**Rising Watershed and Bay Water Temperatures—Ecological Implications and Management Responses: A Proactive Programmatic CBP STAC Workshop Proposal**
**REVISED DRAFT 1/28/2021**

## Submitted By

- Water Quality Goal Implementation Team and its Forestry and Urban Stormwater Workgroups
- Habitat Restoration Goal Implementation Team and its Stream Health, Wetlands and SAV Workgroups and Brook Trout Action Team
- Maintain Healthy Watersheds Goal Implementation Team
- Sustainable Fisheries Management Goal Implementation Team
- Scientific, Technical Assessment and Reporting Team and its Climate Resiliency and Status and Trends Workgroups
- Citizens Advisory Committee

## Workshop Steering Committee Members

1. Rebecca Hanmer, Co-Chair; U.S. EPA Retired; Chair, CBP Forestry Workgroup
2. Bill Dennison, Co-Chair; UMCES; Member, CBP STAC; and Co-Chair, CBP STAR Team
3. Matthew Ehrhart, Stroud Water Research Center; Member, CBP Citizens Advisory Committee
4. Julie Reichert-Nguyen, NOAA CBO; Coordinator, CBP Climate Resiliency Workgroup
5. Bruce Vogt, NOAA CBO; Coordinator, CBP Sustainable Fisheries Goal Implementation Team
6. Representative, The Nature Conservancy
7. Representative, Healthy Watersheds GIT/Brook Trout Action Team
8. Katherine Brownson, U.S. Forest Service
9. Scott Phillips, USGS; Co-Chair, CBP Scientific, Technical Assessment and Reporting Team
10. Rich Batiuk, U.S. EPA Retired; CoastWise Partners

## Workshop Objectives

Water temperature increases are occurring in Chesapeake Bay tidal waters and in streams and rivers across the Bay's watershed, and are expected to continue. Water temperature increases have significant ecological implications for Bay and watershed natural resources, and could undermine progress toward Chesapeake Bay Program (CBP) Partnership goals for fisheries management, habitat restoration, water quality improvements, and protecting healthy watersheds. There is a critical need for insights into what the CBP Partnership might do now–within the scope of its current goals, policies and programs–to actively prevent, mitigate or adapt to some of the adverse consequences. This STAC workshop is proposed to meet these needs through these primary objectives:

- Summarize major findings on the ecological impacts of rising water temperatures, including science-based linkages between causes and effects; and
- Develop recommendations on how to mitigate these impacts through existing management instruments, ranging from developing indicators, identifying best management practices, and adapting policies.

## Management Relevance and Targeted Management Outcomes

The impact of climate change on the restoration and protection of Chesapeake Bay and its watershed is being monitored, modeled and studied, and much new knowledge is being gained. This workshop will take advantage of available knowledge to determine how to better direct or redirect five of the Chesapeake Bay Program Partnership's major management instruments to help to prevent, mitigate or adapt to harmful effects from water temperature increases. These management instruments are: (1) development, public reporting and management application of a **Chesapeake Bay water temperature change indicator**; (2) identification of and better quantification of the benefits from **temperature-lowering best management practices (BMPs)** for targeted implementation in the states' **Phase III Watershed Implementation Plans** (WIPs); (3) changes to **habitat restoration strategies** to prevent,

mitigate or adapt to rising water temperatures; (4) adaptation of Partnership and states to proactively respond to **fisheries** impacts associated with projected increases in watershed and Bay tidal water temperatures; and (5) enhancing the **Partnership's Healthy Watersheds Assessment** to factor in whether watersheds may be more vulnerable or resilient to stream temperature changes in the absence of certain key landscape factors.

## Why a STAC Workshop and the Urgency

Previous STAC sponsored and other scientific efforts have documented that water temperatures are rising, and discussed their potential effects on the Bay and its watershed. For nearly four decades, the CBP Partnership has largely based its restoration and protection goals and decisions on assumptions of constant air and water temperature regimes. Further, the Partnership has focused on nitrogen, phosphorus and sediment pollutant load reductions as the means to restore water quality and aquatic ecological integrity, with limited consideration of temperature. Recently, the Partnership has placed emphasis on possible impacts of climate-related changes, such as how BMPs might function in light of changing precipitation patterns, but not increasing water temperatures. So there is a critical need for a STAC workshop on better understanding the potential effects of rising water temperatures, and developing options to mitigate these effects.

A STAC workshop provides the ideal forum for: (1) updating information on the potential effects of rising temperatures; (2) improving understanding of the science-based linkages between causes and effects; and (3) using the enhanced scientific and technical foundations for recommending changes in Partnership priorities, policies, and management decision support systems and tools. The findings and recommendations from a STAC workshop provide needed credibility for the Partnership to fully factor increasing water temperatures into its decision-making for achieving the Partnership's shared fisheries, habitat, water quality and healthy watersheds goals. To influence the states' implementation of the Phase III WIPs through 2025, stronger linkages between rising water temperatures and decisions about placement of BMPs must be forged now to change decision-making in 2023-2025 and beyond.

## Workshop Preparation and Planning

We propose addressing the workshop outcomes in three sequential phases, leading to production of a final workshop report with recommendations in STAC's requested 'SPURR' format.

**Phase 1** This workshop preparation phase will begin with in-depth compilations of the CBP partners' and stakeholders' current understanding about Bay watershed and tidal water temperature increases, their ecological implications, any recognized temperature change thresholds, and current understanding of actions being taken to actively prevent, mitigate or adapt to rising water temperatures. The workshop's sponsoring committees, goal implementation teams, and workgroups will also be challenged to initiate work on identifying a range of possible actionable recommendations to be considered and discussed at the workshops. A series of short pre-workshop summary presentations will be prepared by subject matter experts and posted as YouTube videos addressing background themes focused on the five management instruments. Workshop participants will be asked to watch the YouTube presentations prior to the workshop to significantly reduce the meeting time devoted to background presentations.

**Phase 2** The first workshop will be a one full-day meeting. Concurrent tracks will address the ecological impacts and management implications of rising water temperatures on the watershed and tidal waters, respectively. This first workshop will focus on building a more complete picture of interrelationships between the causes of increasing water temperature, the resultant ecological impacts, the range of management implications, and the relative scales of these cause and effects.

**Phase 3** The third phase will start with the Steering Committee working from a synthesis of the first workshop to refine findings on the interrelationships and develop recommendations for more effective use of the Partnership's management instruments. The second workshop, one full-day, will focus on in-depth discussions to build consensus on the first workshop's findings and the action recommendations. Having the synthesis of the first workshop already in hand will help ensure the final workshop report is completed by the Steering Committee within 90 days of the second workshop.

## Questions to Answer

- What type of indicators and data considerations—spatial (e.g., location in the water column) and temporal (e.g., seasonal versus annual)—are needed to assess watershed and tidal Bay water temperature change that will be useful in informing fisheries management and habitat restoration decisions?
- How could available monitoring and modeling data be used to develop such indicators and what are the data and information gaps?
- What characteristics of BMPs will likely help in mitigating (or conversely, exacerbate) rising water temperatures?
- How should priorities for BMP implementation be changed based on increasing water temperature considerations?
- What watershed and Bay species and habitats are most likely to be endangered by climate-induced water temperature changes?
- What modifications in habitat restoration and fisheries management programs seem necessary in light of current and projected watershed and Bay water temperature increases?
- What are the characteristics that make healthy watersheds either more vulnerable or more resilient to increasing water temperatures?

## Expected Outcomes

The end-product of this three-phased approach will provide: (1) recommendations for specific management actions tailored to the Partnership's Sustainable Fisheries, Habitat, Water Quality, and Healthy Watersheds Goal Implementation Teams and their workgroups, the Scientific, Technical Assessment and Report Team and its workgroups, the Scientific and Technical Advisory Committee, and, ultimately, the Management Board, Principals' Staff Committee and the jurisdictions; (2) specific recommendations for more rigorous scientific applications to better understand the impacts of elevated water temperature and further develop management actions in the future which can be taken to prevent, mitigate or adapt to its ecological consequences; and 3) an appendix to the final workshop report presenting the synthesis of the information compiled during preparation for the workshops.

## Logistics

We propose to conduct the first workshop in January 2022 to allow time to conduct the necessary pre-workshop compilation and synthesis. To enable the Steering Committee to carry out its consideration of the outcomes from the first workshop, the second workshop will be scheduled in April 2022.

## Budget

The total cost is projected to be $10,000. The components are venue: $1500; food: $2,500; travel/lodging for selected participants: $3,000; and contractual assistance with pre-workshop compilation and synthesis of existing scientific findings, technical data and supporting information: $3,000.