BIENNIAL STRATEGY REVIEW SYSTEM
Chesapeake Bay Program

DRAFT Narrative Analysis

[CLIMATE RESILIENCY MONITORING AND ASSESSMENT OUTCOME – NOVEMBER 10TH, 2022]

ABSTRACT: [PROVIDE A CONCISE PARAGRAPH SUMMARY, BEGINNING WITH THE OUTCOME STATUS (*E.G.*, ON TRACK, OFF TRACK, AHEAD OF SCHEDULE), YOUR KEY FINDINGS, SUCCESSES AND CHALLENGES THAT ARE DESCRIBED IN MORE DETAIL BELOW.]

Over the past two years, the Climate Resiliency Workgroup's (CRWG) recent progress has increased as the workgroup continues to monitor and assess the trends and likely impacts of changing climatic and sea level conditions on the Chesapeake Bay ecosystem. Furthermore, the outlook of this outcome is on-course as progress is being made on assessing climate change trends related to physical change (e.g., temperature, precipitation, and sea level rise). Challenges faced over the past two years include capacity and resource constraints when it comes to actions like climate change indicator work; developing and maintaining a climate change indicator is time and staff resource intensive and there is a need for commitments from long-term data providers and analysis assistance. Successes over the past two years include piloting a new climate staffer position, which improved the workgroup's capacity to support indicator efforts and cross-workgroup coordination, assessing the utility of a Bay Water Temperature Change Indicator through the STAC Rising Water Temperature Workshop, and assisting the Water Quality Goal Implementation Team and Urban Stormwater Workgroup in assessing BMP climate resilience uncertainties. Moving forward, the workgroup plans on determining how they can support the science recommendations that were developed during the STAC Rising Water Temperature Workshop, including collaborating with other workgroups to identify how best to build a water temperature change indicator. Additionally, the workgroup will evaluate how they will support and collaborate with other workgroups on topics such as blue carbon and carbon sequestration and BMP performance research.

NOTE: The narrative analysis summarizes the findings of the logic and action plan and serves as the bridge between the pre-quarterly logic and action plan and the quarterly progress meeting presentation. After the quarterly progress meeting, your responses to these questions will guide your updates to your logic and action plan. Additional guidance can be found on ChesapeakeDecisions.

1. ARE WE, AS A PARTNERSHIP, MAKING PROGRESS AT A RATE THAT IS NECESSARY TO ACHIEVE THIS OUTCOME? WOULD YOU DEFINE OUR **OUTLOOK** AS ON COURSE, OFF COURSE, UNCERTAIN, OR COMPLETED? UPON WHAT BASIS ARE YOU FORECASTING THIS OUTLOOK?

   The Chesapeake Bay Program (CBP) Climate Resiliency Workgroup (CRWG) is responsible for both the **Monitoring and Assessment** and **Adaptation** outcomes under the climate

resiliency goal in the Chesapeake Bay Watershed Agreement. Both outcomes have broad narrative objectives. The Monitoring and Assessment outcome involves continually tracking and assessing the trends and likely impacts of changing climate and sea level trends on the Chesapeake Bay ecosystem, including the effectiveness of restoration and protection policies, programs and projects. The current outlook for this outcome has been categorized as **on course**, as progress is being made on assessing climate change trends related to physical change (e.g., temperature, precipitation, and sea level rise). Furthermore, over the past two years, these trends spurred the development of recommendations related to restoration and protection policies, programs, and projects (e.g., the STAC Rising Water Temperature Workshop and the BMP Climate Uncertainty Report). For this outcome to remain on course, the recommendations need to be reviewed and implemented by respective partner programs (e.g., natural resource agencies, federal agencies, local governments, etc.).

How would you summarize your **recent progress** toward achieving your outcome (since your last QPM)? If you don't have an indicator, would you characterize this progress as an increase, decrease, no change, or completed? *If you have an indicator and it was updated since your last QPM, use your answer to question 16 from your Analysis and Methods document.*

We classify our recent progress towards this outcome over the past two years as **increasing**, as the workgroup has supported a number of activities that helped make progress towards the Monitoring and Assessment Outcome. The CRWG worked alongside the Management Board to develop a list of prioritized climate change indicators to assist in how we focus our resources and efforts. From that list, two indicators remain current, while the rest are under refinement. The two current indicators (i.e., Average Air Temperature and Total Annual Precipitation) are set to be updated within the coming months for the first time since 2017. We have secured the data from the data provider and are working on finalizing the Analysis and Methods documents for the indicators. To assist in informing the new development of a Bay-wide water temperature indicator, the workgroup co-led the STAC Rising Water Temperature STAC Workshop effort, which included a pre-workshop during the CRWG's June 2021 meeting and two full-day meetings during January and March 2022. This workshop developed a number of management recommendations and science and assessment needs that could elevate policy and program effectiveness in addressing climate change impacts on landscapes, nontidal and tidal fisheries, and submerged aquatic vegetation (SAV) related to increasing temperatures in the watershed and Bay. Additionally, the CRWG identified ocean acidification and blue carbon monitoring and assessment needs for STAR's Monitoring Program review effort, which was in response to a PSC request.

EXPLAIN ANY GAP(S) BETWEEN OUR ACTUAL PROGRESS AND OUR OUTCOME.

The Climate Resiliency Monitoring and Assessment outcome is qualitative and does not have numeric metrics, making it difficult to evaluate progress in a quantitative sense. With climate change, there will always be the challenge of keeping up pace since we will never be truly done with our outcomes. Therefore, the workgroup interprets any progress on assessing trends and identifying scientific needs to better prepare policies, programs, and projects to minimize vulnerabilities to climate change impacts as achieving the outcome. We are continually trying to improve and implement strategies to build resilience to climate change impacts for Chesapeake Bay restoration efforts.

NOTE: YOUR RESPONSES RELATED TO OUTLOOK AND RECENT PROGRESS WILL BE USED TO UPDATE YOUR OUTCOME PAGE ON CHESAPEAKEPROGRESS AND THE OUTCOME STATUS PAGE.

2. Looking back over the last two or more years, describe any scientific (including the impacts of climate change), fiscal, and policy-related developments that impacted your progress or may influence your work over the next two years. Have these resulted in revised needs (*e.g.*, less, more) to achieve the outcome?

*TO THE EXTENT FEASIBLE, DESCRIBE YOUR NEEDS USING THE SPURR THOUGHT MODEL, I.E., **S**PECIFIC AND ACTIONABLE, **P**ROGRAMMATIC PARTNER, **U**RGENCY OF THE NEEDED ACTION, **R**ISK OF NOT ACTING, **R**ESOURCES REQUIRED.*

Recently, the federal government passed a number of new laws (i.e., the Infrastructure Law, the Inflation Reduction Act) that include a significant amount of funding for natural infrastructure and resilience efforts. As the workgroup develops their next 2-year Logic and Action plan, they will likely direct the majority of their staff and membership resources on actions under the Adaptation outcome to better position the Chesapeake Bay region to compete for the influx of this resiliency and habitat funding for large-scale adaptation projects. This increase in funding could allow partners to implement projects that are more impactful in building resilience. While the next 2 years will have an adaptation outcome focus, the CRWG still plans to make incremental progress on the climate change indicators, with progress mostly being made on developing the Bay water temperature change indicator.

During the next 2 years, the CRWG also anticipates there will be requests for scientific advisory support for the Phase 7 Chesapeake Bay Watershed Model and on projects under the EPA's Request for Applications (RFA) to support stormwater outcomes and research on agriculture and natural BMP effectiveness related to climate change impacts. The EPA's RFA is building upon efforts supported by the CRWG, including literature reviews on BMP performance uncertainty related to climate change impacts (further described under question 3).

There was also a large effort by the Integrated Monitoring Workgroup in reviewing the CBP monitoring program needs to fulfill a request made by the CBP Principal Steering Committee (PSC). The CRWG contributed to the review by identifying blue carbon/carbon sequestration and ocean acidification monitoring and assessment needs. When developing the workgroup's next 2-year logic and action, the CRWG plans to discuss next steps with the Integrated Monitoring Workgroup on where the workgroup could support climate-related needs.

3. BASED ON THE RED/YELLOW/GREEN ANALYSIS OF THE ACTIONS DESCRIBED IN YOUR LOGIC AND ACTION PLAN, SUMMARIZE WHAT YOU HAVE LEARNED OVER THE PAST TWO YEARS OF IMPLEMENTATION.

SUMMARIZE OVERALL (NOT PER ACTION) WHAT YOU HAVE LEARNED ABOUT WHAT WORKED AND WHAT DIDN'T WORK. FOR EXAMPLE, HAVE YOU IDENTIFIED ADDITIONAL FACTORS TO CONSIDER OR FILLED AN INFORMATION GAP?

Over the past two years, the workgroup has made progress on a large number of priority actions. We continued our work to develop and maintain indicators that track climate resiliency in the Chesapeake Bay through working with STAR, the Management Board and other workgroups to

generate a list of priority indicators and by working towards updating our two current indicators. This indicator work was collaborative across workgroups and GITs and addressed indicator development for Bay Water Temperature, Stream Temperature related to Brook Trout, and Sea Level Rise related to Marshes. To better understand impacts of sea level rise on marshes, our workgroup supported the Habitat Goal Implementation Team's (GIT) GIT-Funded Marsh Data Synthesis project (completed September 2022) and participated in workshops and meetings that brought in subject matter experts. To improve capacity in supporting climate change indicators and cross-workgroup coordination, we worked with CRC to pilot a new climate staffer position. The dedicated climate staffer position was highly successful, allowing for updates to the existing climate change indicators and the adding much needed support for cross-workgroup workshops and meetings enhancing progress on the Monitoring and Assessment outcome. However, given that the prioritized list of climate change indicators includes the development of several new indicators, and these indicators are time and staff resource intensive (beyond the capacity of current CRWG staff), it will be important to build partnerships with organizations that can commit to being long-term data providers and assist with the indicator analysis. Additionally, to optimize use of the indicators and available resources, we need to first establish the purpose of the indicator with potential end-users to make the level of effort worthwhile. This includes getting support from other workgroups in connecting the climate change indicators with relevant ecological impacts to natural resource outcomes.

The CRWG co-led the Rising Water Temperature STAC workshop effort by holding a full-day pre-workshop meeting with multiple workgroups to discuss the impacts of rising Bay temperatures on living resources, helping facilitate the two-day STAC workshop, and helping draft the Tidal portion of the final report. Five tidal management recommendations, which address four main themes (i.e., Ecosystem-Based Management, Nearshore Habitats, Multiple Stressors, and New Temperature Regime), were developed over the course of this workshop effort and recommendations for management actions and corresponding science needs in the final report.

The CRWG also collaborated with the Water Quality GIT and Modeling Workgroup to review the climate model narrative language for the application of TMDL climate change projections. Further collaboration with the Water Quality GIT included supporting the BMP Climate Uncertainty Report contracted to Virginia Tech. The CRWG worked with the Water Quality GIT who provided a list from their jurisdictions on priority BMPs in their Watershed Implementation Plans (WIPs) where an evaluation of literature on climate change impacts to performance would be helpful. The Virginia Tech report, "A Systematic Review of Chesapeake Bay Climate Change Impacts and Uncertainty: Watershed Processes, Pollutant Delivery, and BMP Performance" was completed in January 2022. The CRWG also collaborated with the Urban Stormwater Workgroup and the Modeling Workgroup on a joint meeting that focused on sharing efforts assessing stormwater BMP vulnerabilities and next steps for more resilient designs. All these efforts are in support of increasing knowledge for implementing climate-ready BMPs to ensure continued progress in meeting water quality goals. However, literature reviews indicated that research is sparse on assessing climate change impacts on BMP effectiveness. This research gap needs to be filled in order to make informed decisions for future BMP use under changing climate conditions.

Through reviewing our progress made on actions that support the Monitoring and Assessment Outcome, we were able to identify general themes about our work that will help build our actions in the next 2-year logic and action plan. Many of these actions focused on the effect of sea level rise on marshes and marsh migration; there are current projects underway that the

workgroup will be able to build upon as they move forward in using this information to track trends and effectiveness of policies, programs, and projects. Additionally, the workgroup has focused on developing climate change indicators that are related to natural resource outcomes, such as wetlands, fish habitat, and SAV, as it is important to be creating indicators that will have management utility. The workgroup also supported efforts to identify monitoring and assessment needs related to blue carbon/carbon sequestration and ocean acidification. The work conducted over the past two years underscored the need for targeting information related to ecosystem services and environmental justice.

4. BASED ON WHAT YOU HAVE LEARNED THROUGH THIS PROCESS AND ANY NEW DEVELOPMENTS OR CONSIDERATIONS DESCRIBED IN RESPONSE TO QUESTION #2, HOW WILL YOUR WORK CHANGE OVER THE NEXT TWO YEARS? IF WE NEED TO ACCELERATE PROGRESS TOWARDS ACHIEVING OUR OUTCOME, WHAT STEPS ARE NEEDED AND, IN PARTICULAR, WHAT SPECIFIC ACTIONS OR NEEDS ARE BEYOND THE ABILITY OF YOUR GROUP TO MEET AND, THEREFORE, YOU NEED THE ASSISTANCE OF THE MANAGEMENT BOARD TO ACHIEVE?

DESCRIBE ANY ADAPTATIONS THAT MAY BE NECESSARY TO ACHIEVE YOUR OUTCOME MORE EFFICIENTLY AND EXPLAIN HOW THESE CHANGES MIGHT LEAD YOU TO ADJUST YOUR MANAGEMENT STRATEGY (IF SIGNIFICANT) OR THE ACTIONS DESCRIBED IN COLUMN FOUR OF YOUR LOGIC & ACTION PLAN. WHAT NEW SCIENCE, FISCAL, AND POLICY-RELATED INFORMATION, COULD BE RECOMMENDED OR PURSUED OVER THE NEXT TWO YEARS TO MAINTAIN OR, IF NEEDED, ACCELERATE PROGRESS? USE THE SPURR MODEL DESCRIBED IN QUESTION #2, TO PROVIDE DETAIL TO THE NEEDED STEPS AND ACTIONS.

While the majority of the CRWG resources are likely to be directed to the Adaptation outcome during the next 2 years in order to maximize opportunities of the influx of near-term resilience and habitat funding for restoration projects, the workgroup plans to make incremental progress through cross-workgroup coordination on the climate change indicators. The CRWG plans to meet with other workgroups to identify how best to build water temperature change indicators in relation to resource-related outcome needs. This includes initiating discussions with the Integrated Trends Analysis Team (ITAT) on water temperature trends and assessing the inclusion of multiple stressor-type information related to marine heat waves (MHWs) and dissolved oxygen on fisheries and SAV based on management needs expressed during the Rising Water Temperature STAC workshop. The CRWG is also planning to have discussions on how the workgroup can support other science recommendations from the Rising Water Temperature STAC Workshop report. The climate staffer has been a critical asset in supporting progress on the climate change indicator and cross-workgroup assessment efforts. However, we have heard that the CRC staffer program is being restructured under a new contract with CRC. **Given the success of the climate staffer position and the urgency in making progress on the climate resiliency goals, we would like to see an emphasis on continued support for the climate staffer position.**

The CRWG also plans to provide advisory support to the Water Quality GIT and Modeling Workgroup on BMP performance research related to climate change impacts in connection with the EPA's RFA (see question 2). It will be important to connect the BMP climate research projects with the needs of the jurisdictions to support future WIP development to meet the

water quality, habitat, and living resource goals of the Chesapeake Bay TMDL and Watershed Agreement under changing climate conditions.

The Monitoring Program Review captured a list of monitoring and assessment needs including those identified by the CRWG. However, it is outside the capacity and scope of the CRWG to implement monitoring programs. Therefore, the CRWG plans to evaluate the workgroup's role in supporting ocean acidification and blue carbon/carbon sequestration monitoring and assessment discussions in coordination with the Integrated Monitoring Workgroup.

Currently the workgroup maintains two current indicators (i.e., Average Air Temperature and Total Annual Precipitation); however, there is discussion about the development of other indicators that were previously prioritized by the Management Board (i.e., Bay water temperature change, stream temperature change, relative sea level rise, high temperature extremes, and flood-related indicators). Both indicator maintenance and development is resource and capacity intensive and there is a need to have consistent, long-term datasets and monitoring. Given this, the workgroup requests that the Management Board assist in **identifying data-providers and/or analysis support within your organizations that could potentially assist with the prioritized climate change indicators**.

5. WHAT STEPS ARE YOU TAKING, OR DO YOU RECOMMEND, TO ENSURE YOUR ACTIONS AND WORK WILL BE EQUITABLY DISTRIBUTED AND FOCUSED IN GEOGRAPHIC AREAS AND COMMUNITIES THAT HAVE BEEN UNDERSERVED IN THE PAST?

When refining and developing climate change indicators to track climate change impacts, the workgroup plans to consult the Diversity Workgroup to assess ways in which to incorporate social vulnerability and environmental justice-related information. Initial ideas were brainstormed during the CRWG's April 2022 meeting. John Wolf from the CBP GIS Team presented on potential options in incorporating climate and environmental justice data for cross-outcome geographic targeting based on input from the CRWG staff. Examples related to the prioritized climate change indicators included:

- Percent tree canopy cover by census block group in relation to underrepresented communities (e.g., people of color) and temperature anomalies (e.g. heat island effects).
- Wetland preservation in relation to marsh migration and vulnerable populations (e.g., age over 64, low-income areas) and building footprints.
- Coastal flooding related to flood hazards and underrepresented communities.