



How the Matrix can benefit your work

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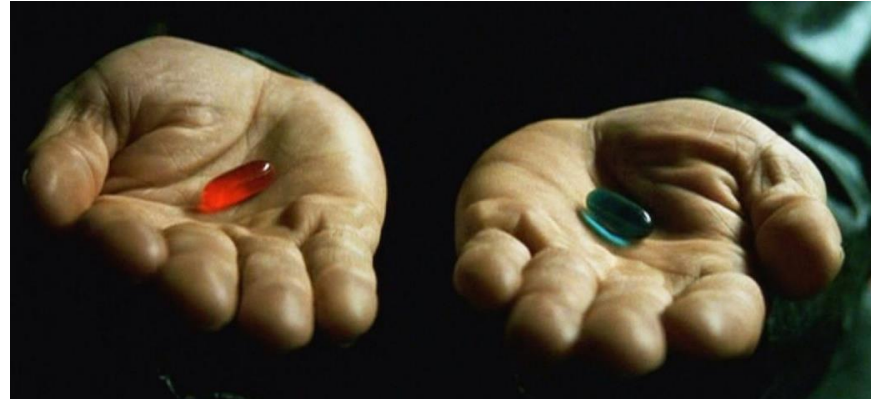
Thursday, May 25, 2017

CBP STAR Meeting

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Two parts to the Matrix

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

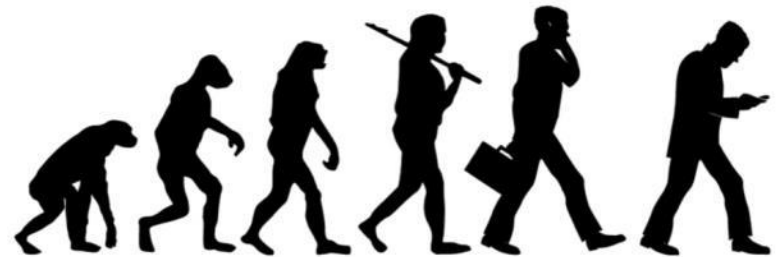


Evolution of the product

- 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
- 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



<https://sites.psu.edu/whothelldoyouthinkiam/2015/04/16/the-big-one-evolution/>

Indicator factsheets

- Used by nontraditional partners in their training materials
- [http://ian.umces.edu/press/brochures/publication/51/tidal water quality indicator factsheets 2017-04-18/](http://ian.umces.edu/press/brochures/publication/51/tidal_water_quality_indicator_factsheets_2017-04-18/)

Indicator factsheets

BACTERIA

CHLOROPHYLL

CONDUCTIVITY &

SALINITY

SILICATE

TOTAL WATER DEPTH

What is total water depth?

Measuring the depth of the water helps characterize a site. A site can be shallow, deep, or within a navigational channel. Tides affect total water depth, so the total depth of a site can change depending on when it is sampled. Knowing the depth is an important first step before taking any measurements. Total water depth is needed to determine where to start measuring dissolved oxygen using a probe—you do not want the probe to hit the bottom, which can disturb sediments and lead to incorrect measurements.

How is total water depth measured?

Total water depth is measured by lowering a weighted line into the water and reading the depth marking on the line when it hits bottom.

What can total water depth tell us about the Bay?

Total water depth of sampling sites is part of the physical characteristics of an ecosystem. Shallow sites respond differently to changing conditions than deeper sites. Total depth can help determine if sedimentation is a problem. Sediment runoff from farms, roads, and residential and commercial development can affect total water depth over time. The sediment settles to the bottom of tidal creeks, slowly filling in shallow waterways, smothering shellfish and seagrass, and leading to low oxygen conditions. Sedimentation can be tracked by measuring total water depth over time. Adjusting for tidal changes must occur to determine if total water depth is decreasing or increasing.



Total water depth is measured by lowering a weighted line into the water and recording the depth markings on the line (MD DNR).

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NITROGEN

pH

PHOSPHORUS

DISSOLVED OXYGEN

AIR & WATER TEMPERATURE

WATER CLARITY & TURBIDITY

What are water clarity & turbidity?

Water clarity is a measure of how much light penetrates through the water column. Sediment, plankton, and other organic materials can become suspended in the water. These floating particles make the water less clear and block light from traveling through water. Turbidity is a measure of the cloudiness of the water itself.

How are they measured?

Water clarity (m) is measured in the field using a Secchi disk attached to a drop line. A transparency tube can be used to measure clarity when a sample site has a current that is too fast or a depth that is too shallow for a Secchi disk to function properly. Turbidity (NTU) is measured in the field, with a kit, by comparing the cloudiness of a water sample to a standardized amount of turbid water.

What can water clarity & turbidity tell us about the Bay?

Clear water is critical for the growth and survival of aquatic species. Aquatic grasses and other plants grow best in clear water because sunlight can pass through the water column to deeper depths and support photosynthesis. Fish, crabs, and other aquatic organisms also rely on clear water to see the environment, catch prey, and breathe.

Poor water clarity and high turbidity are usually caused by a combination of excess suspended sediments in the water, due to runoff from land, and growth of phytoplankton, which is fueled by nutrients.

A Secchi disk on a drop line (top) and a transparency tube (bottom) can be used to measure water clarity (M. Roth, UNCES). Middle: A Secchi disk is lowered into the water until the depth where the black and white disk can not be seen (A. Jones).



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The Matrices

- Bay Agreement Goals → Outcomes of the goals → Management Strategies to achieve outcomes → 2 year workplans
- ~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

[illegible]

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; other 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**

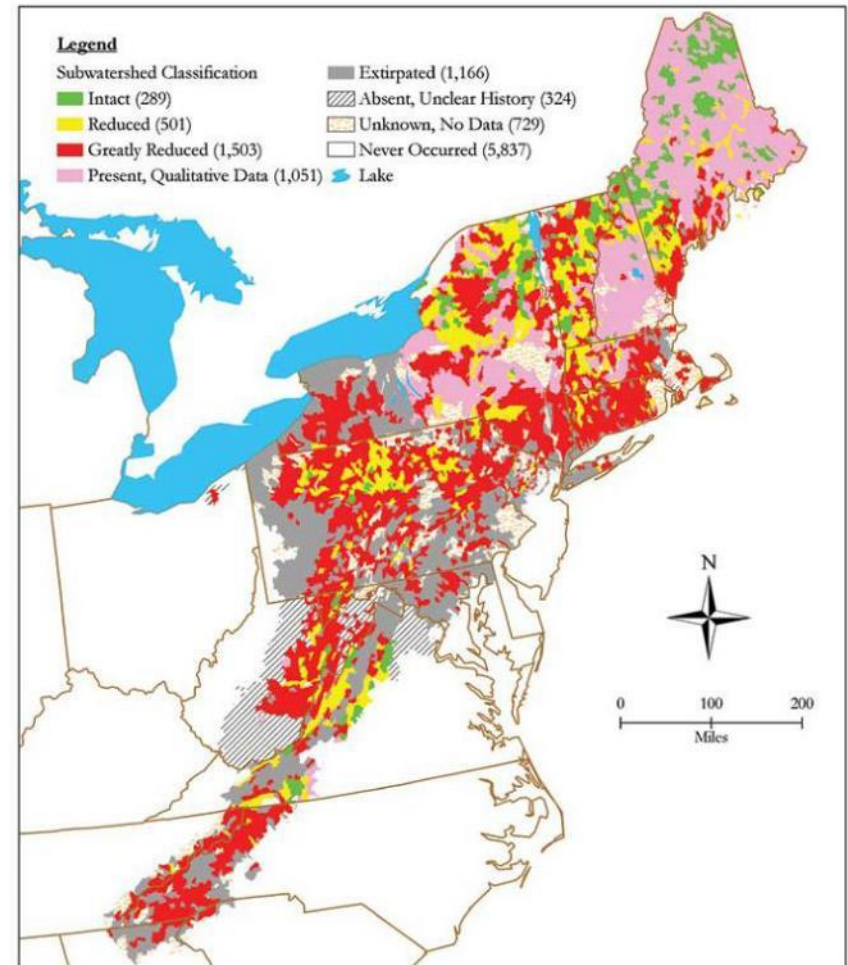
- Healthy watersheds
 - Performance targets that nontraditional partners can support
 - Identify healthy watersheds (DC and MD)
 - Assess existing watersheds (DC and PA)
 - Measuring water quality (NY)
 - Shale gas monitoring (PA)
 - Develop long-term strategy for sustainable monitoring of existing healthy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



Habitat Goal Team

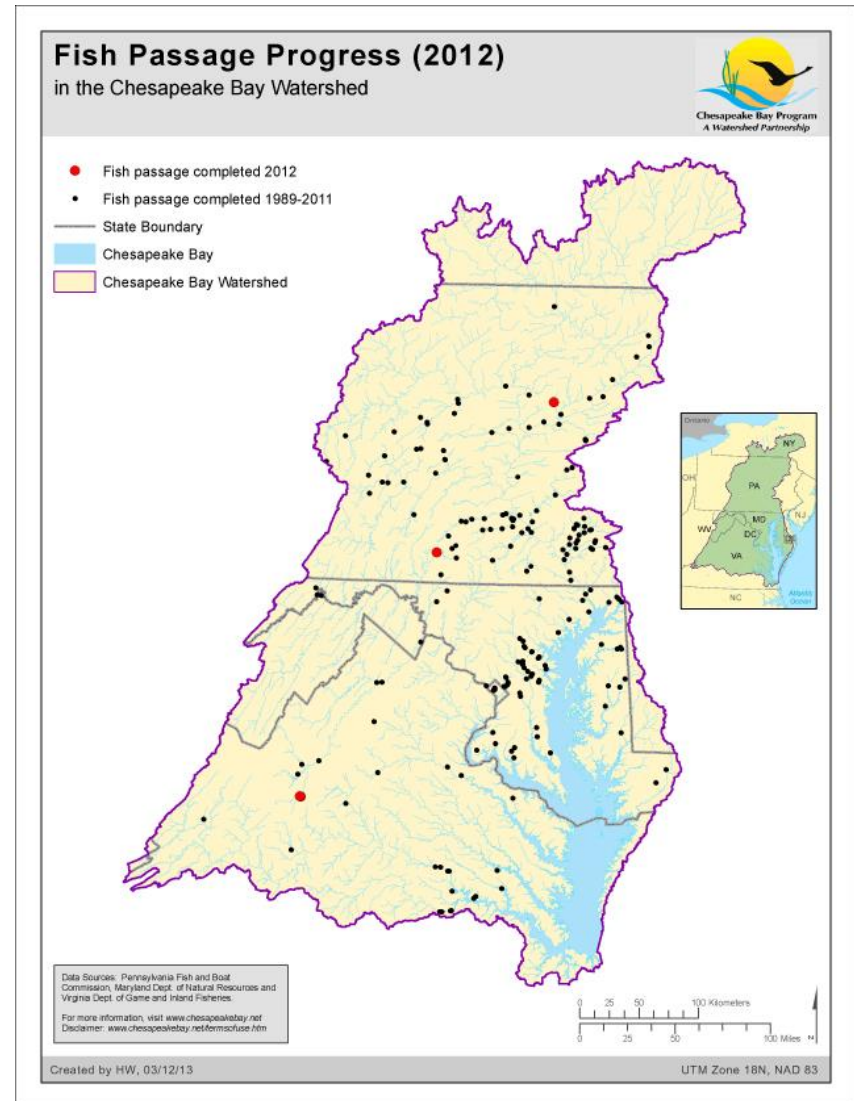
Brook trout

- 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 Laboratory

Climate change **workgroup**

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

Stewardship Goal Team

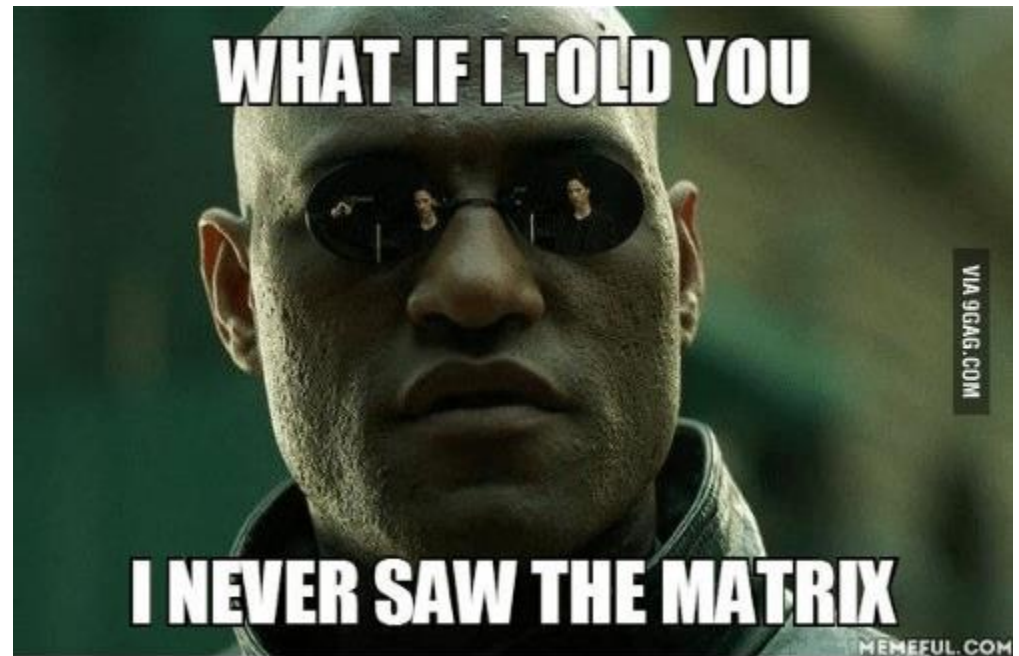
- Citizen stewardship
 - Several overlapping objectives
 - The CMC team
- Local leadership
 - Review management strategies and workplans and engage in dialogue with CBP goal teams and workgroups to identify high priority content and information areas necessary to facilitate local government implementation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

Thank you!

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University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE



Front cover photo: Chesapeake Bay Program

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