

STAC Recommendations for Chesapeake Bay Agreement goal and outcome statements

This document presents some recommendations for restating the draft goals and outcomes proposed for the new Bay agreement. The intent is to guide drafting efforts toward a formulation of intentions that will support both the **need for program accountability** and **effective adaptive management** of program actions. To that end, the recommendations reflect the program's evident desire to have aspirational goal statements and outcome statements that are specific, measurable, attainable, realistic, and timed. Recognizing the extensive efforts that have already been made to craft goal and outcome statements, these recommendations attempt to follow the subject and content formulations of the current draft agreement to the extent practicable.

There are three important considerations reflected in these recommendations.

1. First, the state of the science provides inconsistent support for specific numeric targets for many of the outcomes. Evidence of thresholds in system condition or performance at specific levels of system components is frequently weak or non-existent and so the recommendations avoid using numeric targets that can suggest a definitive end point for management efforts. Instead, we recommend an approach of continual assessment of conditions to inform management decisions and provide more realistic expectations for stakeholders.
2. Second, the two principal drivers of Chesapeake Bay system conditions, human use and climate, are constantly changing. As a result, management goals, outcomes, and strategies will need to evolve in response. In the face of this reality, and given the inherent uncertainty in the performance of most of our management efforts, it is our opinion that targeting sustained improvement in critical conditions is a more attainable and realistic objective than arbitrary fixed targets. This approach has the benefit of making accountability for effectiveness and continuous improvement a constant program focus instead of a periodic concern.
3. Third, the undeniable links between monitoring, accountability, and adaptive management call for a commitment to a science-based process of designing a monitoring program. This goes beyond the commitment of dollars, and recognizes the significant potential benefits of such a program: the ability to "decide by doing" with an attendant increase in flexibility of solution application, assistance in drawing the line between study and action, more success stories and feedback about what works, and a reduction in risk of potential and necessary changes in course of action.

The recommendations are based on the objective of having **outcome statements reflect a desired change in system condition**, where the system is understood to include both human

and natural elements. This means outcomes generally are changes in the structure, quality, or performance of the system, or they are changes in the knowledge, skills, abilities, or motivation of the humans in the system.

We have also included identification of potential management strategies that could support attainment of the identified outcomes. This is to help characterize the distinction between goals, outcomes, and strategies that will be important for the overarching objectives of program accountability and effective adaptive management. It is also our intention to provide general guidance regarding the scope of activities that should be considered given the desired outcomes. In many cases the CBP is already pursuing some of the actions that are listed. The point here is that success and accountability require a purposeful consideration of all the things that must be done to attain the outcome.

Finally, we note that there is critical overlap in many of the outcomes and potential strategies listed. These should be points of coordination at the very outset of any implementation, monitoring, and assessment efforts. At its essence the new Bay agreement seeks to raise the capacity of the system, and each of its component parts, to provide water quality and habitat services to the highest practical level in light of the desired human uses. While there is a major focus on improving water quality for the consequent habitat benefits (for both humans and other organisms), that effort is effected through restoration of shellfish populations, restoration of vegetated systems, conservation of natural filters, management of land use practices, and education of human users. Similarly the effort to enhance habitat quality throughout the region depends on improvement in water quality, enhancement of green and blue infrastructure, informed management of land use, and education of human users. The current organization of management efforts in the Chesapeake Bay program is only one of several possible options. There is nothing inherently superior about the present parsing of foci among the Goal Implementation Teams, nor is there a compelling reason to argue for one of the alternatives. What is critical, however, is effective coordination between groups. For program accountability and for effective adaptive management, that coordination needs to go far beyond a spreadsheet identifying connections. It needs to become operational with constant performance assessment and clearly identified responsibilities.

We have taken goal and outcome statements in the public review draft that are more appropriately formatted as management strategies and highlighted them in red.

Sustainable Fisheries

Goal: Protect, restore, and enhance finfish, shellfish and other living resources, their habitats and ecological relationships to sustain all fisheries, and provide for a balanced ecosystem in the watershed and Bay.

Blue crabs

1. **Outcome:** Improved capacity to identify population metrics that best predict sustainable blue crab populations in a changing Bay ecosystem.

Potential management strategies:

- Determine defensible and observable population parameters to guide harvest management in the face of weather and climate variability (**current operational paradigm = maintain or exceed 215 million adult females**)
- Design and implement monitoring to generate population parameters and critical Bay condition data for management model(s)
- Continually assess performance of management model(s)

2. **Outcome:** Continual improvement in the capacity to manage blue crab harvests to achieve a stable and productive crab population.

Potential management strategies:

- Define a stable and productive crab population for the Chesapeake Bay (**provides baseline for management performance**)
- Develop and implement effective monitoring of commercial and recreational harvests
- Develop and implement a Bay-wide strategy for allocation-based harvest management
- Systematically assess the effectiveness of management tools in the context of a changing system

Oysters

3. **Outcome:** Continual increase in finfish and shellfish habitat and water quality benefits from restoration of native oyster populations

Potential management strategies:

- Identify metrics and/or indicators of fish habitat and water quality benefits from restored oyster populations
- **Implement oyster restoration protocols in 10 tributaries**
- Develop and implement monitoring to document pre-restoration and post-restoration fish habitat and water quality benefits in treated tributaries
- Monitor restored oyster populations to document condition and factors impacting condition (disease, predation, harvest, etc.)
- Assess the effectiveness of restoration in the context of a changing system

Forage Fish

4. Outcome: Continual improvement in the capacity to manage forage fish populations in the Chesapeake Bay to enhance fish and wildlife populations

Potential management strategies:

- Develop and implement effective monitoring for forage fish populations in the Bay
- Assess effectiveness of management options for forage fish populations
- Design and implement a preferred management option
- Assess the effectiveness of management in the context of a changing system

Fish Habitat

5. Outcome: Continual improvement in effectiveness of fish habitat conservation and restoration efforts

Potential management strategies:

- Develop criteria for identification of critical spawning, nursery, and forage areas for important fish and shellfish in the Bay and tributaries
- Inventory/monitor the condition of critical fish habitats throughout the Bay and tributaries
- Develop and implement fish habitat conservation and restoration protocols
- Assess the effectiveness of protocols in the context of a changing system

Vital Habitats

Goal: Restore, enhance, and protect a network of land and water habitats to support high-priority species and to afford other public benefits, including water quality, recreational uses, and scenic value across the watershed.

Wetlands

1. Outcome: Continual increase in the capacity of wetlands to provide water quality and habitat services throughout the watershed.

Potential management strategies:

- Develop and implement monitoring to periodically estimate the capacity of tidal and non-tidal wetlands to provide water quality and habitat services throughout the watershed
- Develop protocols for creating, re-establishing, or enhancing water quality and habitat functions of existing tidal and non-tidal wetlands (current operational targets = 85,000 acres of wetlands created or re-established; 100,000 wintering population of black ducks)
- Implement regulatory and non-regulatory programs and supporting protocols to protect and conserve existing wetland service capacity and compensate for degraded capacity (current operational target = 100,000 acres of degraded wetlands enhanced)
- Assess the effectiveness of efforts to increase wetland service capacity in the context of a changing system

Stream Health

2. Outcome: Continual improvement in stream health and function throughout the watershed
Potential management strategies:
 - Develop protocols for determining stream health and service capacity
 - Design and implement monitoring program to periodically estimate the health and service capacity of streams throughout the watershed
 - Assess effectiveness of techniques for enhancing stream health and service capacity
 - Implement regulatory and non-regulatory programs and supporting protocols to protect and conserve existing stream health and service capacity and to compensate for degraded condition
 - Maintain and increase stream health and service capacity (**current operational target = restore reproducing brook trout populations in headwater streams with 8% increase in occupied habitat**)
 - Assess the effectiveness of efforts to increase stream health and service capacity in the context of a changing system

Fish Passage

3. Outcome: Continual increase in the presence of alewife, blueback herring, American shad, hickory shad, American eel, and brook trout in Chesapeake Bay freshwater rivers and streams
Potential management strategies:
 - Identify and remove impediments including invasive predators in historical fish migratory routes (**current operational target = open 1,000 additional stream miles**)
 - Develop and implement monitoring to periodically assess the presence of target species in freshwaters throughout the watershed
 - Develop protocols for determining the habitat suitability of fresh water rivers and streams for target species
 - Develop and implement monitoring to periodically assess the habitat suitability of all freshwaters in the watershed for target species
 - Assess the effectiveness of efforts to restore historical fish migratory routes in the context of a changing system

Submerged Aquatic Vegetation (SAV)

4. Outcome: Continual increase in the capacity of SAV to provide water quality and habitat services.
Potential Management Strategies
 - Develop and implement monitoring to periodically estimate the capacity of SAV to provide water quality and habitat services throughout the watershed
 - Develop protocols for creating, re-establishing, or enhancing water quality and habitat functions of SAV (**current operational target = restore 90,000 acres by 2017 and 130,000 acres by 2025**)

- Implement regulatory and non-regulatory programs and supporting protocols to protect and conserve existing SAV service capacity and compensate for degraded capacity
- Assess the effectiveness of efforts to increase SAV service capacity in the context of a changing system

Forest Buffers

5. Outcome: Continual increase in the capacity of forest buffers to provide water quality and habitat services throughout the watershed

Potential management strategies:

- Develop and implement monitoring to periodically estimate the capacity of forested buffers to provide water quality and habitat services throughout the watershed
- Develop protocols for creating, re-establishing, or enhancing water quality and habitat functions of forested buffers
- Develop protocols for protecting and conserving existing forest buffer service capacity and for compensating for degraded capacity in a changing system (**current operational target = conserve existing buffers in 70% of riparian areas throughout the watershed**)
- Implement regulatory and non-regulatory programs to maintain and increase forest buffer service capacity (**current operational target = restore 900 miles per year of riparian forest buffer**)
- Assess the effectiveness of efforts to increase forest buffer service capacity in a changing system

Urban Tree Canopy

6. Outcome: Continual increase in the capacity of urban tree canopy to provide water quality and habitat services throughout the watershed

Potential management strategies:

- Develop and implement monitoring to periodically estimate the capacity of urban tree canopies to provide water quality and habitat services
- Develop protocols for creating, re-establishing, or enhancing water quality and habitat functions of urban tree canopies
- Develop protocols for protecting and conserving existing urban tree canopy service capacity and for compensating for degraded capacity in a changing system
- Implement regulatory and non-regulatory programs to maintain and increase urban tree canopy service capacity (**current operational target = expand urban tree canopy by 2,400 acres by 2025**)
- Assess the effectiveness of specific management strategies intended to increase urban tree canopy service capacity in a changing system
- Assess the overall changes in urban tree canopy and provide periodic public reporting.

Water Quality

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.

1. Outcome: 2017 Watershed Implementation Plans (WIP): By 2017, have practices and controls in place that are expected to achieve 60% of the nutrient and sediment pollution load reductions necessary to achieve applicable water quality standards compared to 2009 levels.

Potential management strategies:

- Develop and implement monitoring to determine and/or confirm the representation of management practice effectiveness in the model
- Develop and apply a systematic, iterative process to evaluate the performance characteristics of the primary practices and controls, including responses to climate change
- Provide continual updates to those implementing practices and controls on the determined effectiveness and variability in performance
- (Conowingo Dam management would be a potential strategy)

2. Outcome: 2025 WIP: By 2025, have all practices and controls installed to achieve the Bay's dissolved oxygen, water clarity/submerged aquatic vegetation, and chlorophyll a standards as articulated in the Chesapeake Bay TMDL document.

Potential management strategies:

- Design and implement a program to iteratively evaluate the efficacy of practices and controls.
- Demonstrate the effective use of adaptive management approaches through data collection and adaptive management responses.

3. Outcome: Practices and controls are in place that keep toxic compound loads below levels that impact the health of aquatic systems and human users

Potential management strategies:

- Establish criteria for the definition of toxic contaminants relevant to Bay restoration.
- Clearly establish levels of toxic contaminants (in isolation and combinations) that would constitute a risk to aquatic systems and human users.
- Develop and implement monitoring protocols that identify the presence and concentrations of contaminants with the potential to impact the health of aquatic system of human users
- Develop and implement a program to identify contaminants of emerging concern and assess the need for monitoring in the Chesapeake Bay system
- Develop strategies and implement BMPs to prevent new inputs of toxic contaminants areas
- Develop and implement an outreach program to inform stakeholders of existing and potential issues with toxic contaminants used in the Chesapeake Bay system
- Assess the effectiveness of monitoring, management, and outreach programs to keep toxic loads below levels of significant impact

This is a proposed new outcome for toxics. It is modeled after the existing water quality outcome statements for nutrients and sediments. We suggest the Bay program partners should acknowledge and address the importance and impact of toxics in this system.

Healthy Watersheds

Goal: Maintain and enhance the capacity of small watersheds throughout the Chesapeake Bay system to provide the best possible water quality and habitat services consistent with existing or planned land uses.

1. Outcome: The attainable capacity to provide water quality and habitat services, considering current and intended land uses, is known for every small watershed in the Chesapeake Bay system and tools to enhance service capacity are understood

Potential management strategies:

- Assess the level of knowledge and understanding of “service capacity potential” throughout the Chesapeake region
- Develop and implement a protocol to estimate the attainable service capacity for small watersheds given their geographic setting and the existing/intended human use(s) of the watersheds
- Develop and implement a protocol to identify watersheds where management strategies reach or nearly reach the identified attainable service capacity
- Develop and promulgate guidance on service capacity conservation and enhancement for each type of small watershed throughout the region (forest, agriculture, rural residential, urban, etc.)
- Establish a program for transferring knowledge and skills from exemplary watersheds to similar watersheds throughout the region

2. Outcome: The median water quality and habitat service capacity for all small watersheds of similar type continually moves closer to the maximum observed in the Chesapeake system

Potential management strategies:

- Develop guidance on how to place BMPs for maximum effectiveness and understand the multiple benefits of alternative practices
- Provide training and peer-to-peer mentoring on management options to enhance service capacity
- Assess the effectiveness of efforts to increase service capacity through outreach in a changing system

Land Conservation

Goal: Conserve landscapes treasured by citizens in order to maintain water quality and habitat; sustain working forests, farms, and maritime communities; and conserve lands of cultural, indigenous, and community value.

1. Outcome: Improved protection of lands important for provision of water quality and habitat services

Potential management strategies:

- Develop and implement protocols for assessing the capacity of land to provide water quality and habitat services (current operational target = protect 2 million acres of high conservation priority lands including 225,000 acres of wetlands and 695,000 acres of forest land of highest value for maintaining water quality)
 - Inventory the protection status of lands with high value for habitat and water quality service capacity
 - Develop and promulgate guidance on strategies for protecting lands with high service capacity
 - Develop the skills and abilities of stakeholders to protect high value lands through outreach programs
 - Iteratively assess changes in the skills and abilities of key stakeholders in land prioritization and protection practices.
 - Monitor and report on trends in protection of high value lands to inform and motivate local efforts
 - Assess the effectiveness of strategies to increase protection of high value lands in a changing system
2. Outcome: Continual improvement in the knowledge of land conversion and the associated impacts throughout the watershed
- Potential management strategies:
- Develop and disseminate a uniform set of land use and land cover definitions and hierarchical classification schemes.
 - Develop and implement a protocol for monitoring the rate of land conversions between land use and land cover classifications, (by 2015)
 - Develop and disseminate a consistent definition for impervious surface coverage and apply the definition to measure change over time.
 - Develop and implement a protocol for monitoring and reporting the potential impacts of land conversion and impervious surface change on water quality and habitat service capacity (by 2017)
 - Develop outreach programs to inform stakeholders about land conversion changes and potential consequences
 - Develop and promulgate guidance on options for managing land conversions
 - Systematically, assess the level of knowledge and understanding of land conversion and associated impacts in stakeholder groups to determine effectiveness of the monitoring and outreach programs

Public Access

Goal: Expand public access to and use of the Bay and its tributaries through existing and new local, state and federal parks, refuges, reserves, trails, and partner sites.

1. Outcome: Continual increase in public use of the Bay and its tributaries for boating, swimming, and fishing.

Potential management strategies:

- Evaluate the effectiveness of outreach programs on key stakeholder groups and adapt existing programs as needed.
- Inventory existing public-access sites throughout the watershed
- Establish systematic criteria to define underserved areas and populations
- Geographically identify underserved areas and systematically prioritize opportunities for new access creation
- Identify strategies for creation of new access sites
- Work with local stakeholders to enhance existing access sites and develop new sites (**current operational target = 300 new public access sites by 2025**)
- Evaluate the effectiveness of stakeholder engagement based on the number and quality of new access points created with respect to underserved areas and populations.
- Monitor public use of waterways and existing access sites and provide the public with timely access to spatially and temporally-specific data.
- Assess effectiveness of access sites for increasing public use of waterways in a changing system

Environmental Literacy

Goal: Enable students in the region to graduate with the knowledge to use scientific evidence and citizenship skills to act responsibly to protect and restore their local watershed.

1. Outcome: Continual increase in the number of students graduating with targeted knowledge and skills

Potential management strategies:

- Develop and promulgate programs to provide teacher-supported meaningful watershed educational experiences in elementary, middle, and high schools
- Identify and highlight models of sustainable schools and local education agencies that use system-wide approaches for environmental education
- Assess effectiveness of outreach strategies with respect to targeted knowledge and skills (**current operational target = develop baseline metrics by 2014**)
- Assess changes in relevant knowledge among students, educators, and targeted stakeholders.