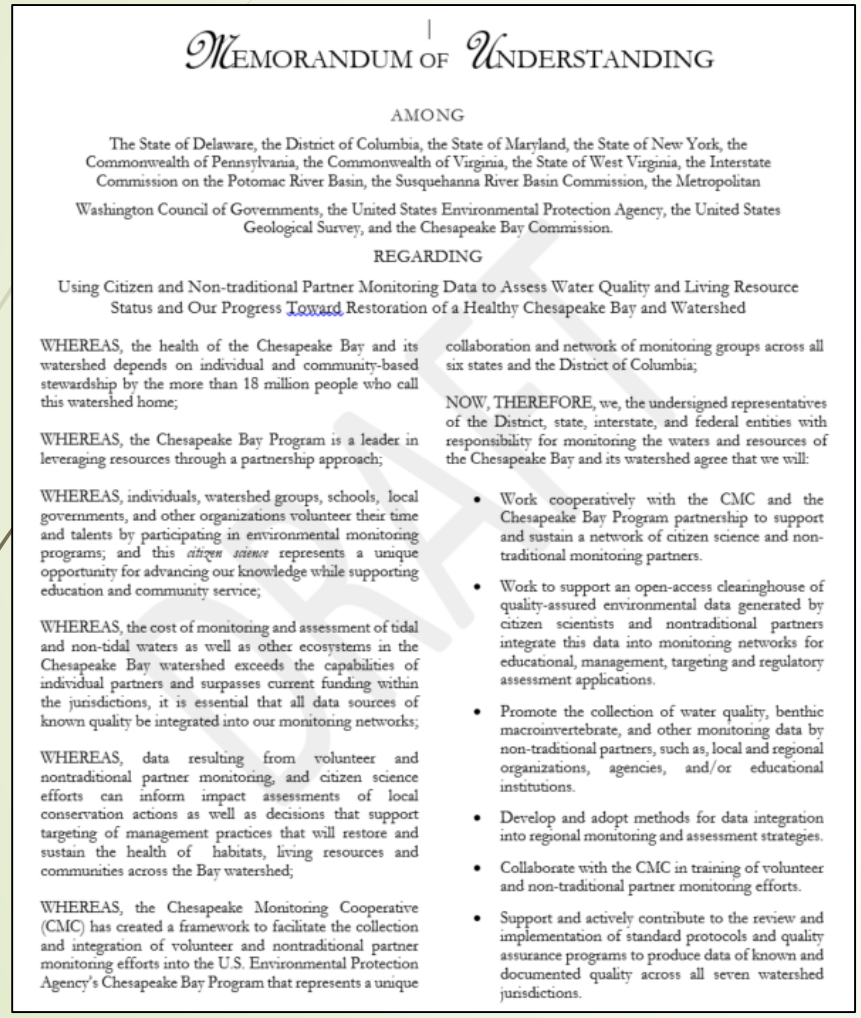
Tiered Framework



Path to CBP Approval of the MOU

- MOU Drafted in 2017
- 2017-spring 2018: Chesapeake Monitoring Cooperative presented MOU to, and reviewed by, STAR Workgroups, STAR, Advisory Committees and WQGIT
- May 2018: WQGIT Outcomes. SRS Review Request to Management Board for support of the MOU
- June 2018: Management Board MOU presentation and initial comments
- July 2018: Updated MOU shared with Management Board for final comment period leading to August approval request
- August 2018: Final comments received and MOU updated for approval copy
- Requests to Advisory Committees for letters of support to the PSC
- August 2018: Management Board Approved content. Work remains on finalizing signatories on the MOU.
- October 18, 2018. PSC approval

Memorandum of Understanding



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DRAFT

- Recognizes the breadth of opportunity for enhanced data collection in space and time.
- Supports capacity expansion
- Promotes availability and use of the data to fill gaps in the decision-support needs of the community (*Data Explorer website release slated for November 2018*)

Thank you for your support!

WHAT are the pieces of our program?

Volunteers

(Data Collectors)

GITs

(Monitoring Information Needs – Gap Analysis Guide)

Chesapeake Monitoring Cooperative

(Data Harvesters Trainers)

We Need Project Directions (i.e., RECIPES) to make the pieces fit together

Volunteers

(Data Collectors)

Project Instructions

- What data to collect
- How to collect it
- Where to collect it
- When to collect it
- How often to collect
- Duration of data collections

Chesapeake Monitoring Cooperative

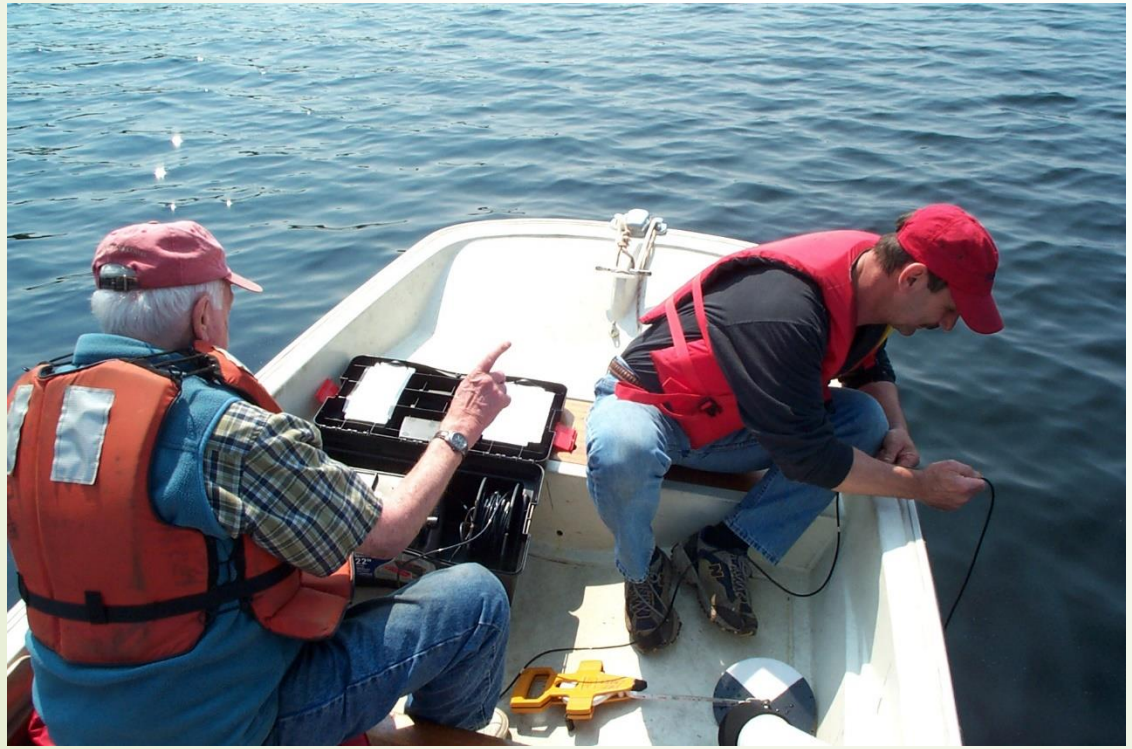
(Data Harvesters
Trainers
QA)

GITs

(Monitoring Information Needs – Gap Analysis Guide)

Website: We need a project page.

- First Project: Dissolved Oxygen Profiles are needed!

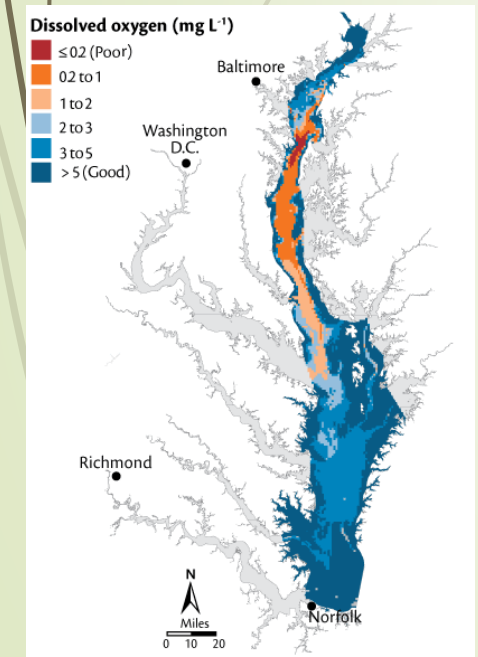


Exciting?

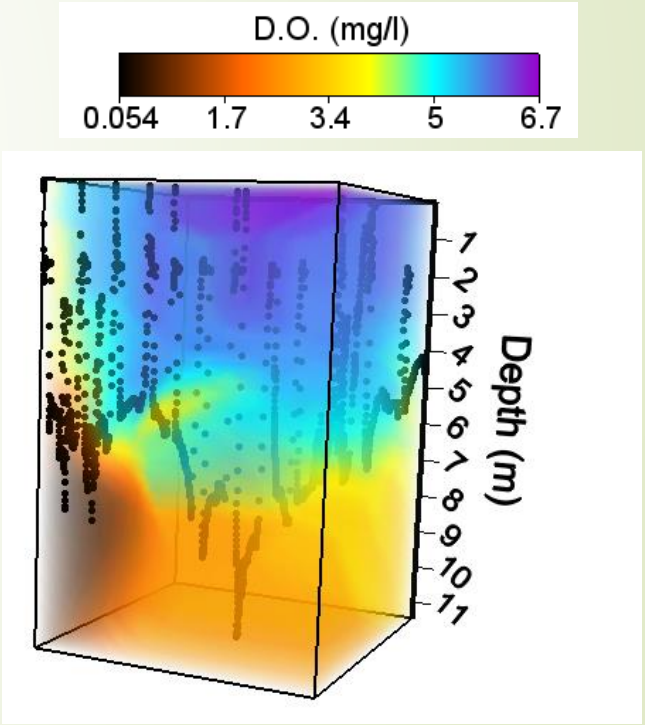
Maybe not so much… but…

We need some creative project development and marketing!

- First Project: ~~Dissolved Oxygen Profiles are needed!~~
- ***<u>The Dead Zone Hunters Club</u>! Discover dead zones in your tributary!***



Chesapeake Dead Zone



Severn River Dead Zone!

Website: We need a project page.

- Second Project: Fixed Site Macroinvertebrate Trend sites are needed.

Website: We need a project page.

- Second Project: Chesapeake's Annual Bug Bioblitz!

YAYYYYYYY!


scistarter™
Science we can do together.
Search
log in
sign up
My Account
Project Finder
Event Finder
Calendar
FIND A PROJECT
Find a location
enter a location
842 PROJECTS and GROWING
CITIZEN SCIENTISTS ARE
USING SCIENCE TO ADDRESS
LOCAL AND GLOBAL PROBLEMS

Blue Catfish Watch

Chesapeake Bay

SquirrelMapper

Lionfish Watch

Chesapeake Bay Parasite Project – mud crabs

Bat tracker (Norfolk,VA)

Bay 100 BMP Monitoring Project

Choptank River, Delaware

Weather Change in Bellefonte, PA

Plant Census at Smithsonian's Global Change Research Wetland

Blue Ridge Biodiversity Mapping

DC/Baltimore Cricket Crawl

Maine Guidance for Reducing Homeless Cats – monitor cat management on unowned cat populations

Sparrow Swap – active bird management

Florida Microplastic Awareness Project

Crabwatch – monitoring crabs and track climate change

Backyard Bark Beetles

Presented By	University of Florida/IFAS
Goal	Monitor bark & ambrosia beetles
Task	Trap & send beetles for ID. See what you caught on a live map!
Where	Global, anywhere on the planet

TreeKIT – measure/map urban forests

Landscape Watch – track landscape change

Goal	Collect hydrological data for modelling
Task	Collect water levels, stream flow data and soil moisture
Where	Global, anywhere on the planet

West Oakland Environmental Indicators Project

Goal	Achieve healthy homes, jobs, and neighborhoods in West Oakland.
Task	Walk and collect air quality data wi a wearable sensor

Present Model

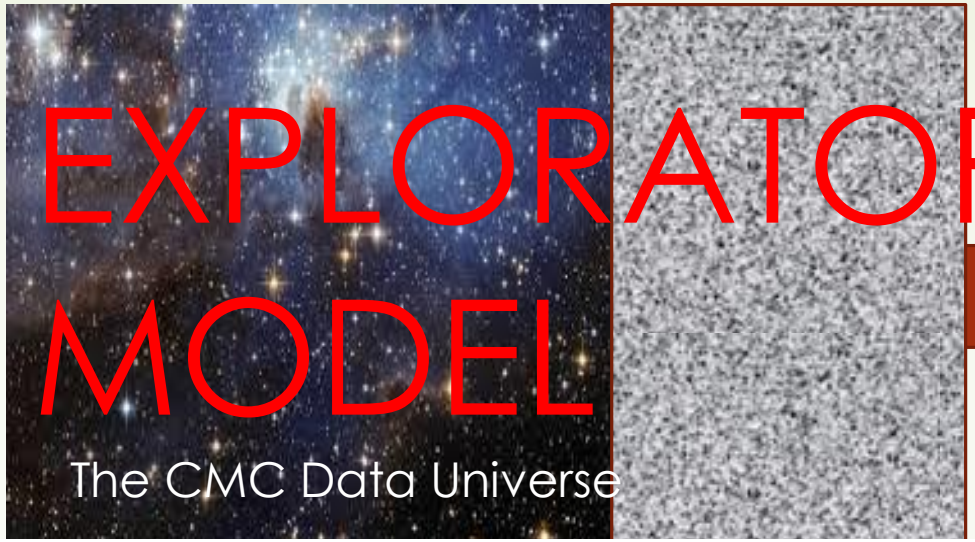
Volunteer And Nontraditional Partner Data Stream

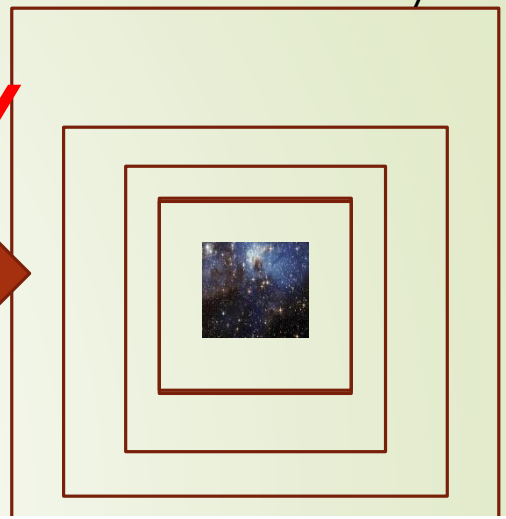
Local Projects

The Data Vortex

The Data Filter

Filtered Data Set
Size depends on how well the data meet analyst needs





Present Model

Volunteer And Nontraditional Partner Data Stream

Local Projects

Built Out Model
Watershed-wide Projects

Volunteer And Nontraditional Partner Data Stream

Project 1

Project 2

Project 3

The Data Vortex

The Data Filter

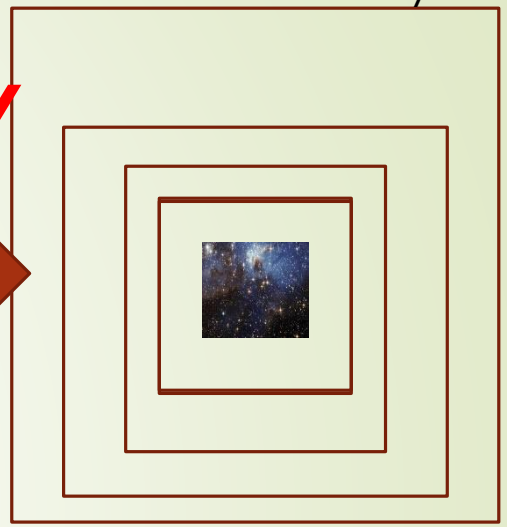
EXPLORATORY MODEL

The CMC Data Universe

DIRECTED MODEL

The CMC Data Universe With CBP Project Focused Data Inputs

Filtered Data Set
Size depends on how well the data meet analyst needs



Filtered Data Set
Project specific protocols
Data meets analyst needs

Project 1

Globally recognized template – Don't recreate the wheel.

North Carolina King Tides Project

Main Project Information

Goal	Documenting high water events in North Carolina
Task	Photograph high water and flooding events
Where	North Carolina, United States of America
Description	The North Carolina King Tides Project is an initiative to photo-document nuisance flooding events. We are looking for photos of high water levels driven by forces such as heavy rains, storms, wind, and king tides. These photos are valuable in helping communities understand vulnerabilities to coastal flooding, and can help us visualize what a future of sea-level rise may look like. This data will inform community planning and spread awareness of local flooding impacts. Remember to be careful - your safety is more important to us than any photo! Read More
How to Join	Interested participants can visit our website and simply submit a photo: http://nckingtides.web.unc.edu/how-to-participate/taking-photos/
Website	http://nckingtides.web.unc.edu/
Social Media	•Facebook •Blog
Ideal Age Group	Elementary school (6 - 10 years), Middle school (11 - 13 years), High school (14 - 17 years), College, Graduate students, Adults, Families, Seniors
Ideal Frequency	Per month
Spend the Time	outdoors
Type of Activity	In oceans, streams, rivers, lakes, While fishing, On a hike, At the beach, On a walk, run, On a lunch break
Training Materials	http://nckingtides.web.unc.edu/plan-your-photo-shoot/
Class Materials	http://nckingtides.web.unc.edu/motions-of-the-ocean-lesson-plan/
Media Mentions and Publications	•Public Invited to Help Document King Tides
Tags	aquatic, coast, flooding, hurricanes, king tides, ocean, photos, sea level rise, storm surge, tides, water level
Project Updated	06/06/2017

July 2018.

USGS report, photo MD D

Next steps

- STAR Workgroups (IMN WG and DIWG) will be developing a project template
- STAR Workgroups developing 1-3 examples of projects.
- STAR and its workgroups will continue coordination with the CMC on implementing projects for directed, watershed-wide data collections.
- STAR working with STAC on cross-GIT integrated management questions to guide prioritization of project development.
- GITs and their Workgroups are continuing efforts on workshops to define indicators, metrics and parameters that monitoring capacity will be needed.
- GITs should consider in their RFP funding requests to have funding for support in developing study designs that address existing capacity and highlight spatial/temporal gaps. This design information can then be used to derive projects that volunteers/citizen

Chesapeake Data Explorer
Consolidate Data

Functions

- Data inputs
- Data management
- Data access
- Data visualization

Number of Data Points			
Parameter	**Tier 1**	**Tier 2**	**Tier 3**
Dissolved Oxygen	1086	3969	10
Temperature	1153	3397	6
Salinity	91	0	5

What We Want

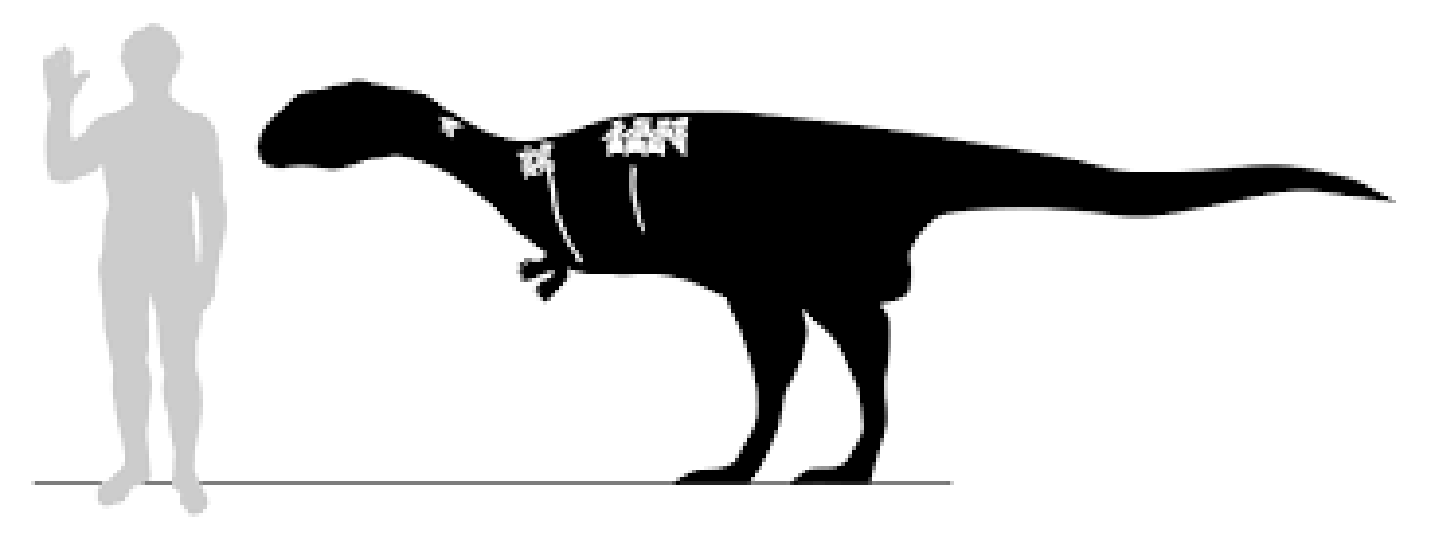
1. Accept and promote the Citizen science and nontraditional partner MOU that support enhanced data assessments.

2. Charge STAR with further analyses for understanding comparisons of observed and expected trends in water quality in the bay and watershed.

Activity: Dinosaur fossil hunting…what did we find?

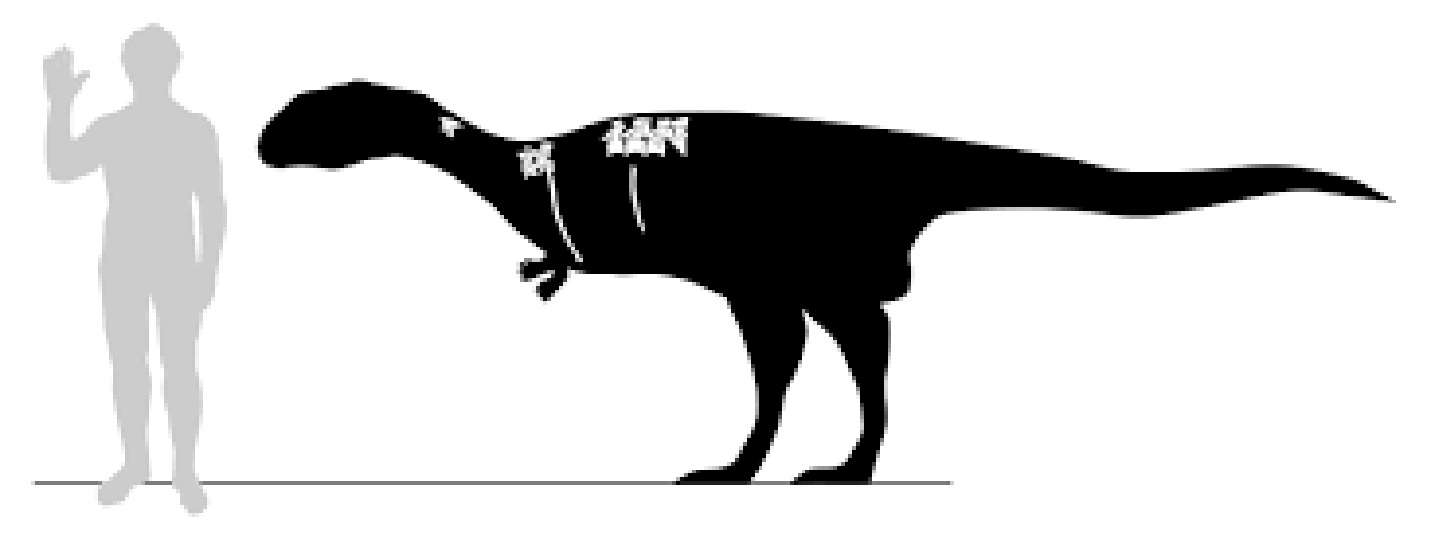
A few bones of some dinosaur. What does it look like

Which dinosaur picture has less uncertainty and more accuracy?

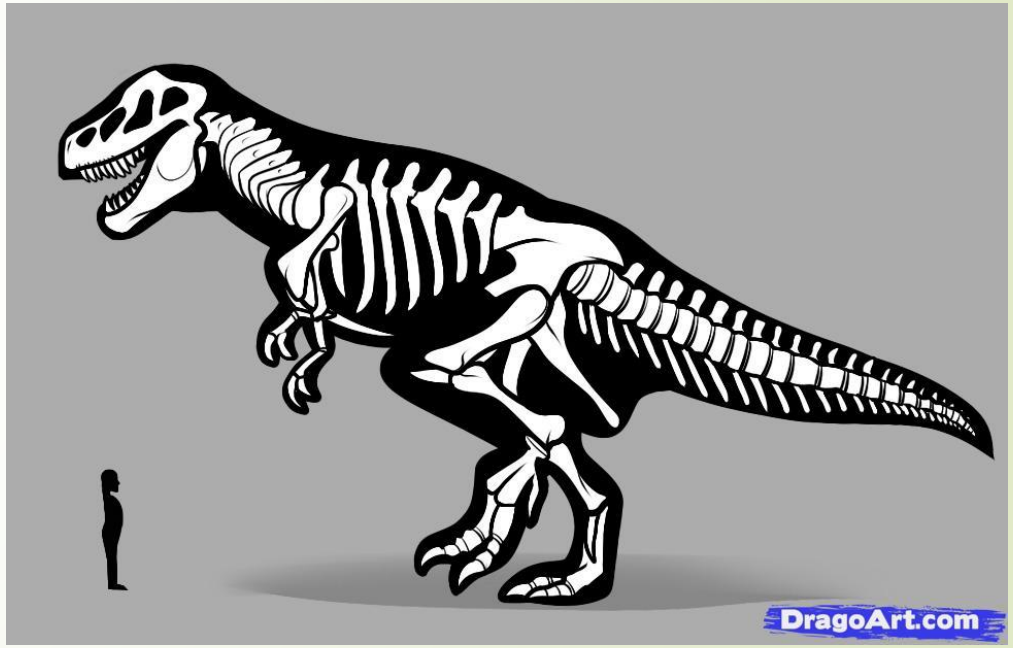


Marginal information

Which dinosaur picture has less uncertainty and more accuracy?

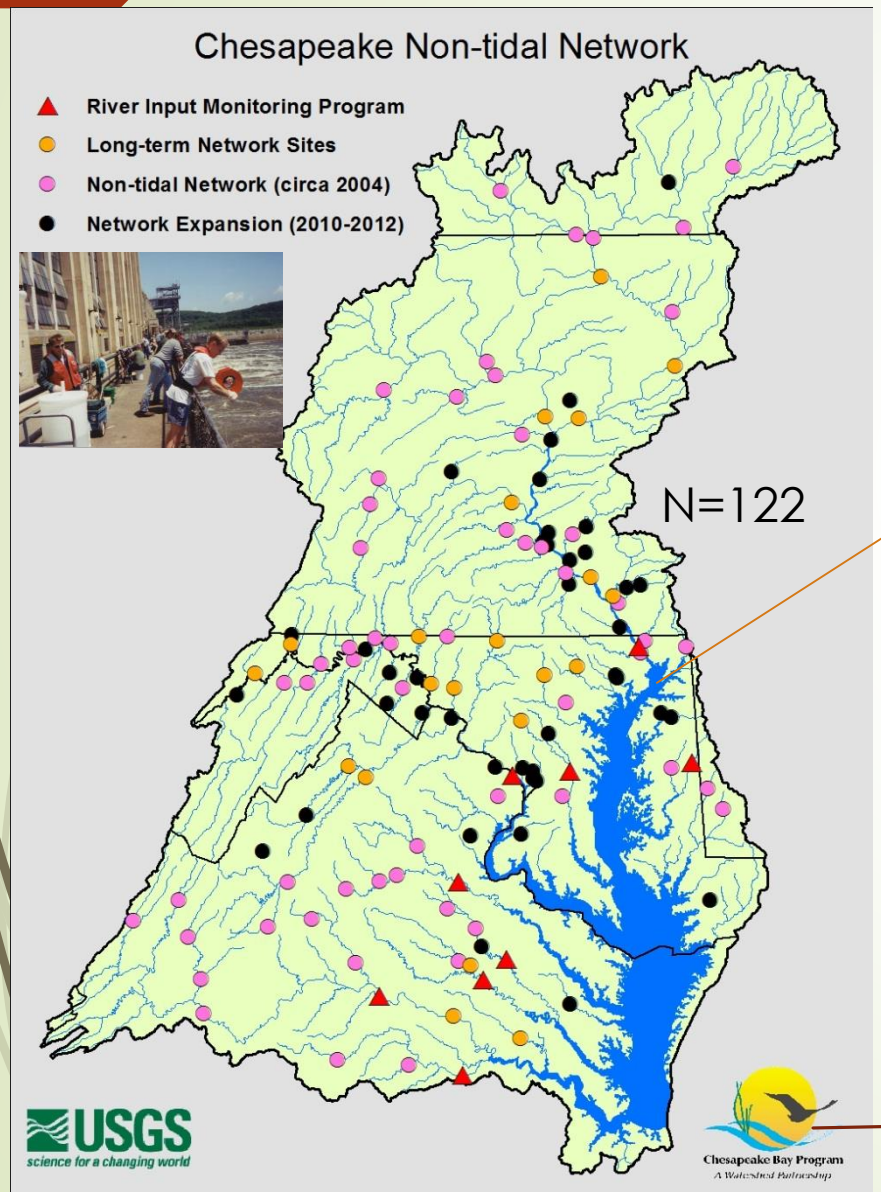


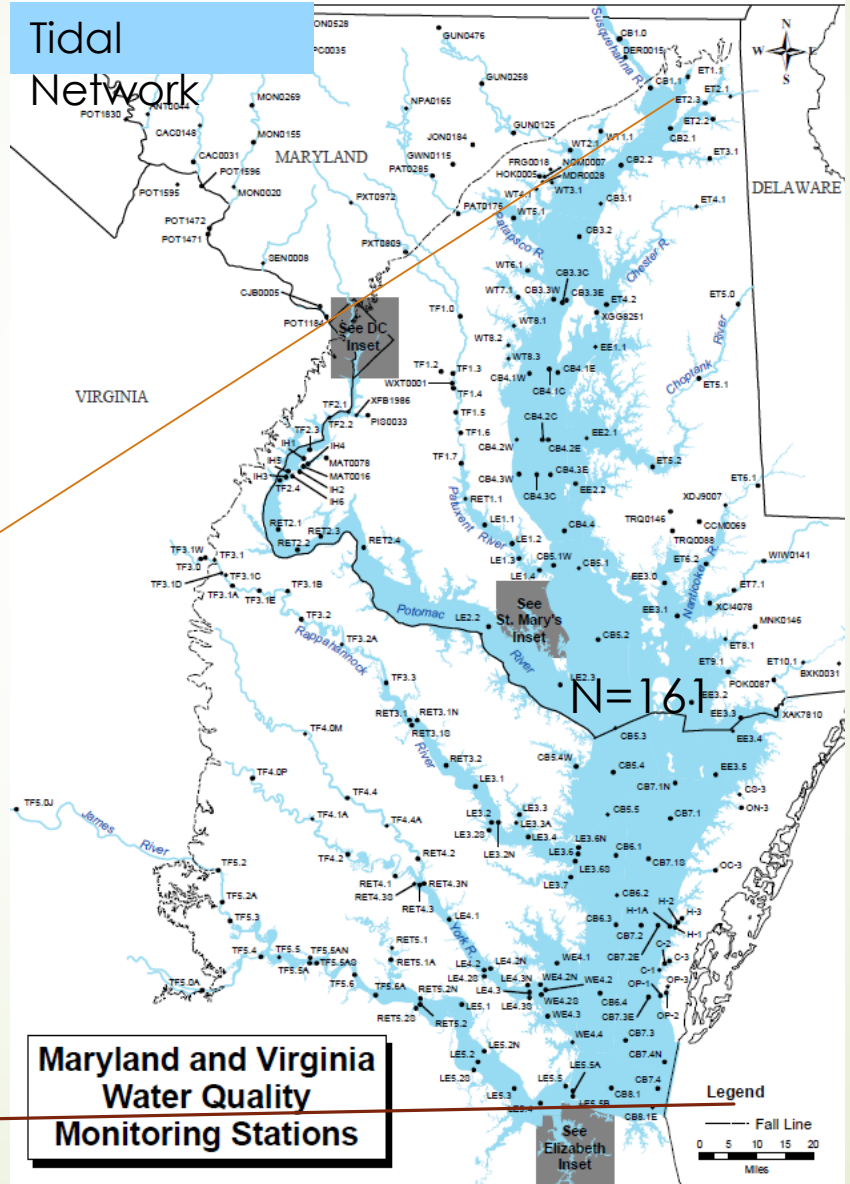
Marginal information



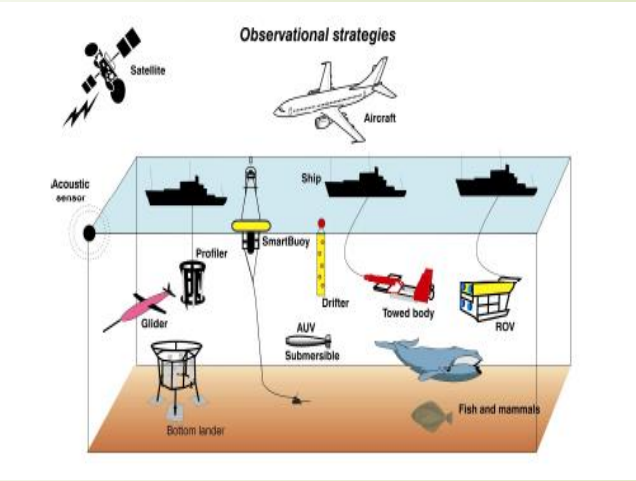
Adequate to full information

The Chesapeake Bay Program Partnership Monitoring Networks

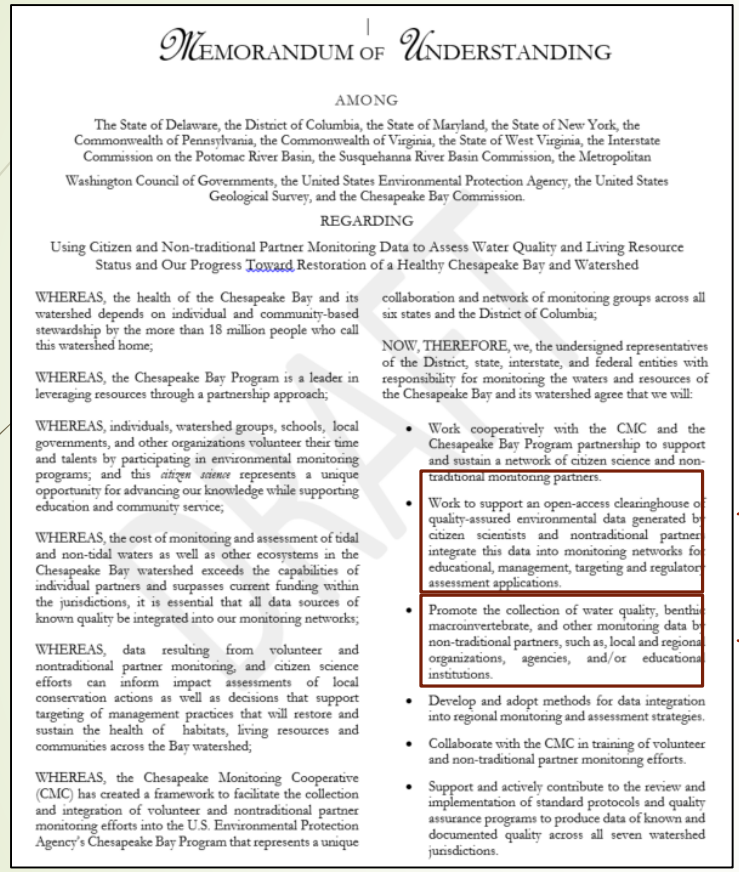




Diverse methods support Water quality assessments



Measures:
- Physical
- Chemical
- Biological
- Hydrodynamic
- Meteorological



MEMORANDUM OF UNDERSTANDING

AMONG

The State of Delaware, the District of Columbia, the State of Maryland, the State of New York, the Commonwealth of Pennsylvania, the Commonwealth of Virginia, the State of West Virginia, the Interstate Commission on the Potomac River Basin, the Susquehanna River Basin Commission, the Metropolitan Washington Council of Governments, the United States Environmental Protection Agency, the United States Geological Survey, and the Chesapeake Bay Commission.

REGARDING

Using Citizen and Non-traditional Partner Monitoring Data to Assess Water Quality and Living Resource Status and Our Progress Toward Restoration of a Healthy Chesapeake Bay and Watershed

WHEREAS, the health of the Chesapeake Bay and its watershed depends on individual and community-based stewardship by the more than 18 million people who call this watershed home;

WHEREAS, the Chesapeake Bay Program is a leader in leveraging resources through a partnership approach;

WHEREAS, individuals, watershed groups, schools, local governments, and other organizations volunteer their time and talents by participating in environmental monitoring programs; and this *citizen science* represents a unique opportunity for advancing our knowledge while supporting education and community service;

WHEREAS, the cost of monitoring and assessment of tidal and non-tidal waters as well as other ecosystems in the Chesapeake Bay watershed exceeds the capabilities of individual partners and surpasses current funding within the jurisdictions, it is essential that all data sources of known quality be integrated into our monitoring networks;

WHEREAS, data resulting from volunteer and nontraditional partner monitoring, and citizen science efforts can inform impact assessments of local conservation actions as well as decisions that support targeting of management practices that will restore and sustain the health of habitats, living resources and communities across the Bay watershed;

WHEREAS, the Chesapeake Monitoring Cooperative (CMC) has created a framework to facilitate the collection and integration of volunteer and nontraditional partner monitoring efforts into the U.S. Environmental Protection Agency's Chesapeake Bay Program that represents a unique collaboration and network of monitoring groups across all six states and the District of Columbia;

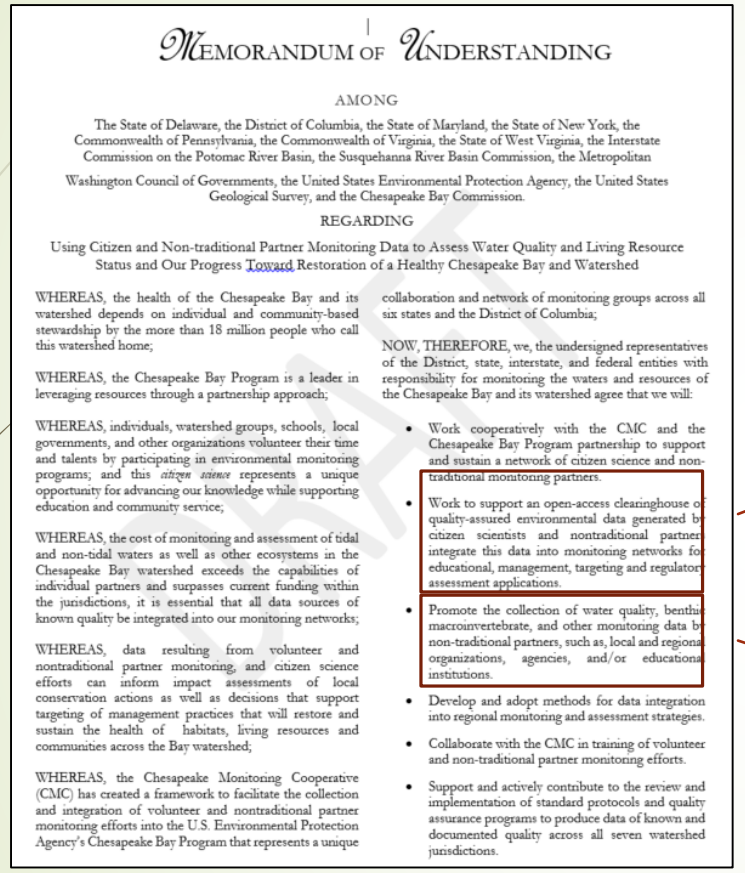
NOW, THEREFORE, we, the undersigned representatives of the District, state, interstate, and federal entities with responsibility for monitoring the waters and resources of the Chesapeake Bay and its watershed agree that we will:

- Work cooperatively with the CMC and the Chesapeake Bay Program partnership to support and sustain a network of citizen science and non-traditional monitoring partners.
- Work to support an open-access clearinghouse of quality-assured environmental data generated by citizen scientists and nontraditional partners integrate this data into monitoring networks for educational, management, targeting and regulatory assessment applications.
- Promote the collection of water quality, benthic macroinvertebrate, and other monitoring data by non-traditional partners, such as, local and regional organizations, agencies, and/or educational institutions.
- Develop and adopt methods for data integration into regional monitoring and assessment strategies.
- Collaborate with the CMC in training of volunteer and non-traditional partner monitoring efforts.
- Support and actively contribute to the review and implementation of standard protocols and quality assurance programs to produce data of known and documented quality across all seven watershed jurisdictions.

Final comments received since July for clarification:

PADEP: Can we please include specific reference to the 3-tiered data use framework of the CMC and identify those uses

STAC: Can we please give examples of "other monitoring data"



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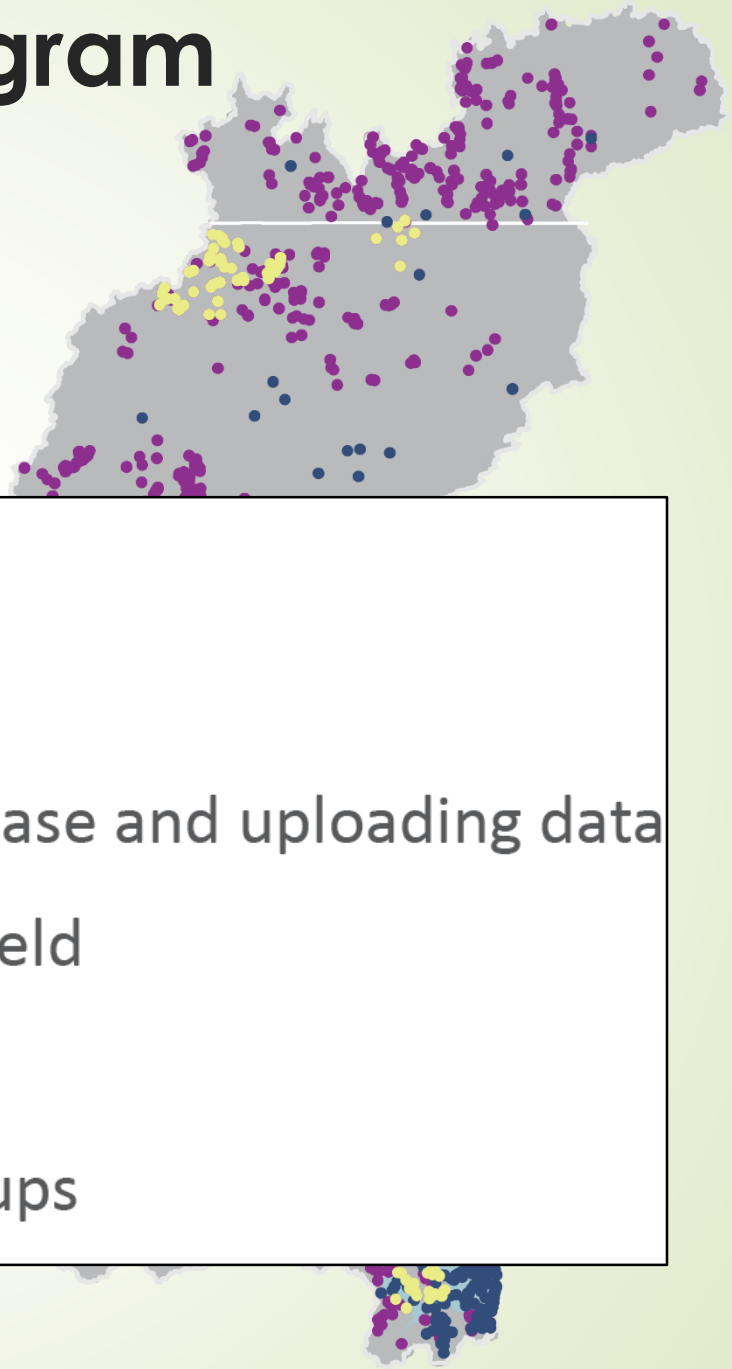
STAC: Can we please give examples of "other monitoring data"

Yes, we can ☺

Yes, we did ☺

Chesapeake Bay Program Monitoring Sites



Chesapeake Bay Volunteer and Nontraditional

1,371 individuals reached

38 training workshops held

7 groups integrated into the database and uploading data

2 data interpretation workshops held

2 active Tier 3 groups

2 additional nominated Tier 3 groups

Expectations for the Management Board

- We request Management Board acceptance of the MOU to move up to the PSC for adoption this autumn.
- Timeline
  - Today we look forward to your questions and your input on what else may be needed in the MOU for it to meet your approval
  - We provide you with two weeks of internal review time before the July meeting
  - The CMC team will incorporate comments and feedback and seek final approval at the July meeting