The Development of Climate Projections for Use in Chesapeake Bay Program Assessments

Scientific and Technical Advisory Committee (STAC) Workshop

March 7-8 2016

Workshop Goals

1.What climate change variables are of most concern to the CBP partners in the consideration of the 2017 Midpoint Assessment decisions and for longer term climate change management decisions?

2. What are the approaches that can be taken to select climate change scenarios for CBP assessments?

Workshop Goals

3. What characteristics of those climate variables need to be specified, e.g., temporal, spatial, and other relevant characteristics? In what format are scenarios needed to provide the most utility at the regional, state, and local levels?

4. What climate change scenarios meet CBP decision making needs for the 2017 Midpoint Assessment as well as for longer term climate change management decisions and programmatic assessments?

Workshop Recommendation (Draft)

- The Partnership should reach agreement on the utility of an integrated source of climate change projection simulation data that all seven jurisdictions could draw from as well as using the same data for applications from a CBP perspective.

- For the 2017 Midpoint Assessment, use an approach utilizing historical (~100 years) trends to project precipitation to 2025 as opposed to utilizing an ensemble of GCMs. Shorter term climate change projections using GCMs have large uncertainties because climate models are structured to look further out and at much larger scales.

- Looking forward, focus on the 2050 timeframe for selecting and incorporating a suite of global climate scenarios and simulations to provide long-term projections for the management community, and an ongoing adaptive process to incorporate climate change into decision-making as implementation moves forward. Beyond the 2017 Midpoint Assessment, use 2050 projections for BMP design, efficiencies, effectiveness, selection, and performance – knowing that many of the BMPs implemented now could be in the ground beyond 2050.

Workshop Recommendation (Draft)

- For 2050, use an ensemble or multiple global climate model approach through a selection of no more than ten models. Use multiple scenarios covering a wide range of projected emissions (RCP 4.5 and 8.5 are a reasonable range to select and are currently being utilized for Fourth National Climate Assessment). Include the 2 °C emissions reduction pathway (RCP 2.6) as well as more "business as usual" assumptions.

- Select an existing system to access GCMs, downscaled scenario data (such as LASSO) in lieu of conducting a tailored statistical climate downscaling process for the CB watershed.

- Carefully consider the representation of evapotranspiration in watershed model calibration and scenarios.

Chesapeake Bay TMDL 2017 Mid-Point Assessment

Recommendations on Incorporating Climate-Related Data Inputs and Assessments: Selection of Sea Level Rise Scenarios and Tidal Marsh Change Models

Climate Resiliency Workgroup

August 5, 2016

Climate Resiliency Workgroup Recommendations - SLR

- The CRWG recommends that the CBP leadership consider the application of the plausible range of sea level rise projections for CBWQSTM modeling efforts, with upper and lower limits, for the years 2025 and 2050.

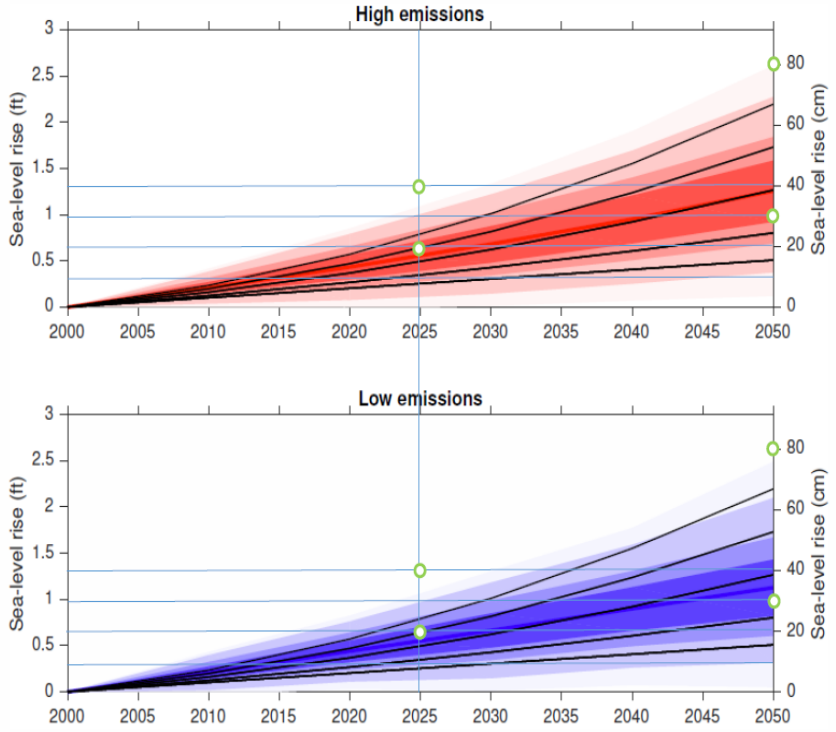
- In selecting the range of scenarios, the upper bound should be consistent with a higher emissions scenario (but not the extreme upper scenario). This would result in the upper bound corresponding with the 99.5% probability, plus 0.1m to account for interannual variability.

- The lower range value should be within the “likely” range, as presented by Dr. Kopp, consistent with a lower emission scenario (RCP 2.6), but not be the extreme lower scenario which depicts historical tide gauge trend.

- Based on the considerations above, the CRWG recommends that the following range of sea level rise projections for 2025 (.2 - .4 m) and 2050 (.3-.8 m) (see graphic below) be applied in the CBWQSTM.

Climate Resiliency Workgroup Recommendations

Baltimore, MD – comparison to VLM-adjusted CARSWG



Dark = likely (17th-83rd percentile range)
Medium = 5th-95th percentile range
Medium-Light = 0.5th-99.5th percentile range
Very light = 0.1st-99.9th percentile range

Rutgers Earth System Science & Policy Lab

Green circles indicate plausible SLR ranges in Chesapeake Bay for 2025 (0.2 – 0.4m) and 2050 (0.3-0.8m), and have been rounded to the nearest 0.1 m.

The upper limits account for interranual variability by adding 0.1m (2 standard deviations of the detrended annual mean sea level residual) to the upper limit of the 99.5th percentile for high emissions scenario. They also account for slightly higher MSL values in the southern Chesapeake Bay, relative to the Baltimore values.

The lower limits are consistent with a low emission scenario, and also account for slightly higher MSL values in the southern Bay.

Climate Resiliency Workgroup Recommendations - Wetlands

- Use a multi-model approach, tied to the CRWG's recommended range of sea level rise projections for 2025 and 2050, to gain estimates of current wetland area and projected wetland loss/gain. Use these estimates to inform watershed loads in the CBWQSTM modeling effort.

- To estimate project wetland gain/loss, analyze data results available through the National Wildlife Foundation, Sea Level Affecting Marsh Model v.5 of the Chesapeake Bay (2008) and data available through NOAA's Office for Coastal Management Sea Level Rise Marsh Impacts and Migration Tool.

- In interpreting the data available through these two products, assess whether the sea level rise projections used for the studies were consistent with the 2025 and 2050 SLR projections (as recommended by the CRWG); or, in the case of the NOAA Marsh Tool, whether data runs could be acquired for a different SLR scenario.

- The USGS/CBP GIS Team, which is working to compile the land use/land cover data set for the Midpoint Assessment, should work with the EPA/CBP Modeling Team to ensure there is consistency among the wetland classifications included in the marsh loss modeling outputs (NWF SLAMM (2008) and the NOAA Marsh Tool) to allow for side by side comparison of results.