

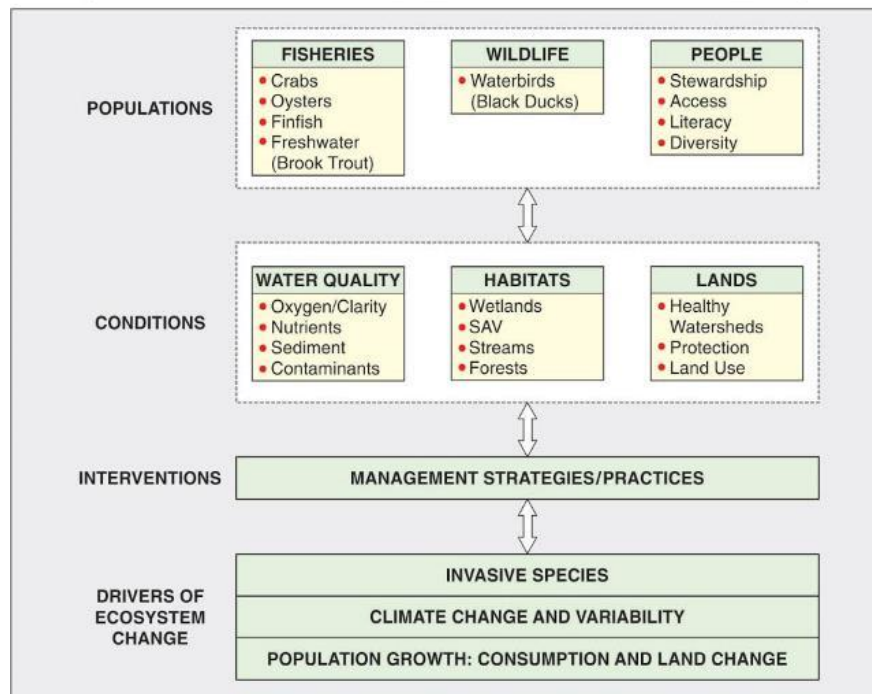
DISCUSSION PAPER: Issues and Opportunities for Future CBP Modeling Efforts to Address Chesapeake Watershed Agreement Goals and Outcomes

Purpose: Provide input into STAC workshop on Future Directions for CBP modeling (Jan 2018). STAR interacted with the CBP Goal Teams to identify modeling issues related to the CBP Watershed Agreement for the workshop participants to consider. Overall the Goal Teams would like future modeling to help:

- Better understand the inter-relations between goals and outcomes
- Focus restoration and conservation efforts to achieve multiple outcomes

The Chesapeake Watershed Agreement had 10 goals and 31 outcomes. Some of the important inter-relationships between goals (boxes for populations and conditions) and outcomes (bullets within the boxes) are shown on conceptual diagram of the Chesapeake ecosystem (from Phillips and Blomquist, 2015)

CONCEPTUAL DIAGRAM OF CHESAPEAKE BAY ECOSYSTEM



The goals and outcomes are managed under the CBP Goal Implementations Teams. The issues for future modeling needs are summarized for each goal team.

Fisheries Goal Team

Overall: Assess factors affecting change in fishery populations, including effects of management efforts, taking an ecosystem approach. Some of the key species to consider, based on outcomes in the CBP Agreement, include oysters, crabs, forage fish and the habitats that support them. Major issues to consider include:

- Sustainable crab and forage populations, abundance, and commercial/recreational harvest
- The relations between improvements in water quality (TMDL efforts) and fishery populations
- Effects of toxic contaminants on fishery health and implications for human consumption

- Effects of changing land-use and climatic conditions on temperatures, salinity, and food-web, and species conditions
- Relation between habitat types and fishery productivity.

Habitat Goal Team

Overall: Some of the key species and habitats, based on the CBP outcomes include: brook trout, fish stream health, fish passage, wetlands, black ducks, and SAV. Major issues include:

- The relations between implementing practices to reduce nutrient and sediment and improving stream health conditions.
- Relation between stream habitat, water temperature to brook trout and other important recreational species (such as small mouth and largemouth bass).
- The effect of toxic contaminants, bacteria, and parasites on freshwater fish populations and implications for human consumption.
- Relation of streambank stability and erosion rates and impacts on sediment loads and fish habitats
- Climate variability and SAV habitat availability (using 1 meter resolution land cover)
- Habitat conditions and food sources needed to support Black Ducks (and other waterfowl)
- Enhanced wetlands function and crediting in the WSM.
- The effects of changing land use and climatic conditions on all of the above
- Ecosystem services and benefits of habitats

Water Quality Goal Team

Overall: The goal team is responsible for the outcomes on the Bay TMDL, water quality monitoring/attainment, as well as toxic contaminants goal. Some issues include:

- Continued application of CBP models to predict effects of water-quality BMPs on nutrient and sediment load reduction.
- Relation between water-quality practices and potential for toxic contaminant reductions.
- Modeling of PCB sources, transport, and effects (also for mercury). These are major causes of fish consumption advisories in the Bay and watershed.
- Relation between toxic contaminants, underserved communities, and fish consumption.

Healthy Watersheds Goal Team

Address goals for conserving healthy watersheds, protecting lands, and outcomes for managing land change. Some major issues include:

- Growth scenarios needed to inform land protection and local planning decisions. Scenarios will be based on socio-economic factors driving growth and consumption.
- Potential impacts of development, energy, and climate change on healthy watersheds and vital lands.

Stewardship Goal Team

- Public access sites and potential effects from climate change (sea-level rise and flooding)
- Use results from stewardship index to help model relations of human attitudes/behaviors toward consumption, restoration and conservation.

Climate Change issues are included in each of the Goal Team but additional needs exist.

Prepared by Scott Phillips (USGS, STAR co-chair) based on input during STAR Dec 2017 meeting.