Chesapeake Monitoring Cooperative Update

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April 19, 2017
Integrated Monitoring Networks Workgroup

A Year ago….

Last Updated: 3/14/2016

Non-traditional Monitoring Integration Strategy: Water Quality and Macroinvertebrates

Introduction

There are many sources of data – including data collected by volunteers, local governments, conservations districts, and nongovernmental groups such as academia and watershed organizations that are not currently being used by the Chesapeake Bay Program to track Bay health and determine success of restoration efforts. The Alliance for the Chesapeake Bay (ACB), Izaak Walton League of America (IWLA), Dickinson College's Alliance for Aquatic Resource Monitoring (ALLARM), and the University of Maryland Center for Environmental Science Integration and Application Network (IAN), referred to as the Project Team, are partnered to provide technical, logistical, and outreach support for the integration of citizen-based and non-traditional water quality and macroinvertebrate monitoring data into the Chesapeake Bay Program (CBP) partnership. This is the first effort to integrate citizen science data, to inform policy management and water quality assessments, into a federal program. The integration of these data into the CBP monitoring network will provide additional cost-effective information that supports shared decision-making and adaptive management, as well as demonstrates a framework for the integration of non-traditional data sources which could later be applied to other data gaps in measuring progress towards the 2014 Chesapeake Bay Watershed Agreement.

This six-year project will focus on the identification and integration of citizen-based and non-traditional water quality and benthic macroinvertebrate monitoring data into a new database for the CBP. These data can subsequently be used by the CBP and a wide-range of stakeholders for purposes such as regulatory assessments of water quality criteria, environmental health report cards, environmental health screening, targeting of management actions, and education. The Project Team, using their expertise and knowledge of the citizen-based and non-traditional monitoring community, is working with the CBP Scientific, Technical Assessment and Reporting (STAR) Team and workgroups to:

- Inventory, prioritize and recruit monitoring groups
- Establish institutional structures and procedures for integrating new data
- Facilitate development of monitoring and training protocols, data gathering tools, quality assurance mechanisms, data analysis, and data communication tools

Last Updated: 3/14/2016

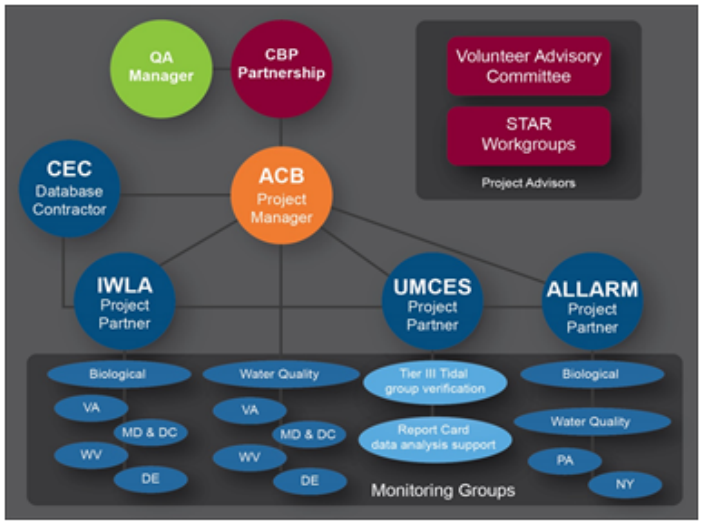


Figure 1. Organization Chart for Project Participants. ACB oversees all aspects of the project and is the main point of contact for project partners, CBP, and the QA manager.

Milestones – Years 1 & 2

The objectives for Years 1 and 2 (May 2015 – May 2017) of the project include:

- The creation of a tiered framework to inform data integration criteria and strategies.
- An inventory of citizen-based and non-traditional monitoring groups and associated data collected in the Chesapeake Bay watershed.
- Three CBP-approved quality assurance project plans (QAPPs) using the EPA guidance for volunteer monitoring QAPP development, for benthic macroinvertebrates, non-tidal, and tidal water quality monitoring.
- Three CBP-reviewed methods manuals for benthic macroinvertebrates, non-tidal, and tidal

Tiered framework

Tiered Framework for Data Collection and Integration for Nontraditional Monitoring

Introduction

The Alliance for the Chesapeake Bay (Alliance), Izaak Walton League of America (League), Dickinson College's Alliance for Aquatic Resource Monitoring (ALLARM), and the University of Maryland Center for Environmental Science Integration and Application Network (UMCES IAN) (referred to as the "Project Team" in this document) are partnering to provide technical, logistical, and outreach support for the integration of citizen-based and non-traditional (i.e., non-agency) monitoring data into the Chesapeake Bay Program (CBP) partnership. The integration of these data into the CBP monitoring networks will provide additional cost-effective data and information that supports shared decision-making and adaptive management by the CBP partners focused on restoration of the Chesapeake Bay and its watershed.

The Project Team, using their background, expertise, and knowledge with the nontraditional monitoring community, are working with CBP STAR (Scientific, Technical Assessment and Reporting Team) to: 1) establish institutional structures and procedures, such as the tiered data use framework; 2) facilitate development of consistent monitoring and training protocols, technical guidance, data gathering tools, quality assurance mechanisms, and data analysis and communication tools; 3) inventory, prioritize and recruit monitoring groups; and 4) provide training and technical support to monitoring entities. This comprehensive approach will ensure a consistent submittal of known quality data to the CBP.

Purpose of the Framework

The Tiered Framework for Data Collection and Integration for Nontraditional Monitoring identifies recommended categories of data quality and their associated end uses. Broad data quality requirements for each category are identified. This framework also provides recommendations of existing resources to inform data production protocols.

For the development of this framework and associated data collection and management protocols, the Project Team is working with experienced nontraditional monitoring programs, state agency programs, and the STAR Data Integrity workgroup to incorporate best practices and lessons learned. Additionally, the Project Team has examined thirteen states' volunteer monitoring programs, and identified five states to best inform the development of this tiered framework. The Project Team will seek adoption of the tiered data use framework, monitoring protocols, and Quality Assurance Project Plans (QAPPs) by the CBP.

The framework is meant to be a guiding document that will be subject to change and refinement once the Project Team receives data from a watershed monitoring census (to document the most commonly used monitoring techniques in the Bay Watershed) which will inform equipment testing and the development ofncorresponding monitoring method manuals and QAPPs. Once those key monitoring

Monitoring Questions

Non-traditional monitoring entities typically develop study designs, in part to identify their research questions and objectives. Most non-traditional monitoring entities have been monitoring for water quality status and trends using three lines of evidence:

- Water quality/chemistry
- Biological – macroinvertebrates and submerged aquatic vegetation
- Physical – habitat and stream bank assessments

Although the issues addressed are almost always locally-based, the data collected can also be utilized, along with other Bay-wide data, to address the status and trends of waterway health in the Chesapeake Bay watershed. Some examples of Bay-wide priority research questions that local non-traditional monitoring data can inform include:

- What is the effectiveness of management actions?
- What are the relationships in space and time between watershed health and bay health?
- What are the effects of emerging contaminants and climate change on the status and recovery of bay and watershed health?
- Where should natural resource managers prioritize restoration efforts?
- How does the inclusion of citizen science data change individual behaviors and increase environmental stewardship?

Once the data are organized and entered into a database, CBP may use the non-traditional data to help answer these and additional questions.

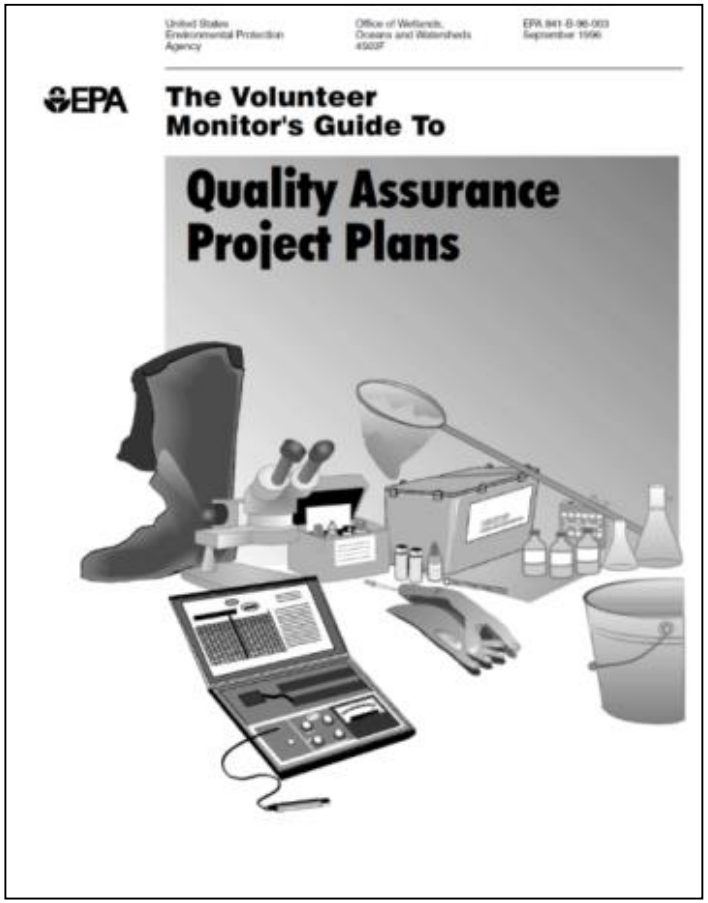
Intended Data Use

TIERS	Intended Data Use
TIER 1	Education, Environmental Health Screening
TIER 2	Environmental Health Report Cards, Environmental Health Screening, Targeting of Management Actions
TIER 3	Regulatory Assessments of Water Quality Standards Attainment

Tier Descriptions and Framework for Determining Tiers

There are diverse motivations for monitoring and diverse projects where non-traditional data are collected. In the aquatic citizen science field/volunteer monitoring, most organizations developing monitoring programs answer the question "how do they intend to use their data" prior to identifying parameters, appropriate techniques, and corresponding quality assurance measures. This process is done with the goal to match the data quality with the intended use. For the integration of non-traditional data into the Bay program, the Project Team has identified Tiers for data use. If data do not meet the data requirements of the different tiers, those data will not be included in this project.

Quality Assurance Project Plans



Water Quality Monitoring in:
Tidal streams (Tier 1 & 2)
Nontidal streams (Tier 1 & 2)

Benthic Macroinvertebrate Monitoring in:
Nontidal wadable streams (Tier 1 & 2)

Tier 3 water quality data:
Candidates will be nominated by the CMC and subsequently audited by the Data Integrity Workgroup.

Standard Operating Procedures for groups

Chesapeake Monitoring Census

Thank you for taking 15-20 minutes to help us learn about your monitoring efforts!

Are you monitoring in the Chesapeake Bay watershed?

This census is the first step of a larger project called the Chesapeake Monitoring Cooperative, which brings together data from community, municipal, county, state, and other non-federal monitoring programs, to aid understanding of the health of the Chesapeake Bay watershed in cooperation with the Chesapeake Bay Program.

With your help we will be able to identify locations, frequency, and types of monitoring taking place, throughout the watershed!

Through the Chesapeake Monitoring Cooperative there will be many opportunities for your program, including:

- A Chesapeake-wide database to store, retrieve, analyze, and interpret data;
- Capacity-building technical support to assist in monitoring program implementation;
- Access to data communication workshops; and
- Increased collaboration and networking across the watershed.

We appreciate you taking the time to answer our questions.

Sincerely,

Chesapeake Monitoring Cooperative Project Team – *Alliance for the Chesapeake Bay, Izaak Walton League of America, Dickinson College's Alliance for Aquatic Resource Monitoring, and University of Maryland Center for Environmental Science's Integration and Application Network*

Questions? Contact Lea Rubin, Project Coordinator
lrubin@iwla.org; (301) 548-0150 x236

CMC Chesapeake Monitoring Cooperative

Alliance for the Chesapeake Bay

The CMC was formed for the Integration of Citizen-based and Nontraditional Monitoring into the Chesapeake Bay Program partnership.

Next

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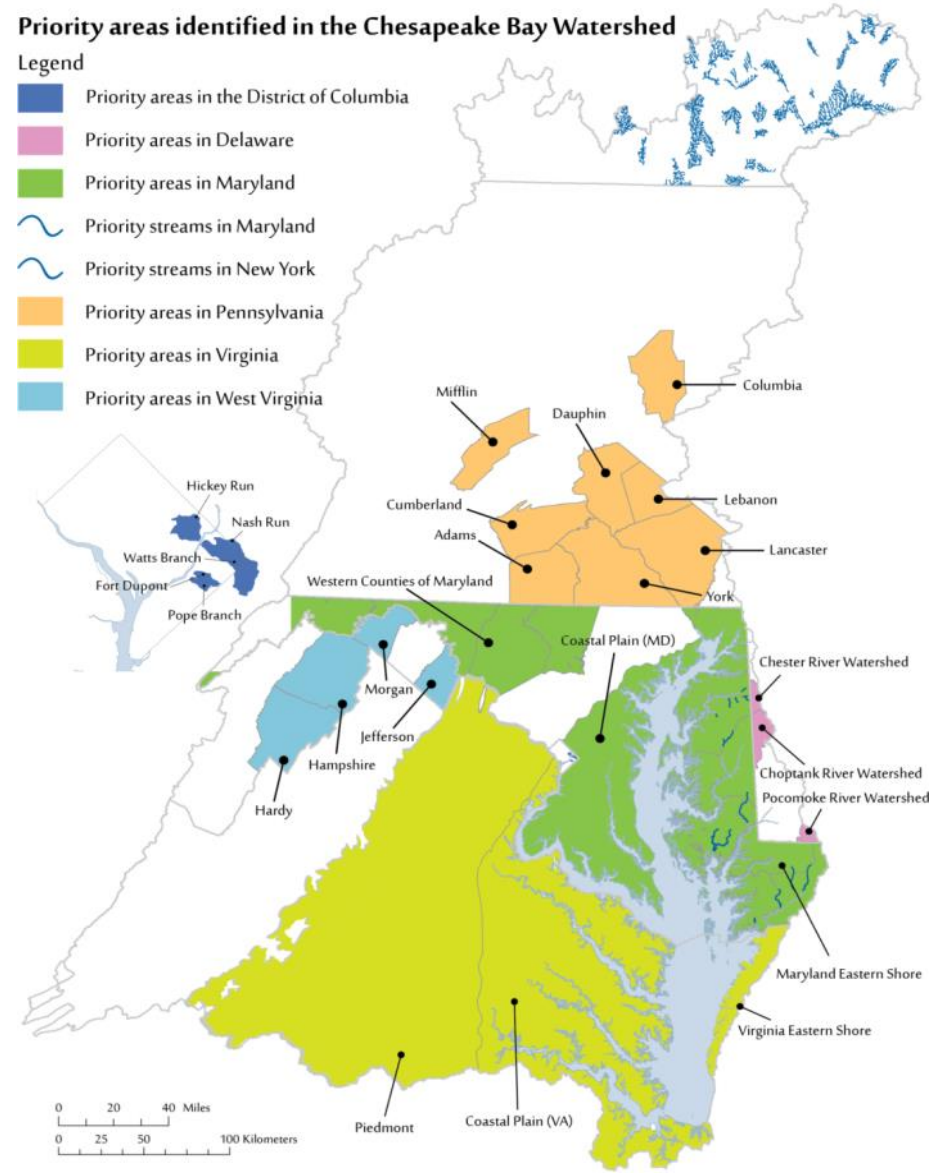
Overview and Next Steps: Prioritization Workshop

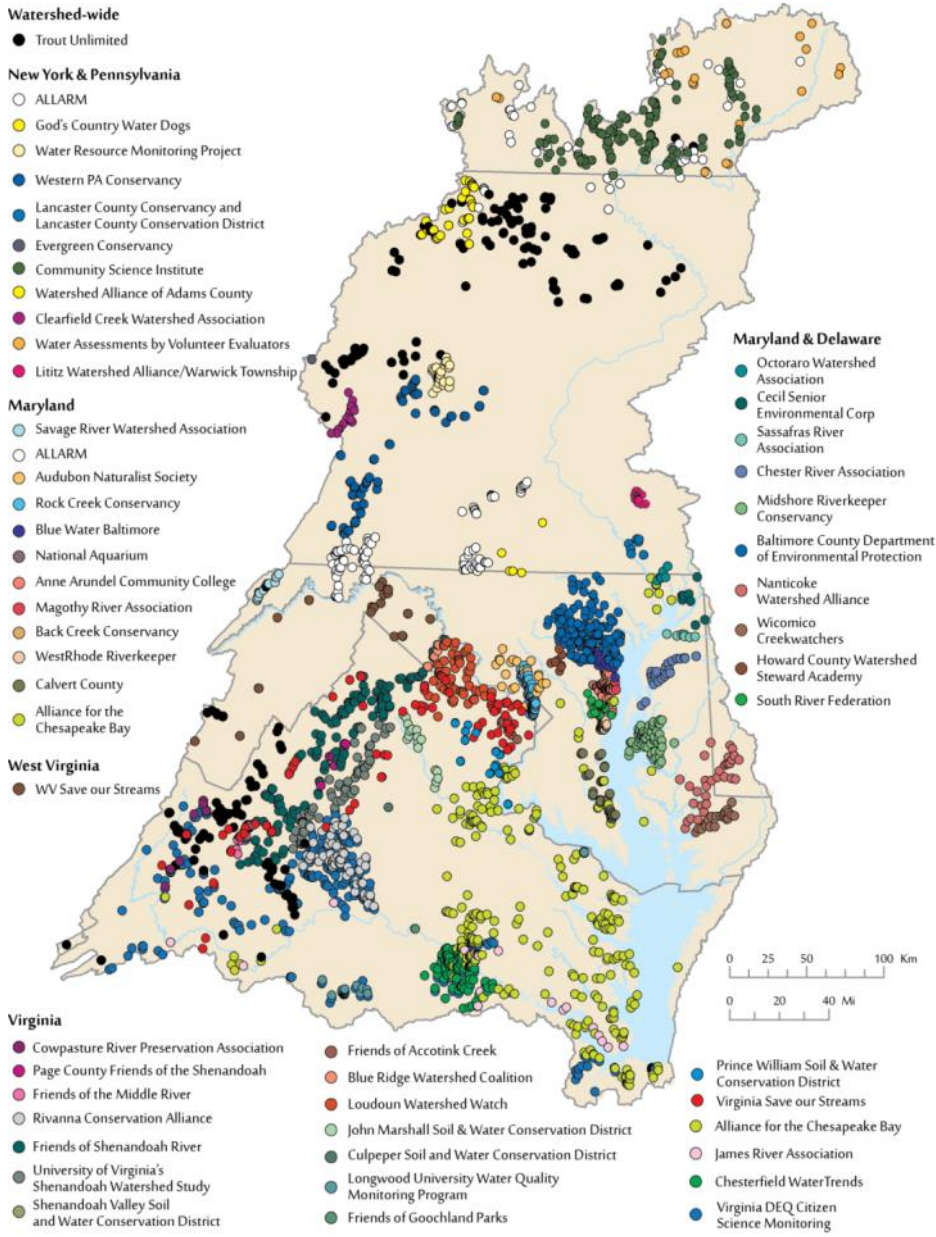
October 13, 2016

Dickinson College, Carlisle, PA

CMC
Chesapeake Monitoring Cooperative

Prioritization Report





Examples of Outreach and Engagement

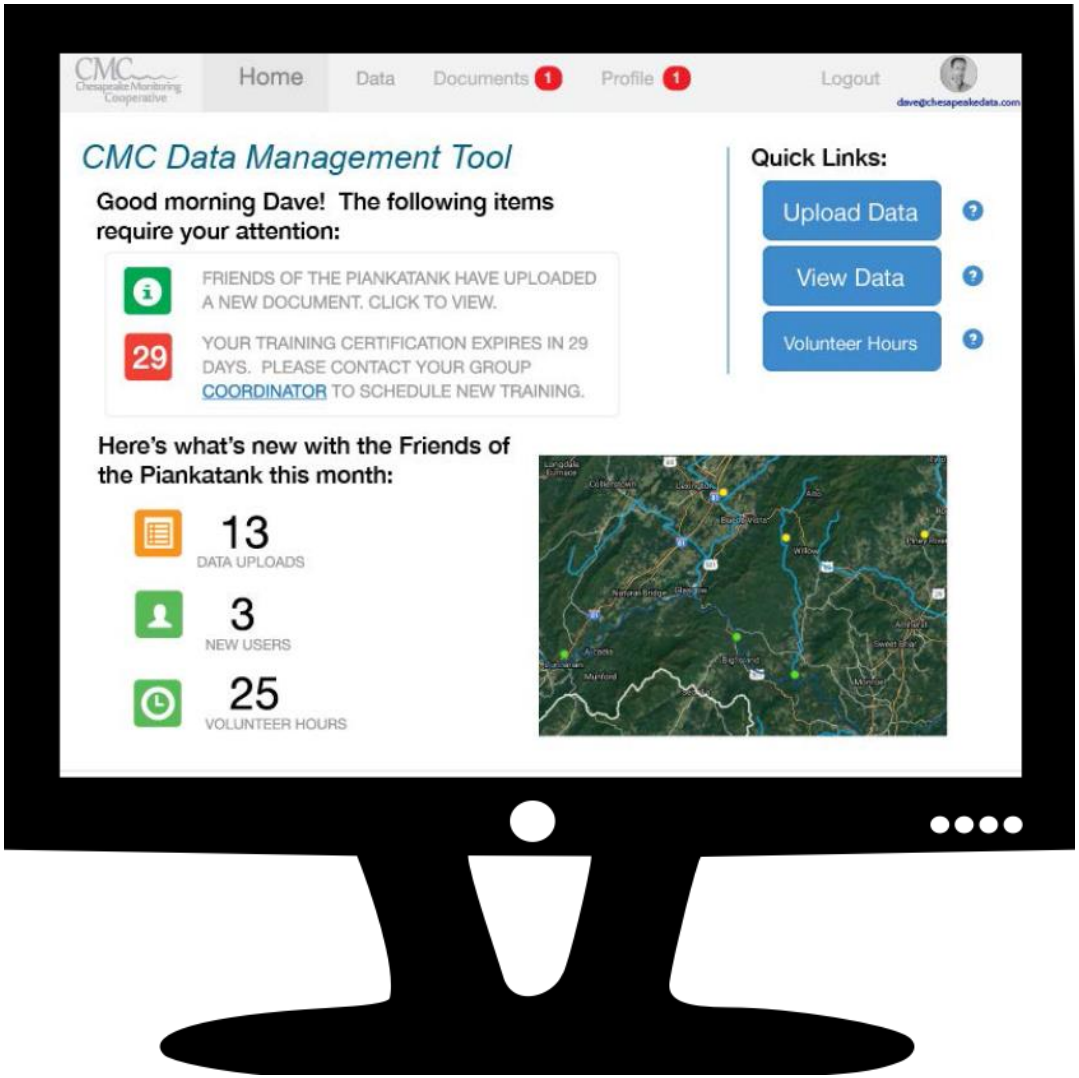
- MD Streams Roundtable (50)
- MD Water Monitoring Council (50)
- VA Water Monitoring Council (75)
- VA Citizens for Water Quality Annual Meeting (50)
- Chesapeake Watershed Forum (150)
- Data to Decisions Workshop (30)
- Mid-Atlantic Water Monitoring Conference (100)
- Choose Clean Water Coalition Webinar (50)
- NY Forum Plus (55)
- National Monitoring Conference (40)

T=650

Examples of Training

- **Green Aquia** – RiverTrends Training and Recertification (Alliance)
- **VA Governor's School** – RiverTrends Training (Alliance)
- **James River Association** – Benthic Macro Training (Izaak Walton League)
- **Cumberland Valley Trout Unlimited** – Study Design & Water Collection Workshop (ALLARM)
- **Otsego County Conservation Association** – Study Design Workshop (ALLARM)
- **Cumberland County Conservation District** – Study Design Workshop (ALLARM)
- **Trout Unlimited, expanded quality control in PA, VA, WV** – Quality Verification (ALLARM and Izaak Walton League)

Chesapeake Data Explorer (online database)



In Summary, the CMC has

- Developed a Tiered Framework for recommended categories of data quality and their associated end uses
- QAPPs and Method Manuals for Tiers 1 & 2 tidal and nontidal water quality and benthic macroinvertebrate monitoring
- Developed a rubric to determine data for all tiers
- Identified a method for assessing and integrating Tier 3 data through the Data Integrity Workgroup
- Identified priority areas where data users would like additional volunteer and nontraditional data
- Outreach, engagement, and training across the Chesapeake Bay Watershed
- Engaged in a process for developing a key tool for integrating this new data, the Chesapeake Data Explorer
- Developed Indicator Factsheets and Indicator Matrix

How the Matrix can benefit your work

Caroline Donovan

Wednesday, April 19, 2017

Integrated Monitoring Networks Workgroup

CMC Chesapeake Monitoring Cooperative

Two parts to the Matrix

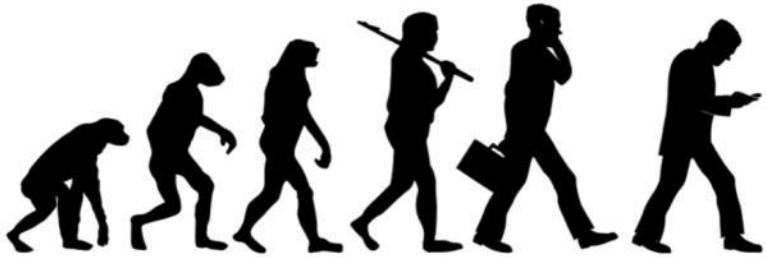
- Background
- Indicator factsheets
- Indicator matrix
  - By Goal Team
- How can the matrices help the Goal Teams?

Evolution of the product

- Research, develop, and test new citizen-based monitoring and nontraditional partner monitoring programs' data-based indicators and metrics for their ability to measure and evaluate the effectiveness of management actions. … Prioritization considerations will be given to indicators that support goals and factors affecting outcomes of the 2014 Chesapeake Bay Watershed Agreement. An "Indicator Effectiveness" matrix will be developed outlining the results of this process that can be used by monitoring groups to review their existing and future programs.

Evolution of the product

- May – October 2016
  - Literature review
  - CMC Census results
  - Drafts of potential products



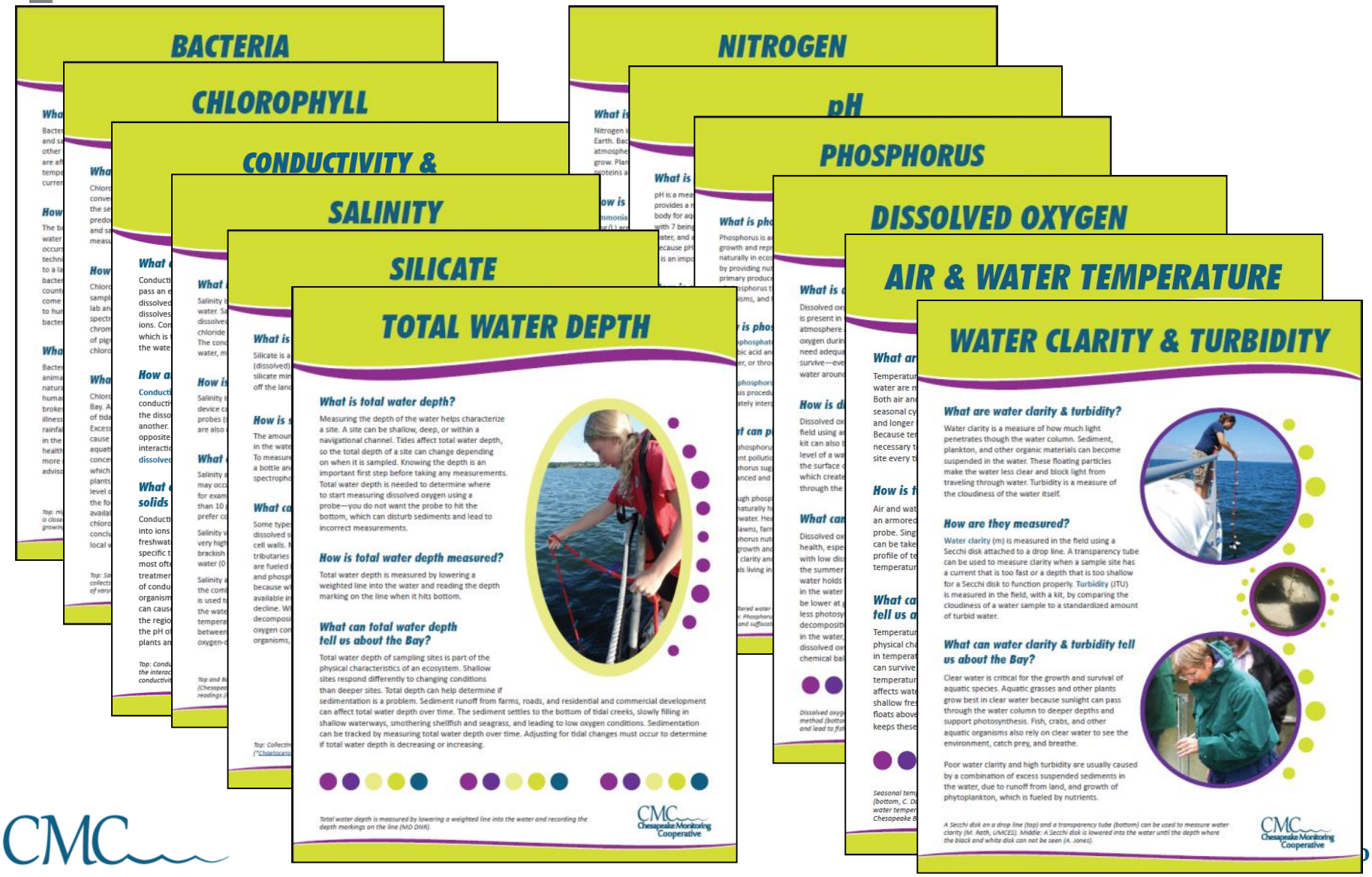
https://sites.psu.edu/whothehelldoyouthinkiam/2015/04/16/the-big-one-evolution/

- October 2016
  - Met with CBP partners to change the deliverables to match lessons learned over the summer
- November 2016 – March 2017
  - Generated 12 factsheets
  - Generated 24 matrices

Indicator **factsheets**

- Used by nontraditional partners in their training materials
- http://ian.umces.edu/press/brochures/publication/551/tidal_water_quality_indicator_factsheets_2017-04-18/

Indicator **factsheets**



The Matrices

- ~20 Management Strategies Workplan documents
- Key action and performance targets – do they match the CMC objectives and/or are there groups out there that can help?
- Strategies already working on
  - Water quality
    - See Prioritization report
  - Stream health
    - See Prioritization report
    - Part of Stream health workgroup

Open Water Quality Matrix

Water Quality **Goal Team**

- Forest buffers
  - Work with local groups to expand tree planting programs (Successful programs such as Turf to Trees, Backyard Buffers, NY's Trees for Tribs, and CLIPS (Baltimore Co)--meet with LGAC, local leadership group, and others to determine how best to do this)
    - Map of all groups
    - Determine which groups are interested in tree planting
- Tree canopy
  - No overlapping objectives, but could work with groups on several performance targets

Toxic contaminants research

- Based on the toxic research goal and management strategy, would suggest reaching out to groups in specific geographic locations who may be interested in monitoring contaminants
- Potential partners include
  - Groups who monitor fish
  - Groups in geographical locations specific to targets
  - UOG research – ALLARM has extensive shale gas monitoring program and data; others groups as well in NY and PA

Toxic contaminants Policy and Prevention

- TMDL source investigation studies included where PCB TMDL being developed. Includes sediment monitoring and low level water column samples in tidal James River and tribs, Elizabeth River and tribs
  - James River Association
  - Elizabeth River Project
- Continue annual PCB monitoring in support of PCB TMDL development. Monitoring includes collection of water column (non-tidal/tidal), sediment and fish tissue samples for PCB analysis to support the development of water quality models in establishing PCB TMDLs in Potomac River (Montgomery and Frederick County)
  - MD Stream Waders
  - Audubon Naturalist Society
  - Rock Creek Conservancy

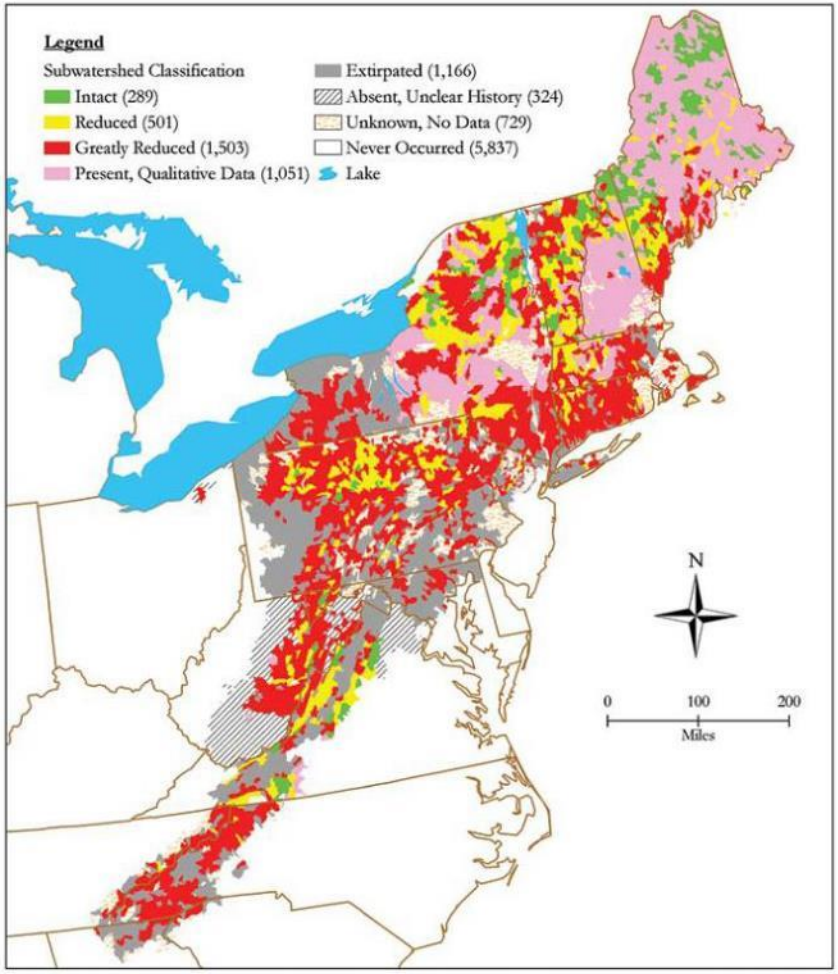
Maintain healthy watershed **Goal Team**

- Healthy watersheds
  - Performance targets that nontraditional partners can support
    - Identify healthy watersheds (DC and MD)
    - Assess existing watersheds (DC and PA)
    - Measuring water quality (NY)
    - Shale gas monitoring (PA)
    - Develop long-term strategy for sustainable monitoring of existing healthy watersheds (MD)
    - Expand stream monitoring to identify new healthy watersheds (MD)
    - Etc.

Habitat Goal Team

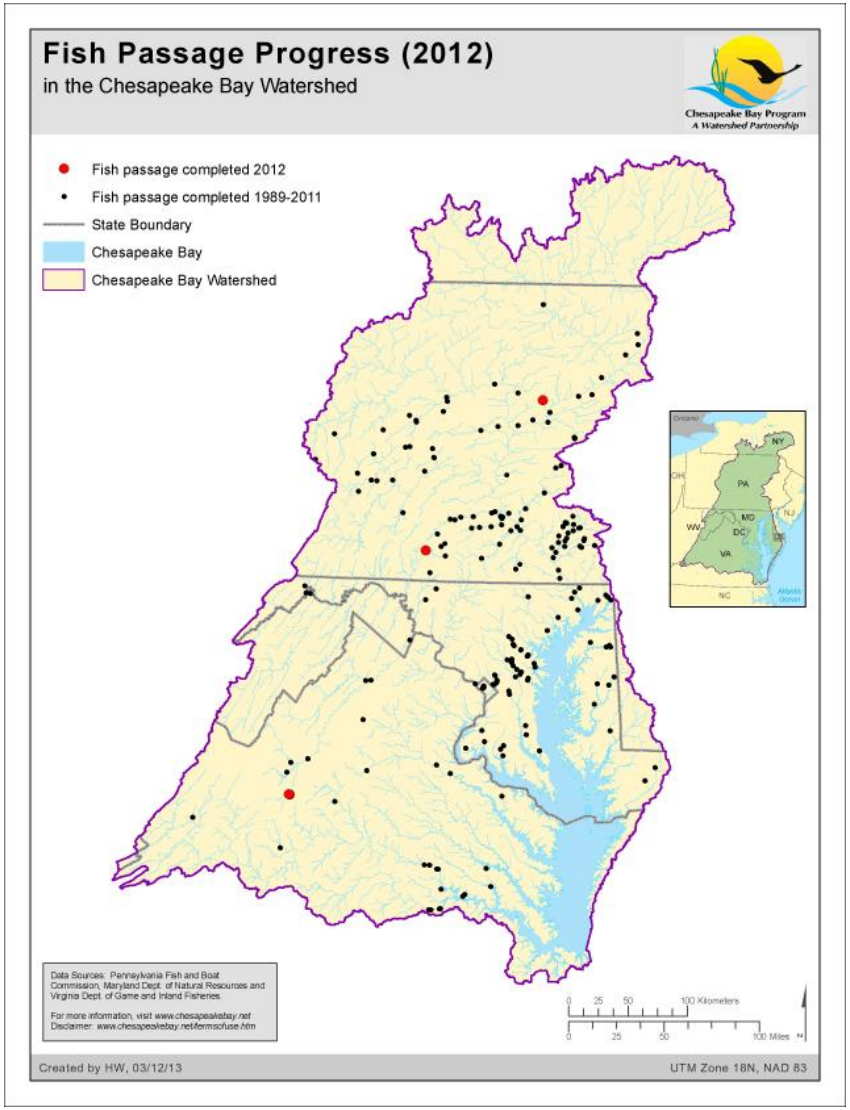
Brook trout

- While no objectives overlap between groups and Performance targets, there are 17 groups listed in the CMC census that monitor fish or are interested in fish
- Geographically, many groups overlap with the brook trout habitat areas, just need to narrow the focus



Fish passage

- ~25 groups overlap with 2013 fish passage progress
- Let's map future fish passage with current groups to see what overlaps and how they can help you!



Submerged Aquatic Vegetation

- Overlaps with water quality objectives
- Working on an SAV monitoring program for nontraditional groups outside the CMC effort

Fisheries **Goal team**

- Oyster restoration
  - Conduct stakeholder outreach meetings for local communities near selected tributaries during the restoration planning process
    - Should work with watershed organizations in these areas; are a conduit to all stakeholders
    - Need more geographically explicit information to determine which groups
  - Marylanders Grow Oyster program
    - Should work with watershed organizations
      - Phillips Wharf Environmental Center already involved

Climate change **workgroup**

- Climate adaptation
  - Work with STAR and STAC to recommend and establish performance metrics and/or indicators to assess Climate Resiliency Goal and Outcome implementation effectiveness, as well as ecological response.
    - The CMC Team members can meet with Climate Change Workgroup to determine which parameters nontraditional monitoring groups should be monitoring to inform this target
  - Data collection, indicator refinement, analysis and development of interpretive data products for second integrated vulnerability assessment in Choptank Watershed
    - Midshore Riverkeeper Conservancy; UMCES' Horn Point Laborator

Climate change **workgroup**

- Climate monitoring and assessment
  - Several overlapping objectives and potential groups
  - More geographically explicit information needed

Stewardship Goal Team

- Citizen stewardship
  - Several overlapping objectives
    - The CMC team
- Local leadership
  - Review management strategies and workplans and engage in dialogue with CBP goal teams and workgroups to identify high priority content and information areas necessary to facilitate local government implementation of 2014 Bay Agreement goals.
    - This Matrix project!

Thank you!

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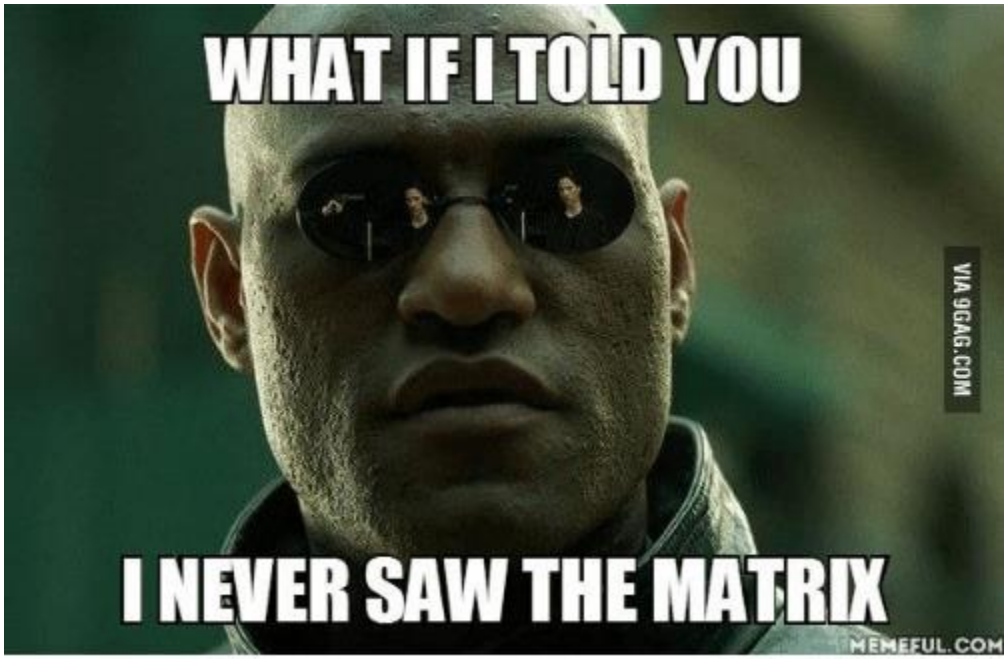

Front cover photo: Chesapeake Bay Program

Coming soon…

- On-boarding webinar
- Training/integrating monitoring groups
- Data upload to the Chesapeake Data Explorer
- Data users self-identify how they want to use volunteer and nontraditional data

A CMC Major Success Story

After CMC participation in **NY Forum Plus** event in November, ALLARM conducted a **Study Design Workshop** in February and is now working with key stakeholders to design a monitoring program for **Otsego County**, including:

- Otsego County Conservation Association;
- Otsego Soil & Water Conservation District;
- Otsego Land Trust;
- SUNY Oneonta;
- Butternut Watershed Alliance; and
- Trout Unlimited.

This is the **first community study design process taking place in Otsego County, NY.** A water quality monitoring workshop is scheduled for June 24, 2017, both NYDEC and USC have been notified. Through the CMC, ALLARM established a distance learning process for implementing Study Design.

"Otsego has a rich history of water quality professionals collecting data but we have always lacked community involvement. My hope with this program is as we engage community members in monitoring they will become more invested in their watersheds and we will see additional restoration projects as a result."

- Matt Albright, SUNY Oneonta

Land use options and Methods and Metrics

- No overlapping objectives or groups identified

Wetlands

- No overlapping objectives
- Geographically specific groups could help support performance targets

Fisheries Goal Team

- Blue crab
  - No overlapping objectives or groups identified
- Fish habitat
  - No overlapping objectives
  - Plenty of groups that could apply to performance targets by group objective or geographic region
- Forage fish
  - No overlapping objectives
  - Groups working within the tidal areas of Chesapeake

Stewardship Goal Team

- Protected lands
  - No overlapping priorities, but many groups in geographic areas
- Public access
  - No overlapping priorities


DEEP SPACE
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R0/G47/B87
NIGHT SKY
PMS 7687 C
C85/M67/Y15/K36
#29426E
R42/G66/B110
SUPERNOVA
PMS 380 C
C22/M0/Y94/K0
#D1DE36
R210/G222/B55
DAYLIGHT
PMS 386 C
C10/M0/Y58/K0
#EAEC8A
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SHADOW
PMS 424 C
C16/M16/Y16/K60
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R108/G105/B105
HORIZON
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C100/M64/Y31/K5
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R0/G92/B133
FLARE
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C77/M99/Y0/K0
#622F92
R104/G46/B134
DAYBREAK
PMS 565 C
C30/M3/Y20/K0
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R178/G215/B207
STARLIGHT
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