Climate Resiliency Workgroup
November 21, 2022
1:00-4:00 PM EST

Event webpage:
https://www.chesapeakebay.net/what/event/climate-resiliency-workgroup-meeting-november-2022

This meeting will be recorded for internal use to assure the accuracy of meeting notes.

Minutes

Action Items:

- Strategy Review System: As per Management Board Request, CRWG Staff will refine the language for the indicator data call and provide it to Denice Wardrop and Meg Cole, with STAC, for distribution.
- Science Needs: Coordinate with the STAC Rising Water Temperature Workshop Watershed Leads to refine the science needs identified during the workshop
- Science Needs: CRWG Staff will send list of science needs, including ongoing needs and those identified during recent workgroup efforts and during the November 2022 meeting, to the workgroup for further input and comments

1:00 PM **Welcome, Opening Remarks, and Announcements – Mark Bennett, Co-Chair (USGS), Jackie Specht, Co-Chair (The Nature Conservancy) & Julie Reichert-Nguyen, Coordinator (NOAA) [10 minutes]**

Focus of meeting:

- *Strategy Review System (SRS) and workplan development*
  - *Discuss next steps in the current SRS cycle*
  - *Review external factors that may impact workplan development*
  - *Review workplan actions that will carry over to the new workplan*
- *Review current science needs in the STAR Science Needs Database and identify new science needs*

Opportunities:

- *Restore America's Estuaries Summit, December 4-8 – Who is going? Great opportunity to meet up.*

- *Job Announcement: The MD/DC Chapter of The Nature Conservancy is hiring a Climate Adaptation Manager. The Climate Adaptation Manager will advance coastal adaptation and climate resilience by guiding policy and adaptation initiatives. Apply at nature.org/careers, searching for #52445. Please share with your networks.*

Summary

Julie welcomed the workgroup and briefly discussed the focus of the November meeting. She mentioned that this meeting will review where the workgroup is at in the Strategy Review System process and what the next steps are in the cycle. This includes workplan development and the external factors that may impact the next two-year workplan. She mentioned that there were a number of actions that carried over from the last workplan as she started putting together the draft workplan. Julie then discussed how the latter half of the meeting will focus on reviewing the existing science needs in the CBP Science Needs Database managed by the Scientific, Technical, Assessment, and Reporting (STAR) team and the science needs that have been identified during workgroup efforts over the past two years, as well as identifying additional science needs that have not been mentioned.

Julie then highlighted two announcements. The first was the Restore America's Estuaries conference, taking place the week of December 4th, 2022 in New Orleans. The conference will also have virtual programming. Julie will be presenting virtually and Jackie Specht will be attending in person. Lori Staver from MD Sea Grant will be presenting a poster and Elliot Campbell from MD DNR will be presenting on the state's blue carbon monitoring work. Julie mentioned that there are some folks from NOAA's Chesapeake Bay Office attending as well. The second announcement highlighted two job opportunities. The first is a Climate Adaptation Manager with the MD/DC Chapter of The Nature Conservancy and the second is Coastal Program Manager with Audubon.

1:10 PM **Strategy Review System Cycle Update and Next Steps (Julie Reichert-Nguyen and Mark Bennett) [15 minutes]**

- *This agenda item focuses on debriefing the workgroup about the Management Board's Quarterly Progress Meeting, where the workgroup presented on the progress made towards the workgroup's Monitoring and Assessment and Adaptation Outcomes over the past two years, successes and challenges, and what is on the horizon for the next two years. Additionally, Julie and Mark will provide insight into the next steps and deadlines in the SRS process, including workplan development and external factors that might influence this development.*

Summary

This agenda item focused on the decisions that came out of the Management Board's November Quarterly Progress Meeting (QPM). At this meeting, Mark and Julie presented on the Strategy Review System (SRS) materials that were discussed during the CRWG August and September meetings for the Monitoring and Assessment and Adaptation Outcomes. During the

QPM, the Management Board discussed the workgroup requests that were presented in the SRS materials.

The first request was to raise awareness to the Management Board. This request stated that "the dedicated climate staffer position has been a critical asset in supporting progress on climate resilience activities, allowing the workgroup to better function in assessing climate change impacts and engage in cross-workgroup efforts in support of adaptation projects. The Management Board's decision to this request was to acknowledge that they are not committing to take specific action and to express gratitude for the work and information.

The second request was also to raise awareness to the Management Board and stated that if any member of the Management Board is contacted regarding any CRWG Marsh Adaptation Project requests to "encourage your organization to participate in the stakeholder outreach activities (e.g., interviews, listening sessions, workshops, etc.; outreach tentatively planned from January-April 2023). The Management Board's decision to this request was to acknowledge that they are not committing to take specific action and to express gratitude for the work and information.

The third request asked the Management Board to "define accountable parties for actions identified under the Climate Change Directive- this is a partnership-wide plan that requires high-level coordination beyond the scope of the CRWG." Mark added that the Climate Change directive workplan has nine associated actions, and while some of these actions have accountable parties already identified, other actions do not and there is no overall coordination for the workplan itself. Additionally, what the Management Board ultimately decides has the ability to impact the CRWG workplan that is currently being developed. The Management Board decided to handle this request; however they determined that they did not have enough information to take a specific action during this meeting and requested more information regarding the potential options for coordinating the Climate Change Directive workplan. This information will be discussed at the December Management Board meeting.

The fourth and last request to the Management Board asked if they could assist in "identifying potential data-providers and/or analysts within their organizations that could potentially assist with prioritized climate change indicators by March 2023 for the CRWG to meet with to see what is feasible support-wise." These prioritized indicators include flooding as it relates to community resilience, high temperature extremes related to urban tree canopy, Bay water temperature change related to living resources, stream temperature related to brook trout habitat, and relative sea level rise related to wetland loss and gains. The Management Board decided to refer this request to STAC, who will broadcast the indicator topics and other science needs to partner institutions. Additionally, they requested that the CRWG staff refine the language for the data call and provide it to Denice Wardrop and Meg Cole, with STAC, for distribution.

<u>Discussion</u>

Taylor Woods commented that within the USGS, they are trying to develop models to assess fish habitat response to climate change in inland waters in the Chesapeake Bay. This research addresses identifying key indicators (e.g., species, traits, habitats) that are resilient or vulnerable to climate and land-use change. Julie responded by mentioning the ongoing work with the Healthy Watersheds Goal Implementation Team (GIT) around a stream temperature indicator and brook trout habitat. She invited Taylor to join those discussions as the workgroup develops their new workplan.

1:25 PM **Review of Executive Council Climate Directive Workplan (Julie Reichert-Nguyen) [15 minutes]**

- *The Executive Council workplan is the result of the Climate Directive No. 21-1. Through this directive the CBP commits to address the threats of climate change in all aspects of the partnership's work to restore the Bay and its watershed. This agenda item focuses on where the actions identified in the EC Climate Directive workplan align with the Climate Resilience Workgroup scope of work and outcome priorities.*

Summary

This agenda item focuses on the actions within the EC Climate Change Directive workplan that have identified the CRWG as a responsible party. Julie started this discussion by stating that she wanted to present on these EC Climate Change Directive workplan actions as they have the ability to influence the CRWG's next two-year workplan. Julie then gave some context about the directive, titled *Collective Action for Climate Change*, which was signed in October 2021. After this directive was signed, a group at the Chesapeake Bay Program developed an associated workplan to carry out the primary objectives of the directive. The group reached out to many of the workgroup at the bay program to see what current efforts can be built upon. The workplan includes actions that are currently underway at the Bay Program as well as newly identified actions.

The first action in the workplan is to implementing a Climate Directive Pilot Project. This action will fall on the jurisdictions to develop an on-the-ground, nature-based implementation project that meets the intent of the Climate Directive. These projects should focus on forest buffers, tree canopy, and wetland outcomes.

The second action is to implement the CBP Monitoring Report to the Principal Staff Committee (PSC). The report developed through STAR summarized monitoring needs across the Bay Program's outcomes. This action focuses on what next steps need to be taken to implement the climate monitoring needs identified in the report. Breck Sullivan mentioned that this action will be assigned to the Monitoring Team under STAR. She mentioned that the Monitoring Team will likely be reaching out to the CRWG, but she plans on building off the work that the CRWG has already done in identifying the monitoring needs for the report.

The CRWG, along with the Water Quality GIT and Modeling Workgroup, was assigned to the third action, which states to "improve understanding of Best Management Practice (BMP) responses to climate change conditions." This action requests the organization of cross-

workgroup meetings to discuss the findings of Virginia Tech BMP Climate Uncertainty Report. Julie mentioned that currently the EPA is developing a Request for Applications to help support this work, and the CRWG will be coordinating with them as they develop this request.

The fourth action states to "create a Bay-wide plan for tidal wetland restoration, marsh migration, and coastal resiliency." Under this action, the Management Board will identify funding to create this comprehensive plan. This action is currently not assigned to a group, however the CRWG's GIT-Funded Marsh Adaptation project was identified as an effort supporting this action in the workplan. Julie mentioned that the workgroup will be working closely with the team or group that is assigned this action.

The fifth action states to "refine and prioritize climate science needs and develop a resource plan." Currently, the Strategic Science and Research Framework coordinated by STAR helps identify science needs. This action aims to have the Management Board host special sessions aimed understanding the climate science needs of each outcome, updating the engaged resources that support those needs, and identifying priority climate science needs. This action will likely be supported by STAR but also incorporates what the CRWG and other groups responsible for Bay Program outcomes do through the SRS process. Breck Sullivan added that STAR needs support from the Management Board to help identify which climate science needs across the Bay Program's outcomes need additional resources. She mentioned that currently STAR does not have the capacity to move forward with the development of a resource plan as outlined in this action.

Action six states to "improve coordination on national funding for climate." This action is likely being assigned to the Budget and Finance Workgroup. The goal of this action will be to convene funders, grant writing partners, and potential funding recipients to exchange lessons, improve understanding of national funding programs, and understanding the challenges in accessing these opportunities.

The seventh action states to "complete climate change-related activities crosswalk and promote biennial reporting of climate efforts to the Climate Resiliency Workgroup." This action falls to the CRWG to help carry out and is an already addressed during the group's SRS process. In the CRWG's management strategy there is a section for partners and jurisdictions to report their climate change-related efforts and activities. Julie mentioned that there has been some turnover in workgroup membership and there is a need to identify new jurisdictional representatives to assist with this.

The eighth action states to "advance conservation finance priorities," which will be led by GIT 6 and the Budget and Finance Workgroup. This action asks that these teams work with the jurisdictions and other Bay Program GITs to showcase lessons learned from the March 2020 Finance and Investment Forum.

Finally, the last action states to "establish a learning and capacity building network." This will be building off of efforts led by the CRWG and the Education Workgroup. This will be led mainly by

the Stewardship GIT, but the Management Board has yet to identify who within the GIT will be directly involved with coordinating the effort.

Discussion

Nicole Carlozo commented on the first action regarding the pilot project, mentioning that there might be a lot of overlap with what state partners are pursuing for federal infrastructure funding. She wanted to note that there may be connections and there may be projects already underway that can align with this action. Julie mentioned that in December there will be a discussion regarding who will be charged with coordinating this entire workplan, and for this action it would be helpful to have a point person for the jurisdictions to coordinate with.

Julie mentioned that this is an updated workplan to the one that was presented at the July CRWG meeting. The order of the actions was updated to reflect priority. This current draft has yet to be posted to the Management Board's page but can be found at the November CRWG page.

1:40 PM **Review of Current Workplan Actions set to continue in the New Workplan (Julie Reichert-Nguyen) [40 minutes]**

- *Julie will review existing commitments that are carrying over into the workgroup's new two-year workplan. The January meeting will focus on identifying any new actions where there is capacity within the workgroup to carry out in the next 2 years.*

Summary and Discussion

Before reviewing the draft workplan for the next two years, Julie briefed the workgroup on the timeline and upcoming deadlines in the SRS process. The workgroup recently presented at the Management Board's November Quarterly Progress Meeting, which focused on progress made towards the outcomes, successes, and challenges, and the requests to the Management Board. Currently, the workgroup is focusing on workplan development and updating the climate science needs. In December, the workgroup leadership will be disseminating a survey to better understand workgroup interests and membership involvement, as well as to compile updates on climate resilience activities conducted by partner organizations. Julie mentioned that the STAR Science Needs Meeting will take place on December 15th, 2022, which will build off of the discussions in the latter half of this meeting. Julie invited any interested folks to attend the STAR meeting. Julie also mentioned that since the workgroup is focusing on workplan development and science needs updates, the December CRWG meeting is canceled. Additionally, the January CRWG has been moved to January 18th, 2022 from 1:30-3:30 PM, since its original date conflicted with a federal holiday.

Julie began the draft workplan working session by discussing that this draft contains the carry-over items from the last two-year workplan as well as newly identified items from the CRWG August and September meetings that were presented to the Management Board, and placeholder items for potential requests that might develop from the most recent round of

Goal Implementation Team Funding. Lastly, the draft contains identified actions that were just presented while reviewing the Executive Council Climate Change Directive Workplan. Due to the number of actions included in the draft workplan, the actions will be categorized as primary or secondary actions. In the draft, the primary actions are denoted in blue, while the secondary actions are denoted in white.

Julie first reviewed the actions that would work towards the Monitoring and Assessment Outcome. The first management approach for this outcome states to "assess past and future trends of climate change in the Chesapeake Bay and watershed in connection with the goals in the Chesapeake Bay Watershed Agreement." Two actions fall within the scope of this approach; both actions are carryover actions and categorized as primary actions. The first states that the CRWG will coordinate updates for prioritized climate change indicators on Chesapeake Progress, and the second action focuses on coordinating the development of prioritized climate change indicators in connection with clear management objectives with corresponding workgroups and natural resource outcomes. Sub-actions for the first action focus on updating current indicators and web text on Chesapeake progress. Sub-actions for the second action include development of a Bay Water Temperature indicator. Rachel Lamb asked if there is a place here for connections to ocean acidification-related monitoring and research related to impacts on resources. She mentioned that there is ongoing work right now around this topic with UMCES, MDE, and MD DNR. Julie responded that there is a placeholder action later in the draft for the workgroup to have a discussion on how it can best support ocean acidification monitoring work. Breck Sullivan also commented that the Integrated Trends and Analysis Team (ITAT) is interested in working with the CRWG on the development of a Bay Water Temperature indicator. Julie mentioned that it is something that the CRWG is looking to coordinate with ITAT on once SRS is complete.

The second management approach that fall under the Monitoring and Assessment Outcome states to "fill critical data and research gaps and improve understanding of climate change impacts and implications for selected outcomes in the Chesapeake Bay Watershed Agreement." The first action beneath this management approach was a carryover item from the last workplan and is categorized as a primary action; it focuses on increasing capacity to better understand sea level rise effects on coastal marsh habitats and their ecosystem services. Sub-actions include reviewing the recommendations from the GIT-Funded Marsh Migration Data Synthesis project to inform wetland restoration and adaptation efforts and exploring partnerships and methods to quantify current and project coastal wetland losses as a result of sea level rise. The next action is a placeholder item and states that the CRWG will coordinate with the Modeling Workgroup and Water Quality GIT to support the application of TMDL climate change projects. The last action beneath this management approach states to "improve understanding of best management practices (BMP) responses to climate change conditions. This action is a primary action and focuses on having the workgroup provide advisory support for the EPA's Request for Applications related to climate resilience research.

The first management approach that falls under the Adaptation Outcome states "improve knowledge and capacity to implement and track priority adaptation actions in connection with

the goals in the Chesapeake Bay Watershed Agreement." The first action beneath this approach is a primary carryover item, which aims to support efforts to identify approaches to track climate resilience activities and define resilience enhancements. This action has been narrowed in scope from the previous workplan to assist with feasibility. Sub-actions were identified based on conversations with the workgroup during previous meetings; they include holding discussions during CRWG meetings aimed at determining a means of tracking progress towards the Adaptation outcome, inviting researchers to present on how they quantify resilience, and supporting the EPA ORD ROAR project focusing on developing a way to assess climate vulnerability and natural infrastructure resilience effectiveness, which is a placeholder item. The second action under this approach states to "assist with capacity-building activities that support the implementation pairing, and design of natural infrastructure projects that enhance the resiliency of the bay and aquatic ecosystems from coastal climate change impacts." This primary action's sub-actions focus on supporting the current GIT-Funded Marsh Adaptation project, building upon efforts from that project to assist practitioners with siting and/or designing natural infrastructure projects, and providing advisory support and summarizing lessons learned regarding the grant application process for the projects identified through the GIT-Funded effort. To help achieve these sub-actions, the workgroup will likely need to pursue additional GIT-funding. These actions also align with the action in the EC Climate Change Directive Workplan.

Rachel Lamb commented that there is an opportunity to align this work with the implementation of Maryland's Conservation Finance Act, which prioritizes blue/green financing. There is an interest in developing a common application with key metrics that help guide ongoing investment, outcome tracking and co-benefit tracking. She mentioned that there are some independent commissions within the state of Maryland working on these things, but she would be interested to see how this aligns with workgroup efforts. Julie mentioned that it would be interested to discuss the approaches that these groups are taking since tracking progress on the outcomes is complex. She added that in discussions with the workgroup chairs, there has been interest in hosting themed meetings that bring in groups that are working in this space to share how they are quantifying resilience effectiveness.

The second management approach that supports the Adaptation Outcome states to "undertake public and stakeholder engagement to increase understanding of climate change impacts to inform and support adaptation." The only action under this approach was carried over from the last plan and is marked as primary and states to "coordinate with the CBP Strategic Engagement Team to help connect the CRWG science support activities with community resilience needs." The first sub-action focuses on inviting representatives from the Local Government Advisory Committee to present on the recommendations that emerged from the Local Government Forum: Integrating Resilience into Local Planning. The second sub-action focuses on reviewing the recommendations from the FY20 GIT-funded project, "Chesapeake Bay Program Social Science Assessment and Integration Road Map Development" to determine follow-up actions on how the workgroup can incorporate social science into their efforts.

Hailey McGleam inquired as to whether there have been any connections made between social media coordinators and the workgroup actions to communicate the efforts to a greater audience and connect these resilience efforts to the communities. Julie responded that our workgroup is primarily functioning as a science support group, but we plan on collaborating with the Strategic Engagement Team because they spearhead the social media efforts of the Bay Program. Kristin Saunders mentioned that we could pass the request about implementing a more intentional social media effort on to the Marisa Baldine and Rachel Felver with the Strategic Engagement Team.

The last third management approach addresses institutional capacity of the Chesapeake Bay Program to prepare for and respond to climate change. The first action for this approach is a placeholder for any actions that might arise from cross-GIT climate change projects. Julie highlighted potential sub-actions pertaining to collaboration with the Forestry Workgroup on their climate adaptation-related GIT-Funded project and collaboration with the Stream Health Workgroup on their climate resilience-related GIT-Funded project. The following actions under this approach are administrative in nature. This includes utilizing the SRS process to conduct a biennial review to assess workgroup priorities; within this action, the draft workplan includes the development of a workgroup charter that describes the workgroup's role, membership contributions, participation benefits, and operating principles. Also within this action are updating workgroup management strategies and workplan through the SRS process and documenting high priority science needs. And the last sub-actions are related to how the workgroup can support the science recommendations from the STAC Rising Water Temperature workshop and evaluating the workgroup's role in supporting ocean acidification and blue carbon sequestration monitoring. The last two actions focus on the workgroup membership and meeting and preparing for new federal and state climate initiatives. Julie ended the session by mentioning that there will be more in-depth conversations at the January meeting about workplan actions.

2:20 PM **BREAK [10 minutes]**

2:30 PM **Review of Current Science Needs (Jamileh Soueidan) [20 minutes]**

- *This portion of the meeting will focus on reviewing the current science needs that are listed in the CBP Science Needs Database as well as science needs that have been recently identified through workgroup efforts (e.g., the STAC Rising Water Temperature Workshop, the Joint CRWG and USWG meeting, etc.).*

Summary and Discussion

Jamileh presented a review of the current science needs in the CBP Science Needs Database as well as science needs that were identified through workgroup efforts over the past two years. The presentation provided information for the breakout session that occurred later during the meeting.

Jamileh started with a review of the current science needs, which are group together based on theme. The first needs she presented were the carbon-related science needs. They included a completed need, which was to evaluate the science need necessary to implement blue carbon financing strategies. The second carbon-related need focused on the quantification of carbon sequestration from tidal wetlands and submerged aquatic vegetation (SAV) and the potential application of conservation and restoration efforts of these resources in the carbon market. This need was marked as a high priority need. Additionally, when reviewing this need, CRWG leadership made a note to re-evaluate to include other nature-based practices and how to go about quantifying progress towards reducing carbon in the atmosphere. Rachel Lamb commented that for this second need, the workgroup should consider methods and next steps recently adopted by the State of Maryland in their Greenhouse Gas Inventory, which include tidal wetlands and SAV. They are using this inventory as part of the implementation of the Conservation Finance Act, which requires quantification, verification, and registration of outcomes. Jackie Specht commented that The Nature Conservancy was planning to initiate a contract in collaboration with MD DNR to assess the potential of a blue carbon and resilience credit market in MD. Peter Tango also commented that there is evolving research by some Chesapeake Bay Program researchers assessing blue carbon stocks using satellite-based assessments of SAV, and he can connect the workgroup with Dick Zimmerman at Old Dominion University to coordinate this effort.

The second group of science needs currently in the database relate to habitat and living resources. The first of these needs is to understand the impacts of a changing climate on SAV, which was supported by the STAR FY20 GIT-funded project titled “Modeling Climate Impacts on SAV in the Chesapeake Bay.” The second need relates to climate change’s impact to key aquatic fish species abundance, life cycle, and habitat. This need was supported through a number of engaged resources including a FY20 GIT-funded project focused on forage indicator development, and an oyster vulnerability assessment conducted by VIMS. The last need in this group, which was marked as a priority need, was to gain a better understanding of sea level rise and subsidence impacts related to wetland loss, marsh migration, and adjacent land-use considerations.

The third group of science needs currently in the database relate to best management practices (BMPs) and stormwater. The first need in this group highlights the need for data and research regarding impacts of sea level rise, storm surge, increased temperatures, extreme precipitation, and saltwater inundation on BMP climate resilience. This need was marked as a priority and addressed through the VT BMP report, which generated more specific science needs regarding BMP effectiveness in the face of a changing climate. The second need in this group highlights the need for a better understanding of precipitation changes with regards to intensity, annual amounts, seasonal impacts, storm events and stormwater management.

The fourth group of current science needs are related to shoreline hardening and natural infrastructure. The first need highlights the need for a better understanding of green infrastructure (e.g., living shorelines) performance in building resilience to climate change impacts, cost-effectiveness of these strategies, and potential unintended consequences to

other restoration metrics. The second need highlights the need for effective designs for combining gray-green infrastructure approaches.

The last group of current needs relates to other miscellaneous needs in the database. The first is a need for social science research into human behavior and the implications of the human response to climate change, flooding, sea level rise, as well as motivation and needs of communities to adapt. The second need relates to the development of a method or metrics to track climate resilience progress related to the Chesapeake Bay Watershed Agreement goals; this need was marked as a high priority. The last need relates to the establishment of an Ocean Acidification Monitoring Network.

Jamileh then presented on the newly identified needs and mentioned that these needs would be discussed more in-depth during the breakout sessions later in the meeting to help develop them further and identify potential resources. These needs were grouped based on theme. The first group pertained to science needs identified in the CBP Monitoring Report. The first need build upon the current ocean acidification monitoring network need and stated that there is a need to develop a suitable ocean acidification monitoring design and sampling strategy Bay-wide. This would include an assessment of discrepancies among methods between states and provide suggestions to align methods and outputs to support a regionally consistent story about ocean acidification measurements and effects. The second need is requesting research on improving knowledge of carbon stock changes from sea level rise as it pertains to marsh drowning and erosion and landscape conversions.

The second group is related to indicator needs. The first need highlighted refers to the development of an extreme temperature indicator as it relates to urban tree canopy in underserved communities. The second need relates to identifying an indicator focused on either river or coastal flooding as it relates to community resilience.

The third group of science needs relates to those that were identified through the Virginia Tech BMP Climate Uncertainty Report. The needs from this report include climate forecasting and scenarios at spatial and temporal scales needed to inform decision-making; research and modeling studies on how climate change impacts runoff processes; a better understanding of how climate change influences landscape management; research to inform the selection, design, and siting of cost-effective BMPSs that are resilient to climate change; additional studies that investigate the influence of climate factors on BMP performance; social science research to with an environmental justice frame to understand the impacts of large-scale BMP implementation on more than just water quality; and modeling studies that assess the performance of BMPs under future climate conditions and incorporate short- and medium-term population growth projections. Jamileh mentioned that there is greater coordination with the Water Quality GIT to further develop these needs.

The fourth and final group of newly identified science needs relate to those that were identified through the STAC Rising Water Temperature Workshop. Jamileh mentioned that some of the needs identified did not directly pertain to climate resiliency, however CWRG staff denoted

where there could be climate considerations incorporated into the need. These needs include determining temperature and oxygen thresholds for striped bass and other key fish species; developing habitat suitability models and indicators for key fishery resources; communication research focused on gaps in current communication strategies regarding the new temperature regime in the Bay; improving environmental monitoring of surface and bottom temperatures, dissolved oxygen, and fish habitat; exploring a state of the ecosystem report level synthesis for tracking climate change in the Bay; explore assessment of emerging fisheries in the Bay to facilitate management; develop a monitoring plan for long-term changes in environmental conditions impacted by climate change as it pertains to fisheries habitat and spawning grounds; evaluating the need for zooplankton monitoring at spawning and nursery sites; reviewing the current definitions of marine heat waves and conducting research to determine an appropriate definition; exploring real-time monitoring of marine heat waves and development of a marine heat wave indicator and warning system; conducting an analysis of costs of natural infrastructure versus hardened infrastructure; conducting a threshold analysis to determine ecological impacts and benefits from natural infrastructure; developing criteria for siting natural infrastructure projects where co-benefits can be optimized; using models to increase understanding of habitat change from sea level rise for decision-making regarding restoration efforts; and developing pilot studies co-locating SAV and oysters to understand co-benefits. Katie Brownson mentioned that the needs presented from the STAC Rising Water Temperature workshop only included the tidal needs, and that there should be considerations for adding the non-tidal needs as well. Julie agreed and mentioned that we will coordinate with the watershed team on how best to incorporate these science needs.

Breck Sullivan mentioned that she wanted to thank the CRWG for taking the time to review their current science needs. Feedback from users of the database is that it would be helpful to have more specific actions that are needed from the science need. She likes to think that these science needs as the conversation starter between CBP Workgroups and potential resources. Therefore we do not need to know every single detail, but we need it to be actionable enough that people reviewing the database without knowing much about the CBP workgroup has enough information to know how they can contribute to support the need.

Jamileh and Julie ended the presentation by introducing the discussion sessions. The first breakout session focused on discussing the newly identified science needs that Jamileh presented, including other considerations, potential resources, and other outcomes. Also this session reviewed whether the science need should be revised to incorporate more of a climate change/resiliency focus or if they would be better suited for another Bay Program outcome. The second breakout session focused on identifying science needs that were missing from the presentation and should be considered for addition to the STAR Science Needs Database.

2:50 PM Identifying New Science Needs [60 Minutes]

- *This portion of the meeting will focus discussing the current science needs in the database, identifying new science needs to add to the database,*

and identifying where the workgroup has the resources to support these science needs.

Summary of Breakout Session One

During the first breakout session, the workgroup focused on reviewing the newly identified science needs that were presented in during the previous agenda item. Not every science need presented was able to be discussed, so the CRWG staff plan to send out a list of the science needs to the workgroup for additional comments and input.

The first need related to the CBP Monitoring Report that states to "Develop a suitable ocean acidification monitoring design and sampling strategy Bay-wide. Include assessment of discrepancies among methods between states and provide suggestions to align methods and outputs to support a regionally consistent story about ocean acidification measurements and effects." Workgroup member discussed how there should be a development of cost estimates for monitoring designs, assistance and funding considerations, and a cost analysis on how to grow the effort or coordinate the efforts across the Bay. Workgroup members highlighted that there is already a lot of work happening in this space and there needs to be an alignment across these efforts. Discussions also identified potential resources including MD DNR/MDE research on this topic and an already established network which includes Bay and tributaries. Amy Goldfischer mentioned that they have a list of people who have been engaged with the ocean acidification talks in the past and there is an opportunity to hold more small group discussions around the topic and how best to align efforts. Comments made on the regarding the second science need, which states to "improve our knowledge of carbon stock changes from sea level rise pertaining to marsh drowning and erosion and landscape conversions," include identifying potential resources (e.g., ODU research on SAV assessments, MDNR/GMU/TNC EESLR SLAMM and blue carbon research (2023), CBP (Chesapeake Conservancy) 2018 Land-use/ land cover data, etc.).

For the indicator related needs, the workgroup identified a number of potential resources to support both science needs. For the first need, focused on an extreme temperature indicator, identified potential resources include American Forest: Tree equity score and the CBP Forestry Workgroup, who are working on developing an indicator related to urban tree canopy. For the second science need, regarding a flooding indicator, potential resources that were identified include the MD Coastal Adaptation Report Card and the MD MyCoast community science flood tracking.

For the BMP related science needs, Jeremy Hanson (Water Quality GIT coordinator), mentioned that it would be best to wait to see what is needed after the EPA Request for Applications is released to see what resources will be engaged and what recommendations from the Virginia Tech BMP Climate Uncertainty report are incorporated. Some potential resources that were identified for the first BMP science need regarding climate forecasting, include the EPA Request for Applications and MARISA's regional scale flood/precipitation forecasting data.

For the STAC Rising Water Temperature science needs, workgroup members discussed the need for more specific details regarding the threshold analysis. They suggested following up with Bay Program workgroups to better understand which specific species (e.g., fish, bird, SAV) are of interest. Additionally, there was conversation regarding the need to understand how climate change and temperature may impact oysters' ability to filter water and that current knowledge might be insufficient in predicting how oysters will respond to changing climatic conditions.

Summary of Breakout Session Two

The second breakout session focused on identifying new science needs that were not included in the one's presented earlier in the meeting. Meeting participants were split into three breakout groups to discuss and add ideas to a Jamboard and groups reported out on their discussions at the end of the session.

Julie reported out for the first breakout group. Her group's discussion fell into three main categories of science needs. The first category focused on science needs for tidal fisheries; there is a lot of research regarding upstream fisheries in non-tidal waters, however there is less research on the impacts of climate change on tidal fisheries and fish habitat for both temperature and flow. For non-tidal fish, there is a need to understand how climate change is impacting other life cycle stages and how temperature and flow impact non-tidal fish phenology. The second group focused on science needs that incorporated diversity, equity, inclusion, and justice into workgroup efforts. Specific needs identified include a better understanding of green infrastructure and how it may impact under-resourced communities through green gentrification and how this may be prevented. The last category focused on more research around BMPs and climate change including understanding BMP impacts on water temperature (ex: stream restoration) and increasing the understanding of tradeoffs and designing ways to implement BMPs so that they do not impact temperature or dissolved oxygen. (Slide 1, see below)

Jamileh reported out for the first breakout group. This group also generated ideas around a few main categories. The first category focused on research needs related to BMPs. Some research needs were added from the watershed portion of the STAC Rising Water Temperature workshop including understanding how BMPs may be contributing to water temperatures (e.g., helping or hindering aquatic ecosystems); creating design guidance on opportunities to minimize the heating impacts of certain BMPs and maximize the cooling benefits of other BMPs; and developing temperature mitigation BMPs for construction sites and post-construction stormwater. The next category focused on science needs focused on social science. Specific needs included narrowing the social science needs in the current database to focus on specific areas of human behavior in response to climate change. Lastly, there were some interesting points raised around incorporating the science needs generated during the EPA ORD Resilient Coastal Wetlands workshop. (Slide 2, see below)

Jackie reported out for the third breakout group. This group also had a few main categories that emerged during discussions. The first category pertains to siting and modeling research, with

specific needs focusing on coupling ocean/estuary hydrodynamic models with terrestrial hydrodynamic models to better assess combined effects of extreme events; opportunities for storing water in the upper reaches of the watershed, given that floodplains have gray infrastructure; and understanding the extent of parking lots and relation to runoff. The second category focused on equity in adaptation work. Specific need included understanding the impacts of extreme weather events on homeless populations; research into effective ways to engage under-resourced communities in decisions around climate resilience; and developing climate impact mapping with and overlap with social vulnerability. And the last category focused on ensuring that the workgroup is thinking about the integration of adaptation and mitigation work. Specific needs included quantifying ecosystem services. (Slide 3)

Julie thanked the meeting participants for their involvement in the discussion. She mentioned that the next steps include taking the comments from this breakout session and synthesizing them into specific science needs that can be added to the database. She mentioned that these needs will be sent to the workgroup for further commend and input.

3:50 PM **Wrap-up and announcements**

- *Open Communications for the Ocean will be hosting a webinar reviewing the Climate-Resilient Fisheries Toolkit. This toolkit features over 30 tools and resources which can help assess conditions and prioritize interventions; examine governance gaps, climate impacts, ecosystem threats, and food and nutrition security needs; integrate available data and knowledge into management action; and design and implement fishery solutions. Tools are designed for use by fishers, researchers, managers, NGOs, communities, and local officials and can help make informed fisheries decisions even in limited data situations. The webinar will be on* ***December 8th, 2022 at 2:00 PM EST****. For more information and to register, click here.*
- *The Virginia Institute of Marine Science recently launched a Virginia Coastal Resources Tool. This tool includes a map viewer, which display shoreline conditions throughout coastal Virginia; a Shoreline Inventory Dashboard, which display shoreline conditions and tidal marsh inventory by locality or river system; and a Shoreline Management Model Dashboard, which provides best management practices for all of coastal Virginia.*
- *Recently the Chesapeake Conservancy, USGS, and the CBP successfully updated the high-resolution land data and conducted a change analysis. The updated data includes more land-use classes, with the change analysis identifying increases in development, loss of forests, and growing numbers of solar farms. Read more in this new science summary and contact Peter Claggett (PClagget@chesapeakebay.net), who has been involved in the effort for over a decade, for more information: New high-resolution, land-use and change data improves decision-making in the Chesapeake Bay watershed | U.S. Geological Survey (usgs.gov).*

- *NOAA Sea Level Rise Portal provides access to science-based tools to assist in making informed decisions given the current and predicted sea level rise changes. These tools include:*
    - *The 2022 Sea Level Rise Technical Report and Application Guide, which provides assistance with incorporating sea level rise projections into community planning initiatives.*
    - *The Coastal Inundation Dashboard, which provides real-time and historic coastal flooding information, using both a map-based view and a more detailed station view.*
- *The Chesapeake Research Consortium (CRC) is looking ahead to the 2023 summer C-StREAM internship session and we are reaching out to solicit proposals from individual mentors or teams that would like to host a C-StREAM intern for this upcoming summer season. In past years, the Bay Program Office has hosted 3 interns from the C-StREAM program each summer and we are looking forward to doing so again in 2023. For more information about the summer program and the symposium, please visit here.*
- *The MD/DC Chapter of The Nature Conservancy is hiring a Climate Adaptation Manager. The Climate Adaptation Manager will advance coastal adaptation and climate resilience by guiding policy and adaptation initiatives. They are a skilled project manager and strategic-thinker, and emphasize integrating TNC's core values of equity and justice into the Program's conservation portfolio. Apply at nature.org/careers, searching for #52445.*
- *Audubon is seeking enthusiastic and qualified applicants for a Coastal Program Manager in coastal bird conservation, based in Maryland. This new position with Audubon Mid-Atlantic's growing coastal conservation team plays a core role in implementing Audubon's coastal conservation goals across Maryland's eastern shore. The Coastal Program Manager's main responsibility will be to manage coastal resilience projects, including on-the-ground-restoration as well as conservation planning processes and science-based monitoring, which protect, restore and enhance salt marsh habitat and beach and island habitats for priority bird species. They will work closely and build partnerships with internal conservation staff and with external partners including federal, state, local and private landowners, land managers, scientists and others. The Coastal Program Manager will provide expertise in the ecology of salt marshes and their birds, and experience in coastal project management. For more information and to apply visit the Audubon Careers website at https://www.audubon.org/about/careers and search the job ID #2022-5185.*

4:00 PM **Adjourn**

Attendance:

First Name	Last Name	Affiliation
Jamileh	Soueidan	CRC/NCBO
Breck	Sullivan	USGS/ CBP
Grace	Hansen	HRPDC
Rachel	Lamb	MDE
Julie	Reichert-Nguyen	NCBO
Fredrika	Moser	MD Sea Grant
Mark	Bennett	USGS
Angela	Jones	DoD
Jackie	Specht	TNC
Matt	Konfirst	EPA R3
Nicole	Carlozo	MD DNR
Sharon	Hockenberry	Integrity Data Solutions, LLC
Taylor	Woods	USGS
Katie	Brownson	USFS
Amy	Goldfischer	CRC
Moriah	Baybrick	
Jeremy	Hanson	CRC/CBP
Kristin	Saunders	UMCES
Peter	Tango	USGS
Jim	George	MDE
Ben	McFarlane	Hampton Roads DCVA
Amanda	Poskaitis	NWF
Amanda	Small	MD DNR
Hailey	McGleam	EPA R3
Cassie	Davis	NYS DEC

Identify any additional science needs that should be included (Lead: Julie)

Adaptation Outcome Continually pursue, design, and construct restoration and protection projects to enhance the resiliency of Bay and aquatic ecosystems from the impacts of coastal ero

Better understanding of green infrastructure - include research and analysis for underserved communities - prevention of green gentrification

Monitoring and Assessment: Continually monitor and assess the trends and likely impacts of changing climatic and sea level conditions on the Chesapeake Bay ecosystem, includ

disproportionate SLR impact on Bay access for underserved communtities

Increase understanding of BMP impacts on water temperature (ex: stream restoration). Increase understanding of tradeoffs.

Impacts on tidal fisheries and fish habitat - temperature and flow

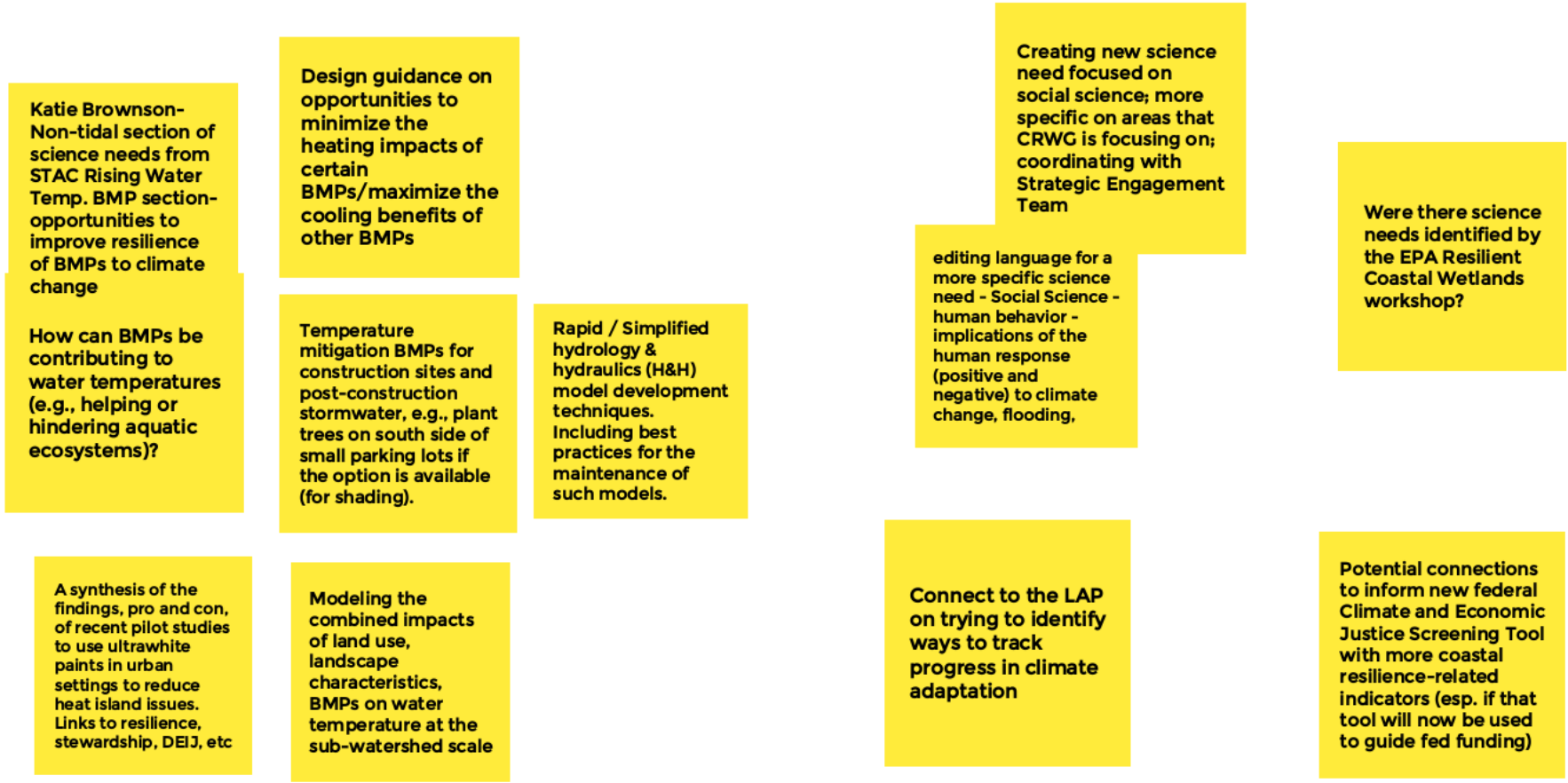
Ecological change - temperature and flow on nontidal fish phenology - disruptions to competition and mutualism - important life cycle events

Design in ways that won't affect dissolved oxygen and temperature

Resource assessment service DNR - under nutrient reduction and temperature change at different sites - sediment versus temp versus DO

Slide 1

Identify any additional science needs that should be included (Lead: Jamileh)



Slide 2

Identify any additional science needs that should be included (Lead: Jackie)