Proposal for a Proactive STAC Workshop on:
An Analytical Framework for Aligning Chesapeake Bay Program (CBP) Monitoring Efforts to Support Climate Change Impact and Trend Analyses and Adaptive Management

Submitted by:
Carl Hershner (STAC member); Zoë Johnson (CBP Climate Change Coordinator/NOAA Chesapeake Bay Office)

Potential Steering Committee Members
Carl Hershner (Steering Committee Chair):* Director of Center for Coastal Resource Management (VIMS) with expertise in tidal and nontidal wetlands ecology, landscape ecology and resource management/policy issues
Susan Julius (STAC member): EPA senior scientist with expertise in conducting climate change vulnerability, risk, and adaptation assessments for aquatic and urban systems
Kirk Havens (STAC member)*: Coastal ecologist, with expertise in adaptive management
Denise Wardrop (STAC member)*: Director of the Sustainability Institute at Penn State College
Zoe Johnson*: CBP Climate Change Coordinator with extensive expertise in climate adaptation planning at federal, state, regional and local levels
Britta Bierwagon*: Acting Group Chief, Exposure Analysis and Risk Characterization Group at US Environmental Protection Agency
*Mark Bennett**: CBP Climate Workgroup co-chair and Director of the USGS VA/WV Water Science Center, which conducts research related to water resources
Peter Tango*: CBP Scientific, Technical Assessment & Reporting Team Coordinator, with broad expertise in CBP monitoring networks

*Consent to Participate Provided

Description of the Workshop
A small workshop series, comprised of three one-day sessions (SAV, Oysters and Blue Crab), to be held between March and May, 2017 (dates flexible), is proposed for the purposes of developing recommendations to guide adjustments of CBP monitoring plans and efforts in order better anticipate, assess and ultimately plan to address the factor of risk that climate change may have on the Partnership's ability to attain Chesapeake Bay Agreement Goals and Outcomes.

Justification for Proposed Topics and Management Implications
Background: The Chesapeake Bay Watershed has experienced changes in climate over the last century. On the whole, the Watershed is experiencing stronger and more frequent storms, an increase in heavy precipitation events, increasing bay water temperatures and a documented rise in sea level; trends that are expected to continue over the next century. These trends, which vary both spatially and temporally throughout the Watershed, are altering the ecosystems, the watershed, and the human communities of the Chesapeake Bay and will require changes in policies, programs and projects to successfully achieve restoration, sustainability, and conservation and protection goals for the Chesapeake Bay watershed.

The 2014 Chesapeake Bay Watershed Agreement commits to a goal to "Increase the resiliency of the Chesapeake Bay watershed, including its living resources, habitats, public infrastructure and communities, to withstand adverse impacts from changing environmental and climate conditions." The Climate Resiliency Workgroup is currently working with individual GITS and workgroups to: 1) prioritize which aspects of climate change may have the most impact on

achieving goals and outcomes; 2) establish a research agenda for those outcomes where the effect of climate is not well understood; 3) assess whether suitable monitoring exists within the Chesapeake Bay to establish baselines; and 4) evaluate progress towards reducing the impact of climate change over time.

The Climate Resiliency Management Strategy identified two major factors influencing the Partnership's ability to attain the two Climate Resiliency Outcomes: complexity of the monitoring program and the impact of non-climate related and multiple stressors. This workshop proposal grows out of the need for a long term vision for the management of a complex system in the context of climate change. This is a system for which there is no current strategy for monitoring long term trends and impacts of climate change, independent of other non-climate related stressors; or for how to assess the influence of climate change on the effectiveness of individual management strategies.

Justification: To assist the Climate Resiliency Workgroup with address the factors above, STAC input is being requested to design and facilitate a series of small (15-20 participants) workshop sessions (SAV, Oysters and Blue Crab) to develop a monitoring and assessment plan that builds from the workgroup's current understanding of the potential impacts of climate change on their management strategies. The overarching idea is to work with each workgroup to develop a plan to learn and adapt as we begin to implement strategies that are based on current understanding of climate science and ecological response.

Workshop Design: Preliminary work by the steering committee and the relevant workgroup will be conducted prior to each workshop session. The Steering Committee will assist the workgroup in examining the current management strategy and articulating exactly how they believe climate change will impact their ability to achieve the identified outcome. To provide structure and to enable the follow-on workshop, this exploration will be constrained to the consequences of potential change in the following set of climate/ecosystem parameters: temperature (increase in both mean and extremes); precipitation (total may change, seasonal patterns may change, possibly more extreme events); CO2 increase; and rising sea level.

Management Implications: Each workgroup (with assistance) will be led to identify the potential changes in the system and they should be required to identify the rate/pattern of each response. This reflects their current understanding of how climate will interact with their management strategy. This background material will be provided to workshop participants in advance of each workshop. Workshop participants will be provided guidance on how to review the material and should come to the workshop prepared to discuss what monitoring information and analyses of that information would be necessary to evaluate the accuracy of the workgroup's forecasts of the interaction between climate and each management strategy. The programmatic need is to prepare for iterative assessments of management efficacy with enough information to decide if a strategy should be continued, stopped, or modified. The results of the workshop series will be informative for STAR, and the Habitat and Sustainable Fisheries GIT, and inform future collaborations with other Goal Teams and workgroups.

Research Questions: Using the SAV, Oyster and Blue Crab Workgroups as case studies, the workshop series will provide opportunities for the various climate change PIs and STAC to understand the following: how is the CBP making resource management decisions in the context of climate change; are we currently able to assess a climate signal from within the current set of

observations being collected, documented and analyzed; how do we anticipate climate change may affect the attainment of desired goals and outcomes; and based on current understanding of the science, how should we continue, stop or modify a given management approach?

Detailed description of workshop product and identified delivery date
The expected workshop product is the development of a monitoring plan and a plan for analysis of that monitoring data at some specified point in the future (ideally not more than a few years out). The results of the foregoing are 4 specific products for each workgroup:
1. conceptual model of climate impacts on the workgroup's targeted outcomes;
2. recommended plan for collection and analysis of monitoring data over the subsequent period of management strategy implementation;
3. identification of gaps in monitoring network important for assessing long-terms impacts or ecological response and adaptive management; and
4. documentation of workshop deliberations, including any commentary on the conceptual model developed in discussions during the workshop.

Three small, one-day workshop sessions will be conducted. Draft workshop deliverables will be prepared by the steering committee for review and comment by workshop participants within 60 days of the final workgroup session and a final workshop report will be completed within 90 days of the final session. Workshop deliverables will be packaged in one-set but include 4-tailored products (conceptual model, recommended plan, identification of monitoring gaps, and documentation of workshop deliberations) for each workgroup, as listed above. Pending approval by the management committees of the STAR and the Management Board, it is envisioned that workshop deliverables could be used as a template for replication of the process with other workgroups.

List of anticipated speakers and attendees
Workshop attendees will include steering committee members in addition to select SAV, Blue Crab and Oyster workgroup members. Each workshop will be limited to 15-20 participants. We do not currently envision presentations at the workshop. Workshop objectives and approach will be detailed in advance materials and will serve as essential starting point. The format for each workshop is intended to be a structured/facilitated discussion among the assembled experts.

Logistics
The workshop will be conducted as a three-part series of small focal area (i.e., SAV, Blue Crab and Oyster) one-day sessions to be held between March and May, 2017 (dates flexible). Workshop participation will be invitation only, with a limit of 15-20 participants per workshop. A portion of the budget will be dedicated to cover travel expenses for key participants. The location of the one-day workshop sessions will be in proximity to Annapolis, MD.

Budget - Venue: $3,000; Catering: $2,000; Travel for invited participants: $2,500
Total Requested from STAC: $7,500

History of previous STAC-funded Climate Resiliency Workgroup workshops
The Development of Standardized Climate Projections for Use in Chesapeake Bay Program Assessments (March 2016)

Submerged Aquatic Vegetation Workgroup
Chesapeake Bay Program
410 Severn Ave. Suite 112
Annapolis, MD 21403
www.chesapeakebay.net

January 25, 2016

Dear STAC Leadership,

As Chair of the Submerged Aquatic Vegetation (SAV) Workgroup, which is part of the Vital Habitats Goal Implementation Team (GIT), I am contacting you to express my support for the proposed workshop titled "An Analytical Framework for Aligning Chesapeake Bay Program Monitoring Efforts to Support Climate Impact and Trend Analyses and Adaptive Management." The products of this workshop would be highly beneficial to the SAV Workgroup and would help facilitate achievement of the Chesapeake Bay Agreement's Vital Habitat Goal and SAV Outcome.

Part of the SAV Workgroup's Two-Year Work Plan is to "Advance knowledge regarding the effects of human induced stressors on SAV, including those of Climate Change" (Approach 4, Action 10), and to "Evaluate and enhance current statutes and regulations that protect existing SAV in the Chesapeake Bay" (Approach 2, Action 3). The proposed workshop will promote and contribute to each of these actions. We know that each of the four parameters identified in the workshop proposal (temperature, precipitation, CO_2, and rising sea level) will affect SAV globally. This workshop will provide a framework in which to explore the information and data already synthesized, and that which needs to be collected, to fully understand and prepare for the impacts of climate change on SAV in the Chesapeake Bay. It will produce strategies to monitor, plan for, and manage SAV in light of those changes to ensure attainment of the habitat's goal and outcome regardless of climate change impacts.

Submerged aquatic vegetation is a vital habitat in the Chesapeake Bay, aligning closely with the goals of the Sustainable Fisheries GIT. Assessing Blue Crabs and Oysters along with SAV is logical and will provide for a robust and interesting workshop. As such, I look forward to working with the Climate Change Coordinator on planning and producing a workshop that will promote integrative thinking and contribute to the restoration of the Chesapeake Bay.

I appreciate your consideration of this proposal.

Sincerely,

J. Brooke Landry
Chair, Submerged Aquatic Vegetation Workgroup

Sustainable Fisheries Goal Implementation Team
Chesapeake Bay Program
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Annapolis, MD 21403
http://www.chesapeakebay.net/groups/group/sustainable_fisheries

January 25, 2016

Dear STAC Leadership,

As Chair of the Sustainable Fisheries Goal Implantation Team (GIT), I am writing to endorse the proposed workshop titled "An Analytical Framework for Aligning Chesapeake Bay Program Monitoring Efforts to Support Climate Impact and Trend Analyses and Adaptive Management." The proposed workshop outcomes and products would be very beneficial to the Sustainable Fisheries GIT and would specifically support achieving the blue crab and oyster restoration Agreement outcomes.

The workshop proposal requests a series of small workshops with the SAV, Blue Crab and Oyster workgroups. Each of the four climate/ecosystem parameters identified by the workshop proposal align with the climate change impacts identified as "factors influencing" in the blue crab and oyster management strategies. Changing temperature and precipitation as well as sea level rise may impact blue crab mortality rates, habitat availability and predator-prey relationships. Increases in carbon dioxide concentrations could affect the acidification in the Bay, which could result in reduced natural shell production by oysters.

While the SAV outcome is under the purview of the Vital Habitats GIT, SAV provides critical habitat to many fish and shellfish species, specifically providing refuge habitat for juvenile blue crabs. Better anticipating how climate change will affect vital SAV habitat will help fishery managers understand blue crab habitat availability in the future.

The proposed workshop products will provide fishery and habitat managers with recommendations on monitoring these potential climate impacts and analyzing how these impacts could affect achieving these specific outcomes. Such indivudalized workshops on specific outcomes will provide focused discussion for the natural resource managers. In addition, these specific workshops will contribute to development of a conceptual model that can be applied to other Agreement outcomes and improve the partnership's ability to monitor and incorporate climate change into their decision-making.

I recognize the need to synthesize the results of this workshop in a timely manner, and I will support the Steering Committee's efforts to complete the workshop report within STAC's requirements.
I appreciate your consideration of this proposal and hope to collaborate with this workshop team moving forward.

Sincerely,

Peyton Robertson
Chair, Sustainable Fisheries Goal Implementation Team