

## **Issue Paper:**

### **Development and Implementation of Chesapeake BMPs, Stormwater Management, and Other Management Responses to Future Climate Risk**

April 8, 2019

#### **The PSC Direction on Future Climate Risks to the Chesapeake Watershed and Bay**

The PSC gave specific direction to the CBP partnership at their December 2017 meeting. The direction included “narrative strategies in the Phase III WIPs that describe the jurisdictions current action plans and strategies to address climate change, as well as the jurisdiction-specific nutrient and sediment pollution loadings due to 2025 climate change conditions, while incorporating local priorities and actions to address climate change impacts.” Further, the PSC requested that the Partnership “... develop a better understanding of the BMP responses, including new or other emerging BMPs, to climate change conditions” so that in “2021, the Partnership will consider results of updated methods, techniques, and studies and revisit existing estimated loads due to climate change to determine if any updates to those load estimates are needed [through] a Phase III WIP addendum and/or 2-year milestones beginning in 2022.” (Emphasis mine). Finally, the PSC directed the partnership to “starting with the 2022-2023 milestones, determine how climate change will impact the BMPs included in the WIPs and address these vulnerabilities in the two-year milestones.”

#### **Management Board Discussion February 14, 2019**

The response to the PSC direction was further outlined in discussion at the February 14, 2019 meeting of the Management Board and the following priorities were discussed:

- Update design and function of stormwater management and BMPs under the new climate reality of increased flow volumes and intensities.
- Incorporation of precipitation changes with regards to intensity, annual amounts, and seasonal impacts into BMP design.
- Develop understanding of the co-benefits of management practices in response to future climate risk, particularly with respect to jurisdiction-specific and local public health, safety, and infrastructure concerns as well as green infrastructure performance, including riparian buffers, wetlands, and other management actions.

#### **ACTION:**

**The Management Board requests that the Climate Resiliency Workgroup and the Water Quality Goal Implementation Team consider the direction of the PSC and the key points from the February 14 Management Board meeting and return recommendations to the Management Board at their April 11, 2019 meeting on the process and timeline for what is needed to address the PSC’s direction and guidance.**

**Recommendations to the Management Board:**

**Timeline:** Development of a multiyear prototype science and technical program is recommended using available annual funding. The prototype program is suggested to run until 2025, and if successful, the CBP partnership could decide to continue the program. The program would be specific and directed toward the specific CBP partnership applied scientific needs listed below.

**Short-Term Activities:** The initial first year efforts of the program would be to support the design and accelerate the adoption of climate change ready stormwater management systems, i.e., actions and BMPs, that take into account estimated future climate volumes and intensities specific for counties in the Chesapeake watershed. “Many local practitioners want more responsive design curves and parameters for stormwater management practices and we endorse an active leadership approach to do this.” In addition, the work would determine how stormwater management BMPs designed for future volumes and intensity could generate nutrient and sediment reductions that can be counted in the WIP3 milestones up to 2025. Co-benefits will be considered including down stream flooding, public health and safety, infrastructure protection, and green urban infrastructure using natural or engineered forms.

**Long-Term Activities:** In the long-term, beyond the first year’s activities, the Climate Resiliency Workgroup and the WQGIT will examine the top tier agricultural/urban BMPs and actions in the WIP3s that are vulnerable to future climate risk, with initial emphasis on multi-year BMPs that contribute substantially to WIP nutrient and sediment reductions and/or are structural in nature or persist longer in the landscape. In both the short and long-term activities the work will develop an understanding of the co-benefits of management practices that align with local needs to address future climate risk, such as infrastructure and public health and safety concerns (including use of green infrastructure), riparian buffers, watershed and tidal wetlands, and other management actions.

**Program Management:**

The program would be developed through the NOAA Interagency Agreement (IA) on climate change. The ongoing scientific CBP oversight of the projects would be provided by the CBP technical groups, such as STAR and the WQGIT, including its Urban Workgroup, Watershed Technical Workgroup, Agricultural Workgroup and/or the Modeling Workgroup depending on subject matter expertise required. A scientific review by of the project’s products would be conducted by STAC.

**Attachment A:****Discussion by the Water Quality Goal Implementation Team and Climate Resiliency Workgroup March 25, 2019 and April 8, 2019**

The WQGIT discussed focused research and development on management practices adapted to future climate risk for implementation in the Chesapeake watershed. The recommended approach will be reviewed at the WQGIT April 8 meeting and presented to the Management Board at their April 11 meeting.

- Many local practitioners want more responsive design curves and parameters for stormwater management practices. An active leadership approach among the WQGIT to do this is endorsed. As a start, the Urban Stormwater Workgroup's May meeting will include collecting information on this topic and making that information available for BMP designers and practitioners.
- Management practices other than urban stormwater BMPs will also be considered such as high priority BMPs such as agricultural or stream restoration BMPs that are significant in the WIPs
- The timeline should focus on what the states expect to have by their 2022/2023 milestones, 2024/2025 milestones, and for application beyond 2025. The problem being addressed is a multi-generational concern that the CBP partnership needs a proactive response
- There are also other climate impacts beyond precipitation. For instance, length of the growing season, increased evaporation, temperature changes, etc. should also be considered.
- There may be low-hanging fruit to tackle in that BMP efficiency research, for instance simply updating first frost dates might be significant for cover crops and double cropping. Farmers and practitioners on the ground are already doing this, but it needs to be reflected in our modeling/assessment tools. The intent is to look at all possible BMPs with significant impacts from climate change, not just structural ones.
- Some of our agricultural partners are interested in looking at climate adaptation in our practices and looking at elevation and salt inundation in agricultural lands. There could be changes in land use and land cover with sea level rise, and other impacts to practices from climate change as agriculture lands in tidewater regions are inundated. For coastal communities, management practices in response to sea level rise and saltwater intrusion would also be of importance.
- Nutrient credits for design storm that would be "overdesigned" for 2035 conditions of intensity and volume. Could take credit for 1990s to 2035 design conditions up to a reasonable time, perhaps 2025.

- With respect to stormwater management BMPs the following elements might be necessary: 1) agreement on how precipitation, and other drivers, might change, 2) anticipated impacts of those drivers on BMP pollutant removal, degradation and potential structural failure 3) design options which might also entail keeping BMPs as they are, but being prepared to increase inspection and maintenance frequency which could be less expensive than trying to bolster the designs.
- Annual management practices should also be considered. A small impact on annual practices, over many acres, could have a significant loading impact. For example, it's possible that a longer crop growing season could reduce the period over which cover crops are functioning.
- Account for the projected climate change impacts that are likely to occur during the full lifecycle of BMPs. Provide jurisdictions with a summary of existing stormwater and agricultural BMP design tools and models that account for projected climate change scenarios and the influence on BMP design sizing.
- Consider the methodology utilized for quantifying co-benefits of green stormwater infrastructure used in the Community-enabled Lifecycle Analysis of Stormwater Infrastructure Costs (CLASIC) project:  
[https://cfpub.epa.gov/ncer\\_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/10616](https://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/10616)
- Consider the methodology utilized in Climate Resilience Awareness Tool (CREAT) 3.0 for water utilities to consider projected extreme storm events: <https://www.wcrp-climate.org/wgcm-cmip>
- Provide guidance on how to update existing bankfull regional curves, considering how bankfull discharges of stream will change under future climate change scenarios to assist with the design of stream restoration projects.
  - Existing VA bankfull Regional Curves:  
[https://va.water.usgs.gov/projects/reg\\_curves\\_piedmont.htm](https://va.water.usgs.gov/projects/reg_curves_piedmont.htm)
  - [https://www.usgs.gov/centers/va-wv-water/science/virginia-bankfull-regional-curves-project?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/centers/va-wv-water/science/virginia-bankfull-regional-curves-project?qt-science_center_objects=0#qt-science_center_objects)
  - Existing PA and MD bankfull Regional Curves:  
<https://pubs.usgs.gov/sir/2005/5147/>
  - Existing NY bankfull Regional Curves:  
[https://pubs.usgs.gov/sir/2009/5144/pdf/sir2009-5144\\_mulvihill\\_bankfull\\_2revised508.pdf](https://pubs.usgs.gov/sir/2009/5144/pdf/sir2009-5144_mulvihill_bankfull_2revised508.pdf)
  - Existing MD and VA non-urban non-tidal coastal plain bankfull regional curves:  
<https://pubs.usgs.gov/sir/2007/5162/pdf/SIR2007-5162.pdf>
  - Existing MD coastal plain bankfull discharge:  
<https://www.fws.gov/chesapeakebay/pdf/plain.pdf>
  - Existing MD and DE piedmont regional bankfull discharge regression curves:  
[https://www.researchgate.net/publication/268597587\\_The\\_Development\\_of\\_Regio](https://www.researchgate.net/publication/268597587_The_Development_of_Regio)

nal Bankfull Discharge Regression Curves from Rural and Urban Stream Streams in the Piedmont of Maryland and Delaware