**Biennial Strategy Review System: Logic Table**

| Factor | Current Efforts | Gap | Actions (critical in bold) | Metrics | Expected Response and Application | Learn/Adapt |
| --- | --- | --- | --- | --- | --- | --- |
| *What is impacting our ability to achieve our outcome?* | *What current efforts are addressing this factor?* | *What further efforts or information are needed to fully address this factor?* | *What actions are essential to achieve our outcome?* | *Optional: Do we have a measure of progress? How do we know if we have achieved the intended result?* | *Optional: What effects do we expect to see as a result of this action, when, and what is the anticipated application of these changes?* | *Optional: What did we learn from taking this action? How will this lesson impact our work?* |
| Outcome: Monitoring and Assessment | | | | | | |
| Scientific/technical capabilities. | Establish guidance of the application of climate change scenarios, projections and  realizations for Chesapeake Bay Program assessments. | Continued efforts needed;  Lack of scientific capabilities to monitor;  Lack of adequacy of downscaled climate data | 1.1, 2.1, 2.2., 2.3, 2.4, 3.1, 3.2, 3.3, 4.1, 4.2, 4.3 |  |  |  |
| Report on PA Climate Impacts and Assessment, a report that is  required to be updated every 3 year. |
| Synthesize latest scientific research on sea level and water level  trends; precipitation and evapotranspiration; and temperature  change in both air and water |
| Review USACE regional literature synthesis for the mid-Atlantic  region |
| Report on PA Climate Impacts and Assessment |
| Use a combination of field, experimental and biogeochemical  modeling to delineate contributions of atmospheric and  eutrophication drivers to Chesapeake Bay acidification. |
| Simulate the effects of the projected changes on the living resources  of the Bay system through application of an integrative ecosystem  modeling approach(es) (e.g., CAM). |
| Assess effects of climate change on flow, temperature, and water quality  in streams of the Bay watershed. |
| Investigate the risk of flooding and salt water intrusion to state  wildlife impoundments and ponds and consider how to support  important wetland communities and related species. |
| Conduct research on the mechanisms and potential migration path  of wetlands and habitat conversion as water levels rise and salt  tolerance lines move. |
| Compile and synthesize existing Gulf and Atlantic Coast  vulnerability/resilience information on ~30 priority coastal species  and models that quantitatively link SLR and increased storm severity  and frequency with system response, impacts to habitats and  species, and restoration and management alternatives. |
| Provide science on wetlands prioritization |
| Develop a vulnerability assessment guidance document for NER parks  based on lessons learned from completed and ongoing NER |
| Undertake a follow up vulnerability assessment building on that  guidance for Colonial National Historical Park beginning in 2016. |
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| Geographic extent/variability of watershed. | Review USACE regional literature synthesis for the mid-Atlantic  region | Cross-cutting programmatic gaps | 1.1, 2.1, 2.2, 2.3, 2.4, 3.1, 4.1, 6.1 |  |  |  |
| Conduct shipboard and autonomous sampling to study the diurnal,  seasonal, and interannual variability of the CO2 system in the  Chesapeake Bay. |
| Analyze latest scientific data collected at MD CBNERRS sites (i.e.,  SETs, water quality, vegetation data) to gain a better understanding  of what is happening at the reserve level and how that can be  applied to the Bay as a whole. |
| Share USACE Climate Preparedness and Resilience Community of  Practice sea level calculator and watershed-level climate vulnerability  assessment, as well as a non-stationarity detection tool currenlty in  development |
| Range of climate trends and impacts across watershed. | Analyze available climate monitoring and climate sensitive data on  extreme events to document past trends and impacts. Analyze  climate model projections similarly to predict future. Use CB NERRS  data in conjunction with other available data to tell specific stories  about climate impacts on NERRS. Develop climate change chapter for  Chesapeake Bay Ecosystem Atlas for use in formal and informal  education. | Lack of coordination | 2.1, 3.2, 4.1, 4.2, 4.3 |  |  |  |
| Analyze available climate monitoring and climate sensitive data on  extreme events to document past trends and impacts |
| Synthesize latest scientific research on sea level and water level  trends; precipitation and evapotranspiration; and temperature  change in both air and water |
| Complexity of the monitoring program, including numerous partners and institutions engaged in collection effort. | Evaluate the capacity of CBIBS to contribute to climate science and  the CBIB’s Data Enterprise to determine applicability for template for  CBP climate data portal. | Coordination of modeling; Institutional capacity | 2.1, 2.2, 2.3, 2.4, 5.1 |  |  |  |
| Work with 4-select Workgroups to determine current and future  monitoring needs by geography, habitat type, and BMP and outline  gaps at Workgroup or GIT level. |
| Outline gaps for watershed scale monitoring effort, including gaps  related to monitoring of non-climate stressors that could exacerbate  climate impacts to Chesapeake Bay habitat or BMPs. |
| Identify opportunities to better integrate data collected by the NOAA  Chesapeake Bay Sentinel Site Cooperative (CBSSC) with CBP  monitoring efforts. |
| Explore need for consistent bay-wide wetland monitoring in brackish  and freshwater tidal and non-tidal wetlands. |
| Identify agencies/organizations through which commitments could  be sought to fund or participate in filling monitoring gaps. |
| Identify geographical overlap in monitoring and modeling efforts to  explore opportunities for cost saving efficiencies and integration of  priorities to include climate factors. |
| Explore the use of citizen-based monitoring networks. |
| How to differentiate between climate and non-climate related or multiple stressors. | Conduct an evaluation of existing data sets, long-term trends,  projects and research studies at each Sentinel Site in the Chesapeake  Bay Sentinel Site Cooperative (CBSSC) | Lack of indicators | 1.1, 2.2, 3.2, 4.1, 4.2, 4.3 |  |  |  |
| Funding and financial resources | Identify costs associated with closing monitoring gaps. | Facilitate stakeholder engagement | 2.4 |  |  |  |
| Lack of continuity of data collection programs | Undertake the NSF Coastal SEES Project: Chesapeake Bay  Sustainability: Implications of Changing Climate and Shifting  Management Objectives | Institution capacity;  Coordination with Modeling | 2.1, 2.2, 2.3, 6.1 |  |  |  |
| Work with its regional offices, states, tribes, river basin commissions  and other entities to establish Regional Monitoring Networks (RMNs)  for freshwater wadeable streams. |
| Monitor a number of sites in the Susquehanna River watershed for  thermal changes. |
| Lack of guidance (e.g., defined data collection parameters to monitor impacts on BMP performance) | Incorporate RMN sites into the existing Water Quality Network  (WQN). The WQN is a long-term monitoring program with  approximately eleven long term continuous monitoring sites  operated by USGS on large river systems. | Institution capacity | 1.1, 2.1, 2.2, 3.2, 4.1, 4.2 |  |  |  |
| Share and disseminate set of projections in temperature and  precipitation for the DC metro area |
| Launch climate data portal to provide access to climate projections  data (temperature and precipitation) based on downscaling analysis  conducted in 2013. |
| Develop the Virginia Coastal Adaptation Data Portal |
| Disseminate information on CBP’s climate change activities to  MWCOG region local governments and water utility staff and  stakeholders through existing committees (e.g., LGAC) and websites,  and share lessons learned with other metro regions. |  |  |  |  |
| PA DEP has created a “Climate Change” button on the Department’s  webpage for the purpose of posting climate related data and links.  Information pertaining to the Climate Change Advisory Committee,  including the Climate Impacts and Assessment Report and the  Climate Change Action Plan, will be published on this site. |
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|  | MONITORING & ASSESSMENT WORK PLAN ACTIONS | | | | |
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| Green - action has been completed or is moving forward as planned Yellow - action has encountered minor obstacles  Red - action has not been taken or has encountered a serious barrier | | | | | |
| Action # | Description | Performance Target(s) | Responsible Party (or Parties) | Geographic Location | Expected Timeline |
| Management Approach 1: Define Goals and Establish Baselines; Develop Conceptual Monitoring, Modeling and Assessment Model; and Prioritize Climate Impacts | | | | | |
| 1.1 | Develop and implement a methodology to establish climate related goals and baselines for individual Chesapeake Bay Agreement Management Strategies. | Complete a Literature Review of existing ecosystem-based climate resiliency approaches, aids (e.g., tables, matrices) and processes or decision making products. | CRWG | Watershed | Complete. |
| Compile existing climate change vulnerability research and data, including available assessment products and tools, specific to SAV and tidal wetlands/Black Duck, within the Chesapeake Bay region. | CRWG | Watershed | Complete. |
| Create a Climate Resiliency Analysis and Decision Making Matrix to enable the assessment of climate impacts on existing management goals and outcomes and the effect of climate change on the performance of specific management practices (BMPs). | CRWG | Watershed | Complete. |
| Conduct a review of approach to factor climate change considerations into the 2017 Chesapeake Bay TMDL Midpoint Assessment | CRWG, STAC, WQGIT, Modeling WG | Watershed | Complete. |
| Management Approach 2: Design Monitoring and Modeling Plan | | | | | |
| 2.1 | Identify and evaluate the continuity of existing monitoring data and models within federal agencies, state partners, and academic partners, to explain climate factors of interest to the Bay Program Partnership (i.e., sea level rise, precipitation, temp) at the watershed scale. | Conduct STAC Workshops on: 1) Climate Forecasts and Projections for CB Assessments; and 2) Aligning Chesapeake Bay Program Monitoring Efforts to Support Climate Change Impact and Trend Analyses and Adaptive Management. | CRWG, STAC | Watershed | Complete. |
| 2.2 | Catalogue monitoring and modeling gaps for 4 select Chesapeake Bay Agreement Management Strategies | Work with 4-select Workgroups to determine current and future monitoring needs by geography, habitat type, and BMP and outline gaps at Workgroup or GIT level. | CRWG, STAR, CBP Workgroups | Watershed | Complete. |
| Outline gaps for watershed scale monitoring effort, including gaps related to monitoring of non-climate stressors that could exacerbate climate impacts to Chesapeake Bay habitat or BMPs. | CRWG, STAR | Watershed | Complete. |
| 2.3 | Identify gap-filling solutions by expanding the Partnership to include identified ongoing or planned monitoring efforts of climate factors. | Identify opportunities to better integrate data collected by the NOAA Chesapeake Bay Sentinel Site Cooperative (CBSSC) with CBP monitoring efforts. | CRWG, NCBO, CBSSC | Watershed | Ongoing |
| Explore the use of citizen-based monitoring networks. | CRWG, STAR | Watershed |  |
| 2.4 | Develop a plan to fill identified gaps. | Identify costs associated with closing monitoring gaps. | CRWG, STAR | Watershed |  |
| Identify agencies/organizations through which commitments could be sought to fund or participate in filling monitoring gaps. | CRWG, STAR | Watershed |  |
| Identify geographical overlap in monitoring and modeling efforts to explore opportunities for cost saving efficiencies and integration of priorities to include climate factors. | CRWG, STAR | Watershed |  |
| Management Approach 3: Assess past and future trends in sea level, precipitation patterns, temperature and ecosystem response | | | | | |
| 3.1 | Establish guidance of the application of climate change scenarios, projections and realizations for Chesapeake Bay Program assessments. | Facilitate a workshop to evaluate applicability of international, national, regional and state climate scenarios, projections, forecasts and assessments and to develop process for establishing a recommended set of climate projections for use in Chesapeake Bay Program assessments. | CRWG, STAC | Watershed | Complete. |
| Convene a group of sea level rise researchers and resource experts to reach agreement on sea level rise estimates to apply to MPA modeling efforts; how to best approach simulating effects of sea level rise on living resources and wetlands; and the range of sea level rise scenarios to run. | CRWG, CBSSC | Watershed | Complete. |
| 3.2 | Conduct a literature review and synthesis of latest scientific research on past and future climate change impacts on the Chesapeake Bay, as was done in the 2008 Scientific and Technical Advisory Committee report. | Assess international, national, regional and state-level (DE, MD, PA, WV, VA, NY, DC) climate change assessments. | CRWG, STAC | Watershed | Complete with exception of state-level assessments. |
| Synthesize latest scientific research on sea level and water level trends; precipitation and evapotranspiration; and temperature change in both air and water | CRWG, STAC | Watershed | Complete. |
| 3.3 | Gain a better understanding of past and future impact of ocean acidification on Chesapeake Bay waters. | Convene federal, state and regional experts along with academic partners to assess current knowledge surrounding ocean acidification trends within the Chesapeake Bay. | CRWG, MACAN, NCBO | Watershed | Ongoing |
| Management Approach 4: Develop a research agenda to improve understanding of climate impacts or fill critical data or research gaps | | | | | |
| 4.1 | Compile a research agenda to improve understanding of climate impacts or fill critical data or research gaps. | Conduct a cursory review and analysis of 29 individual management strategies to initial climate-related research needs. | CRWG, CBP Workgroups | Watershed | Complete. |
| Conduct an assessment of research needs to support future policy dialog related to the integration of climate change considerations into the Water Quality Management Strategy. | CRWG, WQGIT | Watershed | Complete. |
| Work with regional partners (e.g., LCC, Climate Hubs and Climate Science Centers), academic institutions and other stakeholders to collaboratively define climate related science and research needs at the broader watershed-scale or within a defined geographic area. | CRWG, LCC, Climate Hubs and Climate Science Centers | Watershed | Ongoing |
| 4.2 | Undertake targeted research to improve understanding of climate impacts or fill critical data or research gaps. | No collective action identified. | CRWG | Watershed |  |
| 4.3 | Compile available data, tools and resources that can be used to support Chesapeake Bay watershed vulnerability assessments. | No collective action identified. | CRWG | Watershed |  |
| Management Approach 5: Undertake public, stakeholder and local engagement | | | | | |
| 5.1 | Increase availability and access to monitoring and assessment data. | Develop a Chesapeake Bay Watershed Climate Data and Mapping Repository | CRWG | Watershed | November, 2018 |
| Management Approach 6: Review progress and reassess implementation priorities | | | | | |
| 6.1 | Review progress on a biennial basis. | Evaluate progress toward the closing of gaps in baseline monitoring and gaps in assessment tools and scientific research. | CRWG | Watershed |  |
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