



**Chesapeake Bay Program**  
**SCIENTIFIC AND TECHNICAL ADVISORY COMMITTEE**  
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February 9, 2018

RE: STAC Review of the CBP Partnership's Climate Change Assessment Framework and Programmatic Integration and Response Efforts

James Edward, Interim Chair, Chesapeake Bay Program Management Board  
U.S. Environmental Protection Agency  
410 Severn Avenue, Suite 109  
Annapolis, MD 21403

Cc: Management Board; Water Quality Goal Implementation Team; Scientific Technical Assessment and Reporting (STAR); Climate Resiliency Workgroup; Modeling Workgroup

Dear Acting Director Edward,

I am pleased to attach for your consideration the STAC review report: *Scientific and Technical Advisory Committee Review of the Chesapeake Bay Program Partnership's Climate Change Assessment Framework and Programmatic Integration and Response Efforts*.

A key element of the 2017 Mid-Point Assessment of the 2025 Chesapeake Bay Total Maximum Daily Load (TMDL) effort is the incorporation of the latest climate science, data, tools, and best management practices (BMPs) into the Chesapeake Bay Program (CBP) partnership's decision support tools to help guide implementation and aid in the development of jurisdictions' Watershed Implementation Plans (WIPs). STAC has previously conducted several assessments of the latest climate science and recommended processes to integrate the consideration of climate change impacts into the CBP's management framework (Pyke et al. 2008; Pyke et al. 2012; STAC 2011; DiPasquale 2014; Johnson et al. 2016; Wainger 2016). These efforts also highlighted the need to more effectively embed climate change in decision-making, identify and prioritize vulnerabilities of restoration efforts and management actions, and utilize ongoing research efforts to better assess and evaluate responses to changing climatic conditions.

In addition to questions posed to previous peer review panels on the general approach to incorporate projected 2025 and 2050 climate change variables into the Phase 6 Watershed Model (WSM) and estuarine Water Quality and Sediment Transport Model (WQSTM) modeling processes, the CBP Modeling and Climate Resiliency Workgroups requested a more thorough evaluation of the partnership's climate change assessment framework (CCAF, hereafter) and plans for incorporating climate change into programmatic efforts. As a result of this request, panel of eight individuals with appropriate expertise was assembled in June 2017. In addition to addressing 16 charge questions, the panel was also encouraged to make recommendations for future work or recommend alternative approaches, research, and data gathering to be conducted in the longer term.

In summary, the panel concluded that given the current state of knowledge, the combination of using climate model projections and downscaling provides an acceptable baseline for estimating changing climate conditions for the Chesapeake Bay, and that the CCAF approach is fundamentally sound. However, the panel also outlined several areas where more details or further investigations are suggested, with specific recommendations for CBP consideration in regard to future use and application of the CCAF.

The panel's recommendations are summarized here:

- The approach to select projections and global circulation models largely follows accepted practices, but the CBP could consider excluding strongly biased models by comparing them to longer-term multi-decadal monthly climatologies of temperature and precipitation.
- The use of Representative Concentration Pathways (RCPs) is in line with the best practices documented in the most recent inter-comparison project (CMIP5). While different RCP scenarios are not likely to diverge substantially at the 2025 timescale, greater differences in the RCPs should be expected in the 2050 projections.
- The choice to use Bias Corrected Spatial Disaggregation (BCSD) downscaling is reasonable and justified, however it may be advisable to conduct a review and an inter-comparison of other available downscaled products over the Chesapeake domain.
- The panel agrees with the conclusions of the CBP that there remains uncertainty in the response of tidal wetlands, but that the Sea Level Affecting Marshes Model (SLAMM) provides the most useful and applicable tool available for the geographic region at this time.
- While the current treatment of relative and global mean sea level rise (SLR) in the framework of the CBP modeling suite (i.e., WQSTM) seems appropriate, the potential overall impacts of SLR on the Chesapeake Bay most likely will go beyond what is included in CCAF (e.g., accelerated minor flooding), and should be checked for consistency.
- The panel has concerns related to the decision to extrapolate precipitation from the last 100 years out to 2025 – it remains unclear how extrapolating over the full record corrects for decadal-scale, natural variability.
- The Delta Approach is well-designed to address changes in mean conditions but is not fully capable of analyzing future changes in variability and extreme events. Additionally, the full uncertainty in future climate effects is underestimated by the current set-up of the Delta Approach, and in particular by the choice to use the 10<sup>th</sup> and 90<sup>th</sup> percentiles.
- The panel recommends that the comprehensive description of the overall CCAF strategy must be improved in the formal documentation, including a clear statement of the overarching strategy of the CCAF effort and the specifics of how the climate simulations are incorporated into the CBP modeling suite.

We hope the Management Board, Goal Implementation Teams, and various workgroups find the recommendations outlined in this review report to be useful, and we look forward to your feedback. STAC respectfully requests a written response from the Climate Resiliency Workgroup by May 9, 2018.

Please direct any questions you may have about this report and its recommendations to Rachel Dixon, Coordinator of the Chesapeake Bay Program's Scientific and Technical Advisory Committee, or Maria Herrmann (PSU), chair of the review panel.

On behalf of the entire STAC, thank you again for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Brian Benham", with a long horizontal flourish extending to the right.

Brian Benham

Chair, Chesapeake Bay Program's Scientific and Technical Advisory Committee