

## DISCUSSION PAPER: Issues and Opportunities for Future CBP Modeling Efforts to Address Chesapeake Bay Goals

**Purpose:** Provide input into STAC workshop on Future Directions for CBP modeling (Jan 2018). Their focus is how to evolve several existing Chesapeake models by 2025. The models include:

- Land-change model
- Watershed model
- Estuary water-quality model
- Ecosystem models of estuary (EcoSim and Atlantis)

The Steering Committee had invited STAR to summarize modeling issues related to the CBP Watershed Agreement so the workshop can consider have a broader perspective of future directions.

Overall the Goal Team would like modeling to help

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

Some of these inter-relation are shown on conceptual diagram of the Chesapeake ecosystem (next page)

### Fisheries Goal

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 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 conditions
- Are fish species being restored as fish passage efforts are implemented.

### Habitat Goal

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.

- The relations between implementing practices to reduce nutrient and sediment and improving stream health conditions.
- Relation between stream habitat, 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.

- Habitat conditions and food sources needed to support Black Ducks and other waterfowl populations
- The effects of changing land use and climatic conditions on all of the above

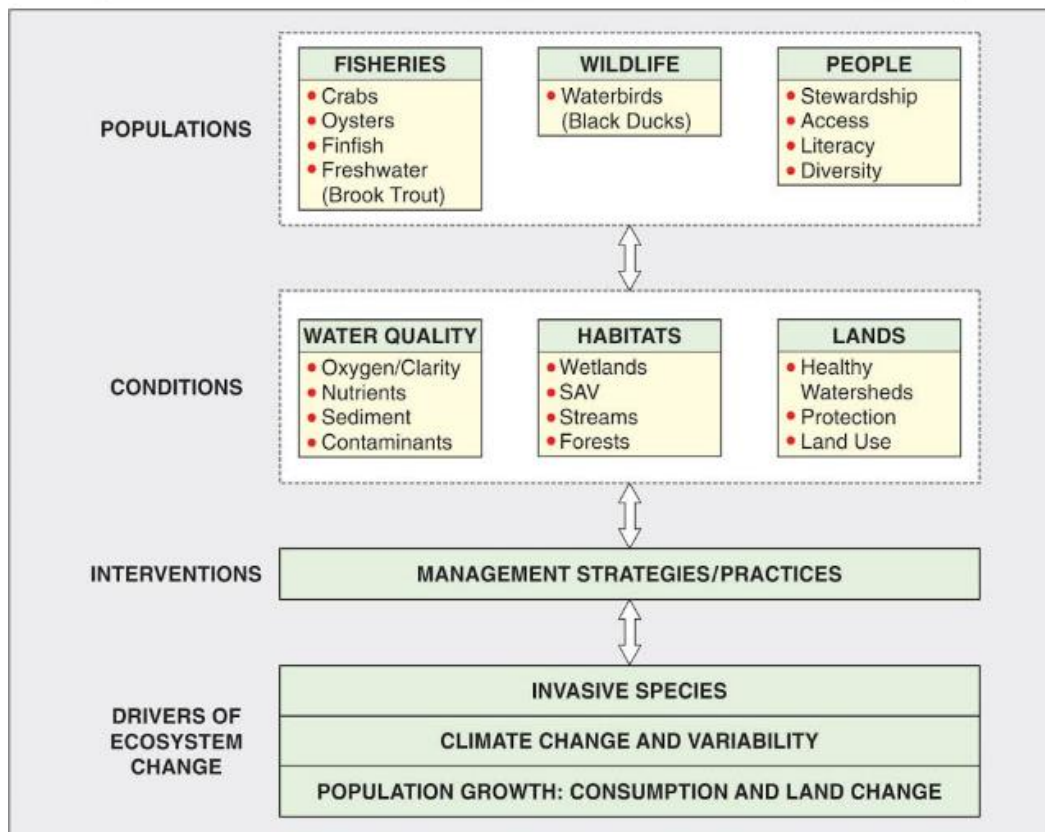
### Water Quality and Toxic Contaminant Goals

- Forecasts of increased food production on water quality. Issues include potentially increasing manure with animal production to meet food demands of population growth. Greater use of fertilizer and pesticides.
- Relation between water-quality practices and potential for toxic contaminant reductions.

### Healthy Watersheds and Stewardship Goals

- Growth scenarios needed to inform land protection and local planning decisions.
- Relationship between development, energy, and climate change on healthy watershed and vital lands.

### CONCEPTUAL DIAGRAM OF CHESAPEAKE BAY ECOSYSTEM



(From Phillips and Blomquist, 2015)