



STREAM HEALTH WORKGROUP JUNE 2025 MEETING MINUTES

Friday, June 20, 2025, from 10:00 AM - 12:00 PM ET

Actions and Decisions from the Meeting:

- **ACTION:** Supply Feedback by Friday 6/27 to Mark Southerland (Mark.Southerland@tetrattech.com) on Tetra Tech's Preliminary List of Potential Indicators as well as the presented draft framework for Phase 3B – Data Review and Development of Multi-Metric Stream Health Indicators – Physicochemical Metric Analysis (see slides in [Appendix I](#))
- **ACTION:** Revise agenda document with contacts of SHWG leadership incase a member cannot access google forms but still wants to request a presentation topic

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10:00 – Welcome, Roll Call, & Introductions (5 minutes)

- **Please put in the chat:** First and Last Name, Affiliation

Attendees:

- | | | |
|---|---|---|
| 1. Greg Zuknick , EA | 11. Rosemary Fanelli ,
USGS | 22. Carol Cain , MD DNR |
| 2. Mark Southerland ,
Tetra Tech | 12. Marina Metes , USGS | 23. Nick Staten , CRC |
| 3. Maggie Woodward ,
Chesapeake Bay
Commission | 13. Brock Reggi , Stream
Restoration Specialist
Virginia DEQ | 24. Matthew Meyers ,
Fairfax County |
| 4. Chris Spaur , USACE | 14. Gabriella Vailati , DE
DNREC | 25. Ashley Huller , PA |
| 5. Rikke Jepsen , ICPRB | 15. Katie Brownson ,
USFS | 26. Paige Hobaugh , Tetra
Tech |
| 6. Sandy Davis , U.S.
Fish and Wildlife
Service Chesapeake
Bay Field Office | 16. Emily Young , ICPRB | 27. Sadie Drescher , CBT |
| 7. Denise Clearwater ,
MD Dept. of the
Environment | 17. Kelly Maloney , USGS | 28. Megan
McClagherty , ICPRB |
| 8. Claire Buchanan ,
ICPRB | 18. Nancy Roth , Tetra
Tech | 29. Matthew Cashman ,
USGS |
| 9. Greg Noe , USGS | 19. Alison Santoro , MD
DNR | 30. Anne
Hairston-Strang , MD
DNR |
| 10. John Lancaster , PA
DEP attending on
behalf of Scott Heidel | 20. Cassie Davis , NYS
DEC | 31. Sara Weglein , MD
DNR |
| | 21. Brittany Sturgis , DE
DNREC | |

10:05 – Housekeeping (5 minutes)

- **New Section of future agendas**
 - Request presentation topics
 - Helpful resources for partners: Funding Opportunities, Job openings.
- **Upcoming Meetings:**
 - The Next Stream Health Workgroup Meeting will be on
April 18th 10 AM - 12 PM

10:10 – Update on Beyond 2025 (15 minutes)

Presenter: Alison Santoro

- **Language Presented to PSC:**
 - Continually improve and protect local stream health and function, including their living resources and ecosystem services throughout the watershed using the best available science to inform land management, planning, and conservation.



- Improve health and ecological integrity of at least 3% of non-tidal stream miles every 6 years.
- **Management Board and PSC are to continue to refine language during June**
- **Public feedback period in July**

See Slides in [Appendix II](#)

- **Targets that were removed from our draft language were due to the Management Board's belief these were incorporated within other outcomes such as protected lands.**
- **Stream Health will most likely be under the new Thriving Habitat and Wildlife Goal with some conversation about moving under the new Clean Water Goal.**

10:25 – Presentation on Draft Framework for Phase 3B GIT Funded Project (30 minutes)

Presenter M:ark Southerland, Tetrattech

- TetraTech has been awarded the GIT Funded Project:
Phase 3B – Data Review and Development of Multi-Metric Stream Health Indicators –
Physicochemical Metric Analysis

Please provide comments to Mark within a week (Friday 6/27)

See Slides in [Appendix I](#)

- Interviews (completed) - there is a lot of work being done on this topic already, we want to build on these initiatives instead of re-inventing the wheel
- Literature Search (completed) - Not fully comprehensive, but tried to pull out the major ideas and efforts on physicochemical indicators to inform what we can build on.
- Select Physicochemical Stream Assessment Literature - Titles of papers which the Tetra Tech Team reviewed
- Relevant Data Sources - Looking at what is practical and can assess the condition of stream health throughout the whole watershed. Desire to use currently available data sources to compile a Bay wide methodology.
- Example Physicochemical Indicator Approaches - example efforts to utilize multiple parameters to define stream health and function.
- Key Physicochemical Parameters - Through literature search, Tetra Tech determined there is no standardized way to develop parameters of stream health.
- Local Examples of Physicochemical Indicators - SRBC utilize metals and development ; UMCES use only 3 parameters; ...
- Preliminary List of potential Indicators - Tetra Tech desires comments on this list.
- Toxics, pesticides, trace metals, and microplastics are not often considered indicators and are still important but are not being recommended as parameters in this iteration of the project.
- Timeline
 - Comments on Draft Framework due June 27th



- Draft Inventory Matrix and Recommendations for Further Indicator Evaluation to SHWG on August 6
- Presentation to SHWG on August 15
- Draft report to SHWG October 31
- Final Report and Factsheet due January 31, 2026

Questions from Audience:

Rosemary Fanelli: Are you planning on quantifying a water quality index across the whole watershed as an input or are you proposing a framework for developing a water quality index?

Mark: No we will not produce a final index, just recommendations.

Alison: Phase 3C will be the final index. The development of the index was presented as a project and was split up due to funding, Phase 3A and 3B are for identifying recommendations for what is available and good to use for an index. Perhaps Phase 3C will start in 2026 depending on funding, and it could take the form of GIT funded project or a STAC workshop or something else.

From Chat:

Chat: Claire Buchannan: Re future interviews: can I suggest PADEP (Dustin Shull) and WVDEP (Ryan Pack). Each have some clever indexes to address aspects of WQ.

Chris Spaur: Major Disconnect between TN and bioavailable N!

Rosemary Fanelli : Perhaps your team can also look at the potential of some of these indicators to serve as proxies for other WQ parameters that are harder to monitor (for example, conductivity as a potential proxy for metals, or nutrients for pesticide loads).

Brock Reggi: Is there a data source or summary available on how the Bay drainage states differ on metrics for quantifying stream health. I know there are differences but not clear how far off each state are different and or similar...?

- Mark Southerland: This is something we are going to dig into. One of the deliverables of this project in addition to the recommendations is a data inventory. We have collected data sources but have not parched through them yet.

Matthew Cashman: ^Great point by Reggi, Brock (DEQ). I would also add it's not just metrics, but also differences in the process for Stressor Identification, when identifying the likely cause of degraded ecological conditions

11:00 – MEETING ADJOURNED.

Helpful Chesapeake Bay Program Resources and Products:

Chesapeake Bay Program Communications Team's Newsletters [Subscribe Here!](#)

1. **Bay News:** Daily roundup of news stories, opinion pieces and blog posts.
2. **Bay Brief:** Weekly list of job/internship openings, funding opportunities, and professional events.



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3. **Chesapeake Currents:** Monthly update on the Chesapeake Bay Program's science and restoration work.

Other Bay Program Newsletters:

1. **Water Quality Goal Implementation Team** [Group Webpage](#) | [Subscribe to Group's Newsletter](#)
2. **Scientific, Technical Assessment and Reporting (STAR)** [Group Webpage](#) | [Subscribe to Group's Newsletter](#)
3. **Local Leadership Workgroup** [Group Webpage](#) | [Subscribe to Group's Newsletter](#)

ChesapeakeData

[ChesapeakeData](#) – a central point of access for data resources and decision-support tools – is publicly accessible website designed to connect you with resources that will facilitate data sharing, data discovery and data-driven decision-making.

Want to explore the site? Visit our Featured Topics pages to find curated collections of resources about [water quality](#), [wildlife and habitat](#), [tree canopy and forests](#), [land conservation](#), and other Chesapeake Bay Program priorities. To dive deeper into our data resources, visit our [searchable, filterable database](#).

Do you have a question about ChesapeakeData, or a resource that you would like to see added to the site? Please email data@chesapeakebay.net.

Have a topic you would like to learn more about?

Help craft future workgroup meeting agendas by requesting a presentation topic:

[Click here to request a presentation topic!](#)



Appendix I: Slides: Presentation on Draft Framework for Phase 3B GIT Funded Project



Mark Southerland
Rory Coffey
Paige Hobaugh

June 20, 2025

Multi-Metric Stream Health Indicators – Physicochemical Metric Analysis

Draft Framework



Leading with Science®

Purpose



This project is conducting interviews with experts, reviewing data, creating a framework, providing a data inventory matrix, and making recommendations that may help develop multi-metric stream health indicators for **physicochemical** parameters. The development of these additional indicators will address the significant science and management need to better understand and communicate how streams respond to management actions.

Technical Advisory Group
Stream Health Work Group
Chesapeake Bay Program



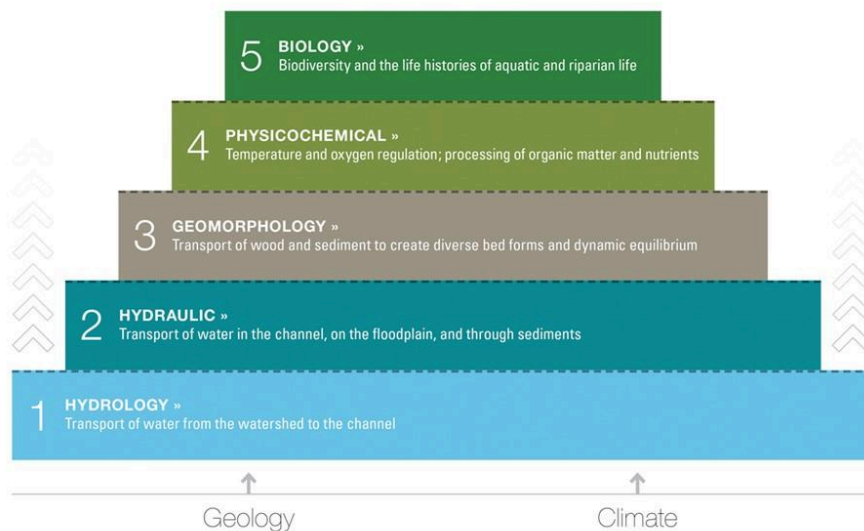
Holistic Approach



- Stream health is closely aligned with the Clean Water Act goal “to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.”
- Important to recognize that physicochemical elements, and indeed all the components of stream health, interact within the watershed.
- Both EPA and CBP have used a Healthy Watersheds conceptual framework that explicitly includes chemical and physical constituents of water quality as indicators of ecological health
- Our approach will be to focus on the near-term development of physicochemical indicators within **Level 4 of the Stream Functions Pyramid** in the context of the supporting geomorphology, hydraulics, hydrology indicators, and landscape-scale indicators influencing the stream corridor

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Stream Functions Pyramid



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Interviews



- Interstate Commission on the Potomac River Basin (ICPRB)
- Maryland Department of the Environment (MDE)
- U.S. Geological Survey (USGS)
- U.S. EPA Region 3
- Fairfax County
- Virginia Department of Environmental Quality (VDEQ)



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Literature Search



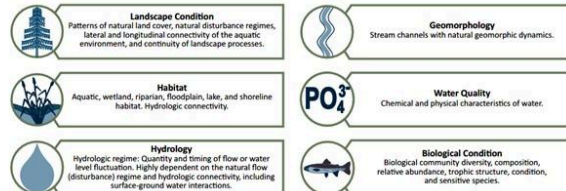
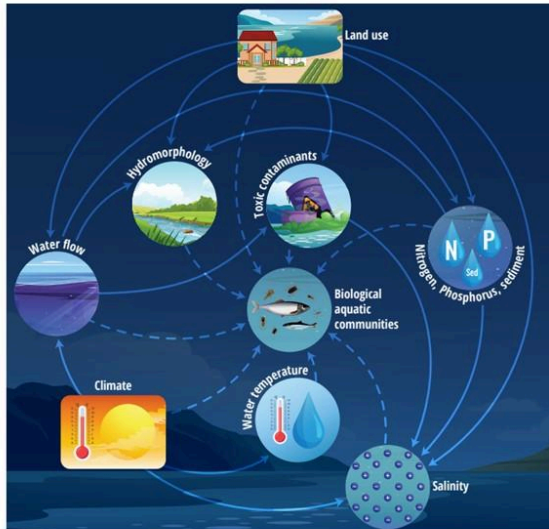
- General literature search to identify journal articles, reports, data, tools, and web information
- Search was conducted at a screening level (i.e., not comprehensive of all literature or resources available)
 - Targeted to capture key approaches and examples
- Information sources provide insights into the current state of the science
 - Assisted in developing the framework



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Stream Health Indicators



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Select Physicochemical Stream Assessment Literature



- Surface water quality profiling using the water quality index, pollution index and statistical methods: A critical review
- A review of water quality index models and their use for assessing surface water quality
- Evaluation of the surface water quality using global water quality index (WQI) model perspective of river water pollution
- Water Quality Indices: Challenges and Application Limits in the Literature
- A comprehensive review of water quality indices (WQIs): history, models, attempts and perspectives

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Relevant Data Sources



- Chesapeake Bay Program Data Hub
- SRBC: Water Quality and Biological Indices for the Susquehanna River Basin
- USGS: Data (nutrients, suspended sediment, flow, temperature, conductance, and toxics)
- USGS: Assessments of Stream Health Condition in the Chesapeake Bay Watershed
- EPA: Ecoregion Nutrient Criteria
- EPA: Water Quality Indicator (WQI) Tool
- EPA: Integrated Assessment of Healthy Watersheds
- University of Maryland Center for Environmental Science (UMCES): Eco Health Tool

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Example Physicochemical Indicator Approaches



- SRBC: Water Quality and Biological Indices for the Susquehanna River Basin
- University of Maryland Center for Environmental Science (UMCES): Eco Health Tool
- Oregon Water Quality Index: Background, Analysis and Usage
- A Water Quality Index for Washington Ecology's Stream Monitoring Program
- EPA Water Quality Assessments for Watershed Health

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Key Physicochemical Parameters



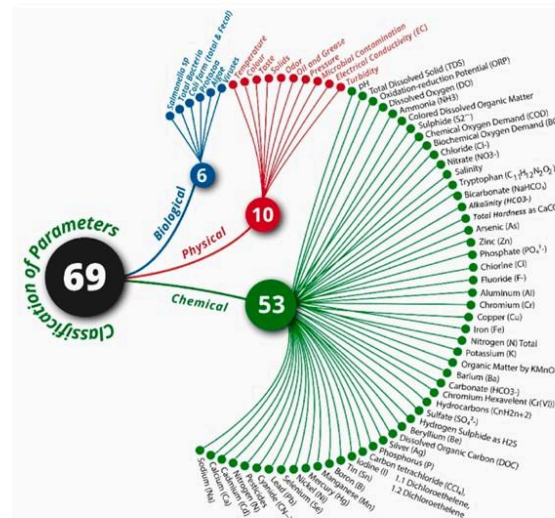
- Key **physical** indicators include temperature, turbidity, conductivity, and flow
 - Provide insights into the stream's habitat characteristics and water clarity
- Key **chemical** indicators include pH, dissolved oxygen, and the concentration of nutrients (like nitrogen and phosphorus)
 - Vital for assessing the chemical balance of the water and its potential for supporting diverse biological communities
 - Heavy metals and organic pollutants can significantly impact stream health
- Selection of parameters is the first step – currently no systematic technique to formalize the parameter selection process
 - Expert opinion (Delphi method), ecological importance of the parameter, and data availability have been used

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Example Physicochemical Parameters



- Scientific literature suggests about 8 to 11 parameters are typically used as indicators, but some studies have analyzed as few as 4 to determine stream health
- Metrics suggested by **USGS**
 - Nitrogen
 - Sediment
 - Phosphorus
 - Water Temperature
 - Salinity
 - Toxic Contaminants
 - Flow



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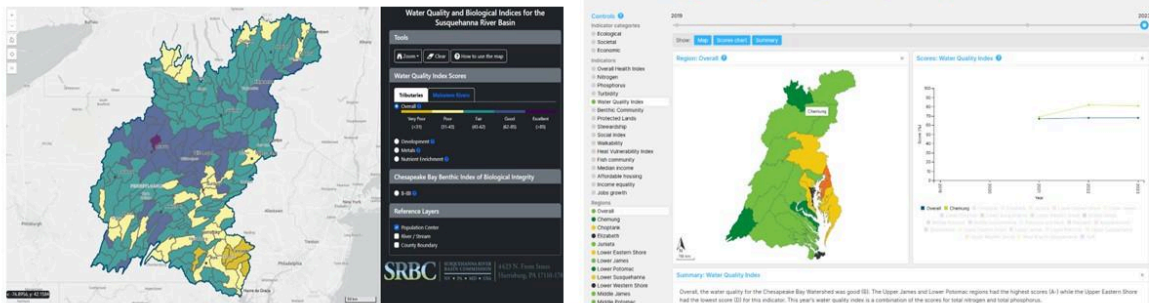


Local Examples of Physicochemical Indicators



Susquehanna River Basin Commission (SRBC) and University of Maryland Center for Environmental Science (UMCES) assess metrics across jurisdictions

- SRBC Water Quality Index
 - Metals: Aluminum, Iron, Manganese
 - Nutrients: Nitrate, Phosphorus, Total Organic Carbon
 - Development: Chloride, Sodium, Sulfate
- UMCES Eco Health tool–Water Quality Index
 - Nitrogen, Phosphorus, Turbidity



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Preliminary List of Potential Indicators



- **Water Temperature**
- **Dissolved Oxygen**
- **pH**
- **Specific Conductance**
- **Nitrogen**
- **Phosphorus**
- ***E. coli***
- **Suspended Sediment/Turbidity**
- **Flow/Water Depth/Connectivity**
- Toxics, pesticides, trace metals, and microplastics are not often considered as indicators, but have been suggested in the literature
- Final recommendation of indicators that can feasibly be used will be determined after completing further assessments of ecological importance, data availability, and utility



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Proposed Framework to Evaluate Potential Indicators



Steps to assess data sources and determine their value and practicality for producing indicators and/or a composite water quality index

- 1. Categorize available physicochemical parameters based on their importance for stream health (defined as ecological integrity)**
 - Most important
 - Moderately important
 - Least important
- 2. Determine the data availability for each important parameter**
 - Spatial coverage across Chesapeake Bay watershed
 - Temporal frequency of sampling relative to natural variability
- 3. Identify or develop thresholds of concern**
 - Water quality standards and criteria
 - Reference benchmarks including using Principal Component Analysis
 - Ecologically relevant relationships



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Proposed Framework to Evaluate Potential Indicators



- 4. Identify assessment scale and regionalization to capture natural variation**
 - Start with ecoregions
 - Modify with geological subregions if needed and feasible
 - Modify with temperature classifications if needed and feasible
- 5. Develop individual metrics or composite indices**
 - Both discrete and continuous concentrations, and how to accommodate variation with natural factors (e.g., DO with temperature and elevation)
 - Indicators of multiple stressors such as conductivity (e.g., for salts, metals, pesticides)
 - Metrics for individual parameters based on benchmarks or departure from expected
 - Composite index using different combinatory methods
 - Transparent composite index with ability to drill down to individual metrics
 - Utility of each indicator method for communication to multiple audiences



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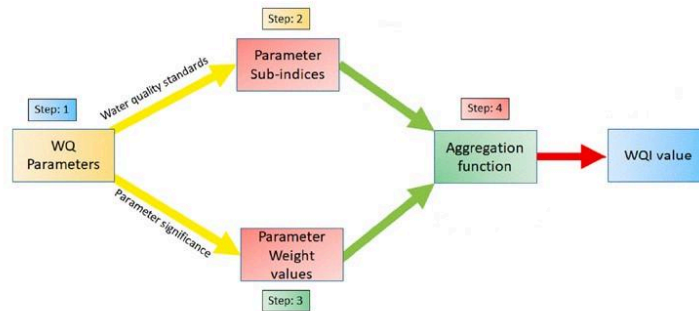


Proposed Framework to Evaluate Potential Indicators



6. Pilot analyses to test feasibility and performance of metrics and indices

- Create simple index with select parameters
- Calculate metrics and indices with MBSS or other data
- Compare metrics with land use, benthic macroinvertebrate IBI, and fish IBI
- Determine feasibility of using biological taxa as stressor surrogates





Feasibility and Challenges of Physicochemical Indicators



- State-to-state differences in data assessment and reporting, as well as limitations in data availability
- Some indicators can be highly variable because of sensitivity to natural (e.g., seasonality) and/or human-induced factors
- Various water quality index models and approaches have been applied both nationally and internationally, but there are no accepted standard methods
- Single composite water quality index simplifies very complex systems and can potentially lose or distort information (known as “eclipsing”)
 - Sub-indexing rules, parameter weightings that do not reflect the true relative influences of parameters, or inappropriate aggregation functions

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Discussion and Next Steps

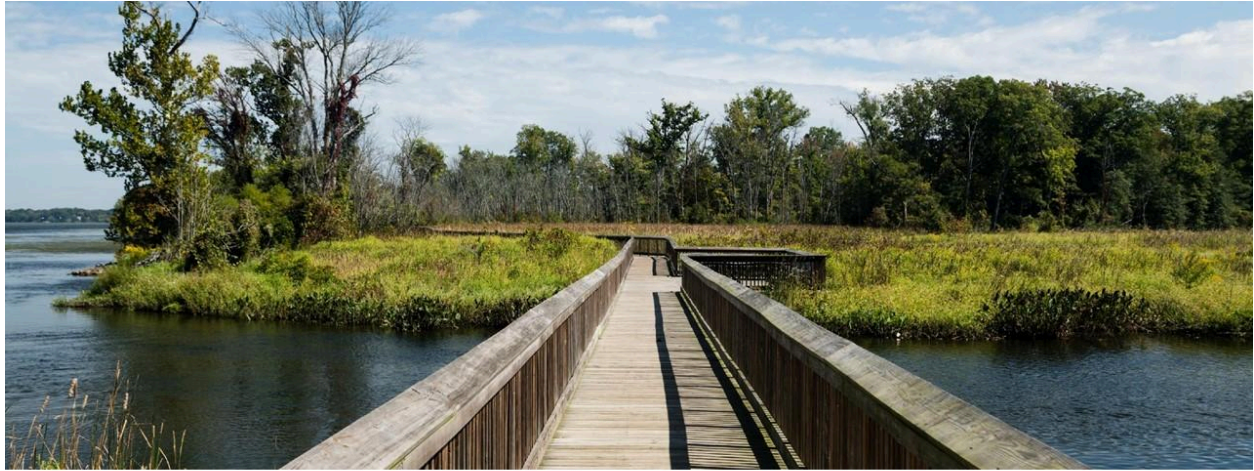


- Framework and Data Sources comments today
- Further comments due June 27
- Data Inventory Matrix and Recommendations for Further Indicator Evaluation to SHWG on August 6
- Presentation to SHWG on August 15
- Draft Report to SHWG October 31
- Final Report and Factsheet due January 31, 2026

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Appendix II: Slides: Communications Department's Beyond 2025 Update



BEYOND 2025: THE FUTURE OF CHESAPEAKE BAY RESTORATION

The Vision for the Chesapeake
Bay Program and *Watershed
Agreement*



WHAT IS BEYOND 2025?

The effort being undertaken by the
Chesapeake Bay Program to:

- Determine the next steps in restoring and conserving the Chesapeake Bay post-2025.
- Streamline the structure and governance of the Chesapeake Bay Program.



WHAT IS THE CHESAPEAKE BAY WATERSHED AGREEMENT?

Voluntary agreement between:

- Six watershed states
- District of Columbia
- Chesapeake Bay Commission
- Environmental Protection Agency on behalf of the federal government.

Contains 10 goals and 31 outcomes to advance the restoration and protection of the Chesapeake Bay.



WHY 2025?

2025 is the targeted completion date for many of the 31 outcomes in the 2014 *Chesapeake Bay Watershed Agreement*.

A 2023 assessment found:

- 18 of the Watershed Agreements were on-course to be completed by 2025.
- 13 of the Watershed Agreement outcomes were off-course.



COMPLETED/ON-COURSE 2014 WATERSHED AGREEMENT OUTCOMES

- 2017 Watershed Implementation Plans
- Blue Crab Abundance
- Blue Crab Management
- Climate Monitoring & Assessment
- Environmental Literacy Planning
- Fish Habitat
- Fish Passage
- Forage Fish
- Land Use Methods & Metrics
- Land Use Options Evaluation
- Local Leadership
- Oysters
- Protected Lands
- Public Access
- Student
- Sustainable Schools
- Toxic Contaminants Policy & Prevention
- Water Quality Standards Attainment & Monitoring

OFF-COURSE 2014 WATERSHED AGREEMENT OUTCOMES

- 2025 Watershed Implementation Plans
- Black Duck
- Brook Trout
- Climate Adaptation
- Diversity
- Forest Buffers
- Healthy Watersheds
- Stream Health
- Stewardship
- Submerged Aquatic Vegetation (SAV)
- Toxics Contaminants Research
- Tree Canopy
- Wetlands



2024 EXECUTIVE COUNCIL CHARGE



Members directed the Bay Program's Principals' Staff Committee to take the following actions by the end of 2025:



Revise the existing *Chesapeake Bay Watershed Agreement*.



Elevate conservation as a key pillar of the partnership.



Address both water quality and living resources (e.g., habitat, wildlife).



Place a greater emphasis in engaging all communities of the watershed.



Ensure goals and outcomes are measurable, time-bound and sufficient to complete the outcome as quickly as possible.



Ground revisions in the most current scientific understandings and issues.

THERE'S MORE TO THE *WATERSHED AGREEMENT* THAN THE OUTCOMES...

Watershed Agreement Section	Revision Lead
Vision	Principals' Staff Committee
Preamble	Principals' Staff Committee
Principles	Principals' Staff Committee
Goals	Principals' Staff Committee, Management Board
Outcomes	Management Board, Outcome Leads
Management Strategies	Management Board



VISION REVISIONS

2014: The Chesapeake Bay Program partners envision an environmentally and economically sustainable Chesapeake Bay watershed with clean water, abundant life, conserved lands and access to the water, a vibrant cultural heritage and a diversity of engaged stakeholders.

2025: The Chesapeake Bay Program partners envision an environmentally and economically sustainable Chesapeake Bay watershed with clean water, abundant life, conserved and **healthy working** lands, a vibrant cultural heritage and a **wide range of engaged individuals whose communities enjoy access to the waters and natural landscapes of the region.**

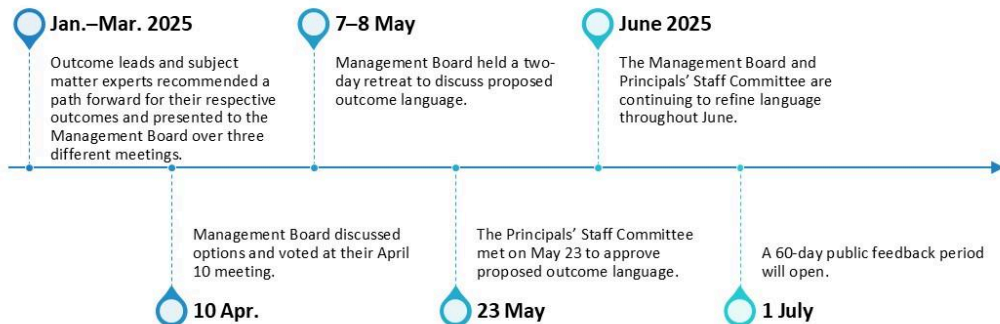
REVISIONS TO PRINCIPLES

- Adds recognition of Tribal nations.
- Expands holistic social science integration.
- Strengthens local knowledge inclusion.
- Removes specific reference to environmental justice but is still implied through added language stating strong inclusion of all and welcoming participation.
- Several principles updated for clarity, specificity and impact.





OUTCOME REVISIONS PROCESS



HOW CAN OUTCOMES BE REVISED?

Updated: Maintains original intent, language added to make it more specific, measurable, actionable, relevant or timely.

Consolidated: Outcomes merged to form a single outcome or activities underneath an outcome are integrated into other outcomes.

Removed

Replaced: Relates to original outcome's intent or subject.

Reclassified: Changed to a target or activity underneath another outcome.





STRUCTURE OF THE REVISED WATERSHED AGREEMENT

Goals: Desired high-level aspects of the Watershed Agreement vision.

Outcomes: Long-term, high-level change that is desired or the difference made by the partnership's actions.

Targets: Direct products of the actions planned for and taken as partners.

Activities: Specific actions taken to achieve the targets.



Thriving Habitats and Wildlife

Sustainable Fisheries
Vital Habitats



Clean Water

Water Quality
Toxic Contaminants



Healthy Landscapes

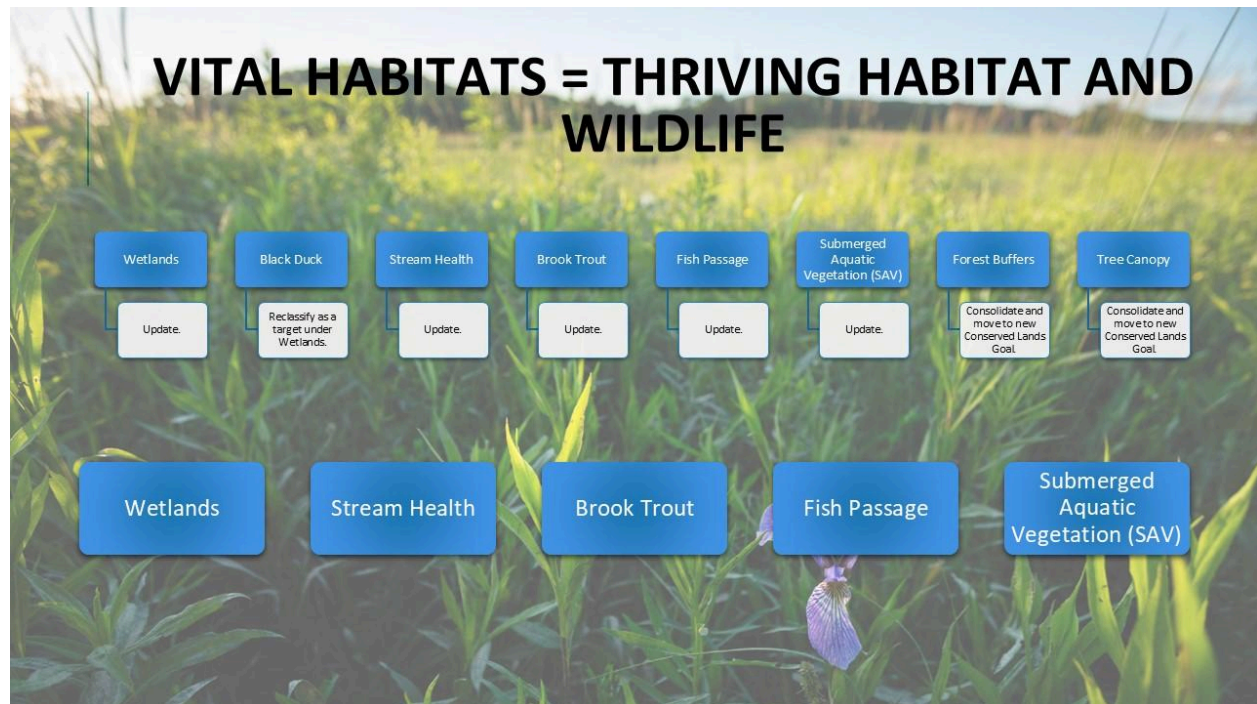
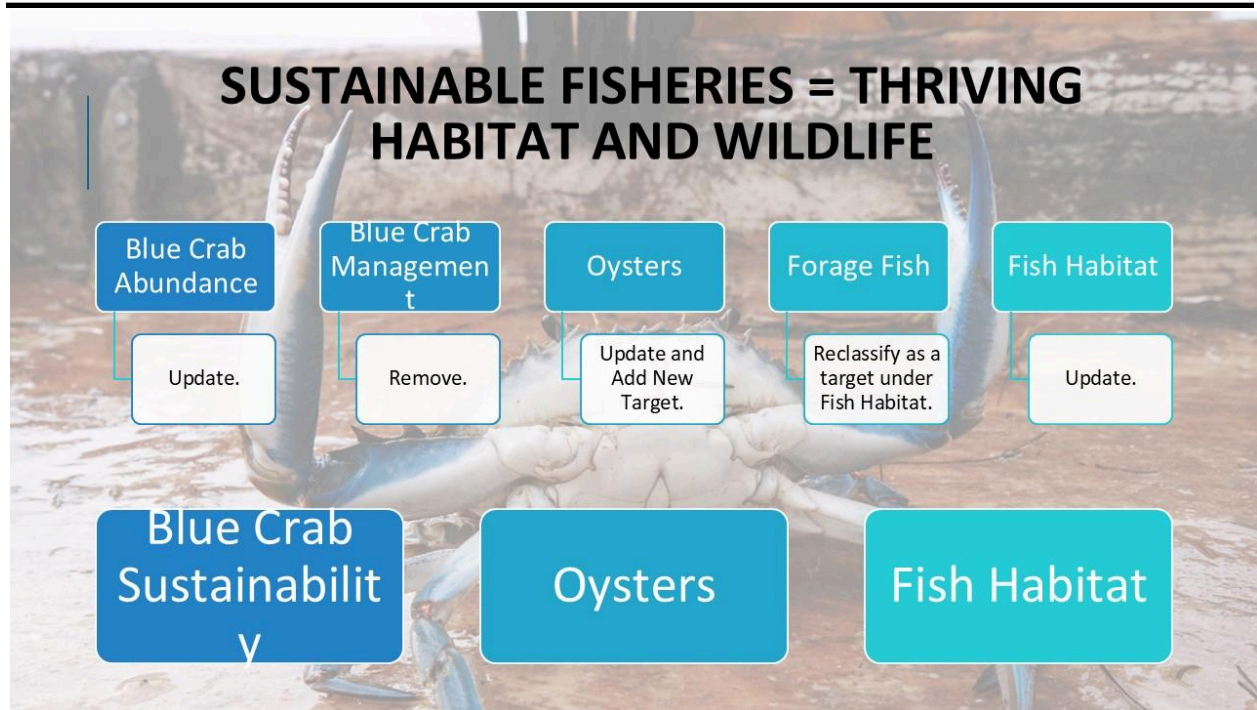
Land Conservation
Healthy Watersheds
Climate Resiliency

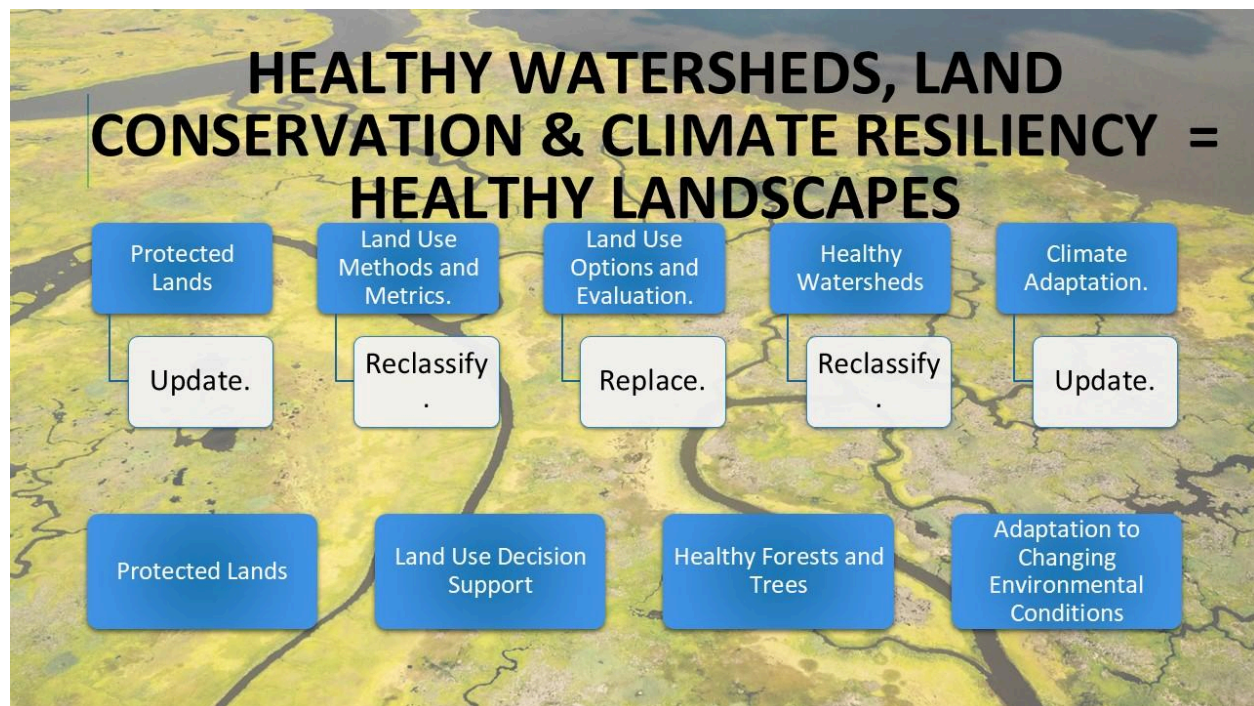


Engaged Communities

Local Leadership
Public Access
Stewardship

REVISED GOALS









REVISED OUTCOMES

Healthy Landscapes	Clean Water	Thriving Habitat and Wildlife	Engaged Communities
<ul style="list-style-type: none">• Adaptation to Changing Environmental Conditions• Healthy Forests and Trees• Land Use Decision Support• Protected Lands	<ul style="list-style-type: none">• Reducing Excess Nitrogen, Phosphorus and Sediment• Toxic Contaminants Mitigation• Water Quality Standards Attainment and Monitoring	<ul style="list-style-type: none">• Blue Crab Sustainability• Brook Trout• Fish Habitat• Fish Passage• Oysters• Stream Health• Submerged Aquatic Vegetation (SAV)• Wetlands	<ul style="list-style-type: none">• Local Leadership• Public Access• School District Planning• Stewardship• Student Experiences• Workforce

*Climate Monitoring and Assessment will be replaced with Climate Science Integration and become a support function across all levels of the partnership.



**WE WANT ALL THE
FEEDBACK!**

- Public feedback period will open on Tuesday, July 1 and run for 60 days until Monday, September 1.

- Everything you need to know can be found at <https://www.chesapeakebay.net/what/what-guides-us/planning-for-2025-and-beyond>

- Feedback can be emailed to comments@chesapeakebay.net.

- Chesapeake Bay Program staff is available to talk with any of your members or groups about Beyond 2025.