Cross-Goal Team Project: Mapping Geographic Areas that Benefit Multiple CBP Outcomes

Draft updated July 11, 2016 (Kristin Saunders, UMCES and Scott Phillips, USGS, based on feedback from Goal Team Chairs)

Need: The current CBP management strategies address individual outcomes of the Chesapeake Agreement. The program expects and intends collaboration between more than one Goal Implementation Team (GITs) to address outcomes. There are aspects of goals and outcomes that are inter-related (figure 1) and the GITs are starting to more effectively collaborate on inter-related outcomes. The guiding principles discussed by the GITs for addressing inter-related outcomes are:

- Providing maximum benefits for "living resources": fish, wildlife and people (**populations**)
- Through restoration or conservation of the habitats, water quality and lands they depend on (**conditions**)
- By focusing on inter-related outcomes and where practices in the CBP management strategies should be implemented (**interventions**) based on what the science tells us and;
- Considering future threats of population growth and climate change (**drivers of ecosystem change**).

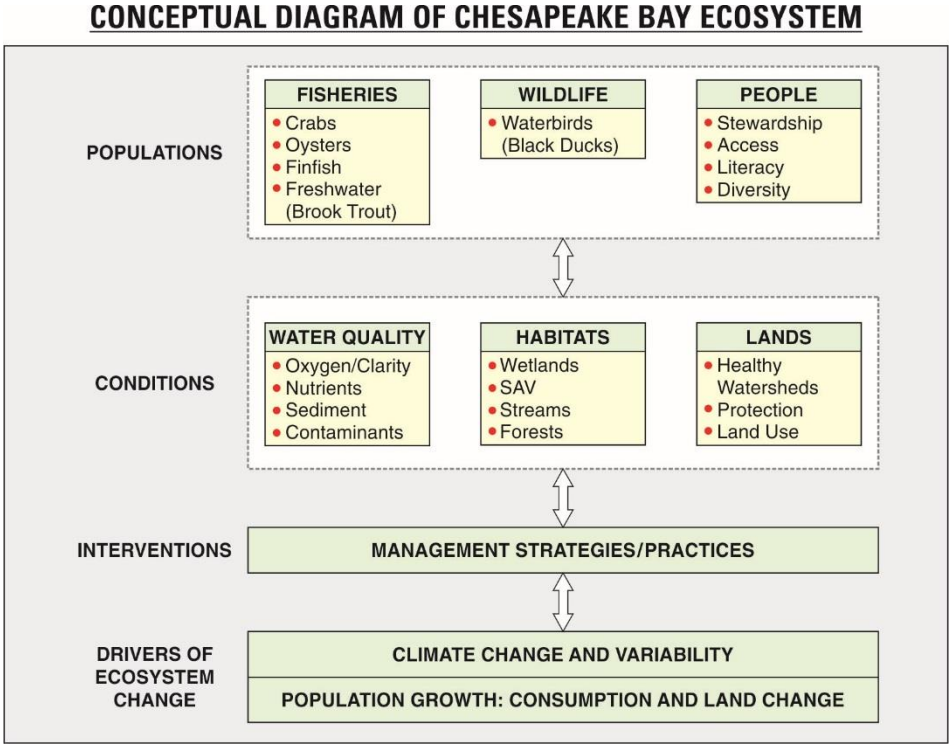


Figure 1 (from Phillips and Blomquist, 2015)

Addressing multiple outcomes has several objectives: (1) identify inter-related actions between outcomes, (2) map geographic areas where effort can be concentrated or targeted that benefit multiple

priority outcomes, (3) summarize the factors that affect achievement of 2 or more inter-related outcomes., and (4) assess common factors that can affect achieving the outcomes. The CBP is beginning to design "Chesapeake Decisions", which will be a valuable tool to inform decision making for addressing CBP outcomes. However, this tool is in early stages of development so the GITs are taking some initial steps to address multiple outcomes (see Appendix 1 for details). One effort is to have a project for mapping geographic areas where actions could provide benefits to multiple outcomes, which is the purpose of this document.

Audiences and Benefits of the Mapping Project: **The initial audience for the project is the GITs** since they are focused on implementing activities to achieve outcomes. Additional audiences include:

- The Management Board, which includes the GITs and CBP signatories, can help direct resources to areas identified important for both restoration and conservation.
- Principal Staff Committee, who can consider policy implications to better achieve inter-related outcomes.

The project will allow the GITs to better coordinate and focus resources in geographic areas that will benefit multiple, inter-related outcomes. The result will be targeted implementation in several geographic areas within the watershed that integrates multiple disciplines from the partnership and ultimately tells the story of the value of the partnership in Chesapeake Bay restoration efforts. The project will also provide an improved understanding of the importance of geographic locations to achieve maximum benefits for restoration and conservation activities.

Considerations to identify geographic areas

There are several approaches or considerations for mapping geographic areas:

- Focus on places most important for living resources (fish, wildlife, and people)
- Identify areas to focus restoration and conservation activities
- Consider threats from land and climate change
- Assess areas where multiple partners are already working.

Mapping considerations for each of the items are discussed below. Some examples of the type of questions that can be addressed include:

Map where different living resources are located or will migrate.

The initial focus is on living resources that are specified in the Bay Agreement:

- Fish: crabs, oysters, forage fish, and brook trout (as an indicator for freshwater species),
- Wildlife: black ducks (as an indicator for other waterfowl)
- People: outcomes related to stewardship, public access, literacy, and diversity.

The geographic extent for different species varies across the watershed. For example, the tidal waters contain a unique set of shell and finfish species compared to remainder of the watershed. Wildlife has similar distinctions in the range they occur in the watershed. Where people live in the watershed will depend on both the social-economic conditions and quality of life they desire. The initial approach of the project is to divide the watershed into different areas that have distinct ecoregions that influence the species occupancy. For simplify we adopted a grouping developed by the EO 202G working group: Coastal Plain, Piedmont, and Uplands (see map, figure 2).

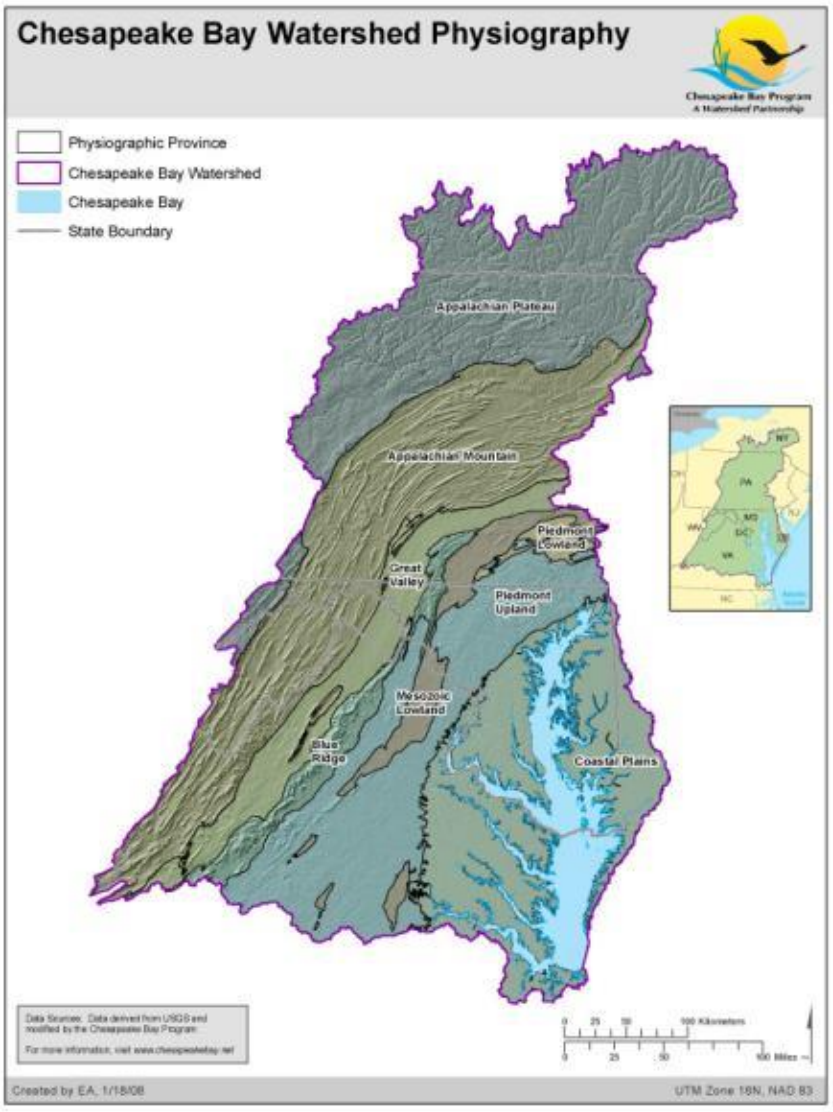


Figure 2: geographic areas where distinct communities of living resources. Three areas are emphasized: Coastal Plain, Piedmont, and Uplands (Combined areas of Blue Ridge and to the West)

Some inter-related CBP outcomes to consider for mapping of in the 3 primary geographic areas that are managed by different goal teams are listed below.

Coastal Plain:

- Fisheries: crabs, oysters, forage fish, and anadromous fish in the Bay and tidal waters.
- Habitat: SAV, fish passage, riparian forests, stream health, and tidal marshes supporting Black Ducks and other marsh-dependent birds. Other items to consider include State Wildlife Action Plans (SWAP) that identify species considered important so they don't become endangered. The challenge of the SWAPs is that each state has identified hundreds of species and their associated habitat. However the Northeast SWAP synthesis is honing the list and this summer will yield a refined list (27 species are common to all 6 Chesapeake Bay state plans, 6 of which are located only in the Chesapeake Bay watershed – Habitat goal team recommends focusing on these "Chesapeake Challenge" species)
- Water quality: Dissolved oxygen, SAV standards to support fisheries and their associated designed uses. Areas of nutrient and sediment reduction. Areas of low contaminant concentrations and hot spots that need to be reduced.
- Healthy Watersheds: each state has identified (MD, VA in the Coastal Plain). Could also consider information in SWAPs for conservation areas.
- Stewardship: public access, land conservation priority layers, working landscapes.
- Add cross outcome questions?

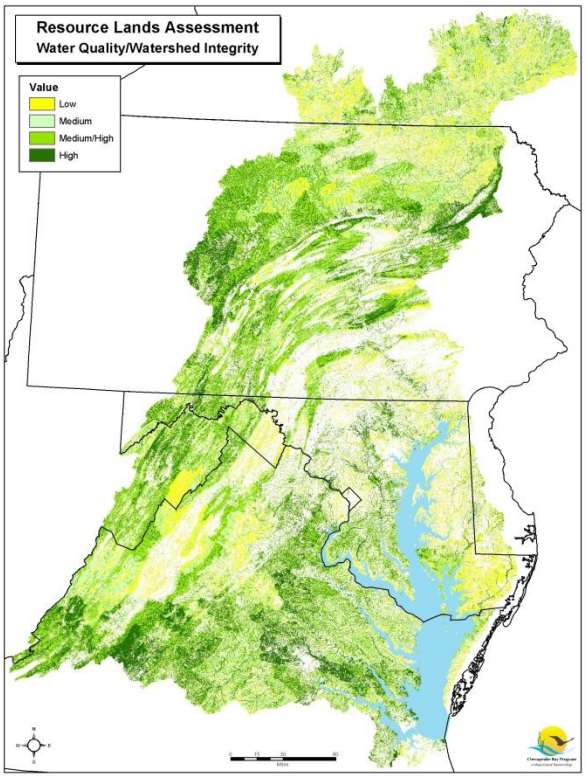
Piedmont:

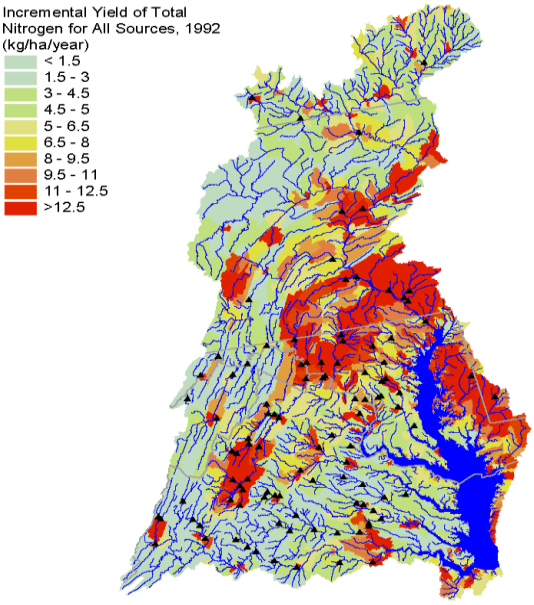
- Fisheries: anadromous fish and brook trout.
- Habitat: streams, fish passage, riparian forest buffers, low contaminant concentrations, adequate nutrient and sediment concentrations.
- Water Quality: Areas needed to reduce nutrients and sediment to improve water quality in tidal waters and Bay. Maintain low contaminant concentrations or reduce impacts of contaminants.
- Healthy watersheds: additional opportunities for ecological protection
- Stewardship: Similar to Coastal Plain items
- Add cross outcome questions?

Highlands

- Fisheries: anadromous fish and brook trout.
- Habitat includes streams, fish passage, riparian forest buffers, low contaminant concentrations, adequate nutrient and sediment concentrations.
- Water Quality: Areas needed to reduce nutrients and sediment to improve water quality in tidal waters and Bay. Maintain low contaminant concentrations or reduce impacts of contaminants.
- Healthy watersheds: additional areas for ecological protection.
- Stewardship: same as Coastal Plain
- Add cross outcome questions?

Identify areas for (1) conservation and (2) restoration activities where habitats and lands need to be protected or restored for fish, wildlife, and people. These are usually different and distinct areas. Two examples include the map on the left showing areas important to protect based on ecological integrity and water quality and map on the right showing areas important to restore based on nitrogen loads to local waters.





Asses threats from land and climate change

Understanding the threats to restoration and conservation areas would be based the two primary stressors to the Bay ecosystem (fig 1):

- Population growth and associated land-use change
- Climate change and variability.

The CBP has a Land-Change Model (Claggett, USGS) that can be used to show likely areas of land-use change. The CBP has multiple assessments of climate change being conducted through the Climate Change Workgroup. Selected results of these assessments, such as extent of projected sea-level rise, will be used to display potential geographic areas.

Assess where multiple partners are already focusing

Many groups have already identified areas where they are focusing efforts that can be used for the mapping project. Some examples include Harris Creek Oyster restoration effort, Delmarva RCPP

wetlands restoration, and federal partner focus areas. These areas will be gathered for the mapping project so areas of benefits (maps produced in items 1 and 2) can be compared with current areas where partners are focused. This will help partners decide if the location of current efforts should be modified.

Proposed Approach and Next Steps:

Create base maps that show 3 major regions of the Chesapeake Bay watershed (Coastal Plain, Piedmont, and Uplands). *Who: CBP GIS team*. Will need to subdivide the Coastal plain waters into major salinity regions given their influence on fisheries.

Compile list of GIS layers that will be helpful to identify geographic areas based on major themes: living resources, areas of restoration and conservation, threats, and existing partner efforts. *Who: GIT staffers with Lindsey Gordon as lead.* Lists would be gathered from:

- Fish habitat mapping, particularly for forage, migration and spawning location priorities (GITs 1 and 2)
- North Atlantic Landscape Conservation Cooperative (NALCC) and Appalachian LCC to bring in layers that depict index of ecological integrity and the synthesis mapping of the State Wildlife Action Plans. They will have mapped Regional Conservation Opportunity Areas (RCOA) in July 2016 – which will show state priorities within a regional context and the layers are supposed to be compatible with our system. (GITs 1 and 2)
- Water quality maps of high loading areas to local streams and the Bay (GIT3)
- Landscope Chesapeake priority conservation lands, public access points and healthy watersheds mapping (GITs 4 and 5)
- Coordinate efforts with Army Corps of Engineers to see how this work might inform or glean information from the Chesapeake Bay Comprehensive Water Resource and Restoration Plan watershed assessment.

Place spatial information into a Webviewer. *Who: CBP GIS team*

Begin to analyze information to identify geographic areas. *Who: GIT staffers and coordinators working with CBP GIS team.* Analysis would include:

- Identify areas of intersection where multiple priorities coalesce based on the science
- Then begin to bring in other layers (actions in the workplans or outcomes not yet mapped) and discuss opportunities to add other disciplines to these geographic areas where work is either already happening or could happen in the context of restoration and protection
- Categorize map layers in terms of positive or negative factors (vulnerabilities, threats, opportunities)
- Conduct structured decision making (SDM) to decide on the target focus areas with an eye toward geographic distribution, input from partners and signatories.
- Environmental justice screen to see what gaps or opportunities surface

- Identify the emerging stories, sound bites, story maps to communicate the work

Suggest geographic areas for partners to focus efforts. *Who: GIT chairs working with MB and PSC*

- Engage MB and PSC (so integrates with signatories at "levels" above staff on the GITs
- Major opportunity is to have habitat restoration and other disciplines' benefits reflected in the Phase 3 WIPs for each state.

Appendix 1: Objectives of Cross Goal Team Collaboration

The goal is to more effectively coordinate actions and resources to achieve inter-related outcomes. The ideas around this project were discussed by the GIT chairs in the Fall of 2015 and have evolved since that time. The CBP Scientific, Technical Assessment and Reporting (STAR) and other partners have offered to apply their capabilities to help carry out the approach working closely with the GIT teams. The project has these primary phases:

- **Phase 1: Identify inter-relation between outcomes**. Common actions that are needed to address 2 or more inter-related outcomes would be gathered from the Management Strategies and 2016-17 associated work plans.
- **Phase 2: Mapping: Identify geographic areas important for inter-related outcomes.** Conduct geospatial analysis to determine where the geographic areas overlap for inter-related outcomes. These geographic results can be used to:
    - (1) Identify areas where addressing multiple outcomes should be considered. This would include unique areas where restoration and/or protection need to be emphasized.
    - (2) Choose a subset of locations where multiple partners want to focus efforts.
- **Phase 3: Summarize the factors that affect achievement of 2 or more inter-related outcomes.** Use the information in the management strategies to summarize the most common factors that affect achieving outcomes. Also identify regions where the drivers of ecosystem change (population growth and climate change) will most likely affect achieving outcomes.
- **Phase 4: Identify the interrelated outcomes and factors most important to achieve the goals of Chesapeake Agreement.** This phase will help identify those outcomes and factors which are "keys" (the most inter-relation) to making progress on multiple outcomes in the agreement. Results of this analysis would most likely be used in the next phase of the work plans (2018-19) but some initial findings could help implement the current work plans.

Phase 1 would be carried out by the Coordinators/Staffers based on reviewing all the management strategies and draft work plans and their knowledge of the outcomes. Phase 2 would be done with support from the STAR and the CBP GIS team. Phase 3 would be carried out by the Staffers/Coordinators. Phase 4 would utilize structured-decision making (SDM), which is an approach to help groups discuss and prioritize options to solve an issue. USGS and FWS have staff experienced in SDM. If staffers/coordinators find it useful toward accomplishing the above task, a more comprehensive

approach could also be considered with information from all management strategies /work plans put into a data base for a more detailed assessment of each tier. The results from the project can be used through the CBP decision framework to consider refinements to work plans in 2018-19 and ultimately adaptively manage implementation.