Outcome: Monitoring and Assessment

Goal: Climate Resiliency

Outcome: Continually monitor and assess the trends and likely impacts of changing climatic and sea level conditions on the Chesapeake Bay ecosystem, including the effectiveness of restoration and protection policies, programs and projects.

Management Approach : Define Goals and Establish Baselines; Develop Conceptual Monitoring, Modeling and Assessment Model; and Prioritize Climate Impacts					
Key Action (Description of work/project)	**Performance Target(s)** (Incremental steps to achieve Key Action)	**Participating Entity** (Partner(s) Responsible)	**Geographic Location**	**Timeline** (completion date: month & year)	**Factors Influencing and/or Gap**
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.	Climate Resiliency Workgroup, Wetlands Workgroup, Chesapeake Conservation Partnership	Watershed	May-16	Lack of guidance
	Compile existing climate change vulnerability research and data, including available assessment products and tools, specific to protected lands and wetlands, within the Chesapeake Bay region.	Climate Resiliency Workgroup, Wetlands Workgroup, Chesapeake Conservation Partnership	Watershed	Jun-16	Vulnerability of the watershed
	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).	Climate Resiliency Workgroup, Wetlands Workgroup, Chesapeake Conservation Partnership	Watershed	Jul-16	Cross-cutting programmatic gap
Inform approach to factor climate change considerations into the 2017 Chesapeake Bay TMDL Midpoint Assessment	Conduct a review of approach to factor climate change considerations into the 2017 Chesapeake Bay TMDL Midpoint Assessment	Climate Resiliency Workgroup, CBP Modeling Workgroup, STAC	Watershed	Aug-16	Climate science
Management Approach: Design Monitoring and Modeling Plan					
Key Action (Description of work/project)	**Performance Target(s)** (Incremental steps to achieve Key Action)	**Participating Entity**	**Geographic Location**	**Timeline** (completion date: month & year)	**Factors Influencing and/or Gap**
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.	Work with its regional offices, states, tribes, river basin commissions and other entities to establish Regional Monitoring Networks (RMNs) for freshwater wadeable streams.	U.S. EPA	Watershed	2016-2017	Coordination of modeling
	Monitor a number of sites in the Susquehanna River watershed for thermal changes.	Susquehanna River Basin Commission	Susquehanna River watershed	2016-2017	Coordination of modeling
	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.	NCBO	Chesapeake Bay	2016	Complexity of monitoring program
	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.	PA DEP	Pennsylvania	2016-2017	Coordination of modeling
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.	STAR	Watershed	Dec-17	Coordination of modeling; Complexity of monitoring program
	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.	STAR	Watershed	Dec-17	Non-climate related and multiple stressors
	Explore need for consistent bay-wide wetland monitoring in brackish and freshwater tidal and non-tidal wetlands.	EPA Region 3	Watershed	TBD	Coordination of modeling; Complexity of monitoring program
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.	Chesapeake Bay Sentinel Site Cooperative (CBSSC)	Sites within the NOAA Chesapeake Bay Sentinel Site Cooperative (CBSSC)	Mar-17	Coordination of modeling; Complexity of monitoring program
	Explore the use of citizen-based monitoring networks.	STAR, Alliance for the CB	Watershed	Dec-17	Coordination of modeling; Complexity of monitoring program
Develop a plan to fill identified gaps.	Identify costs associated with closing monitoring gaps.	STAR; Trout Unlimited	Watershed	Dec-17	Coordination of modeling; Complexity of monitoring program
	Identify agencies/organizations through which commitments could be sought to fund or participate in filling monitoring gaps.	STAR; Trout Unlimited	Watershed	Dec-17	Coordination of modeling; Complexity of monitoring program

	Identify geographical overlap in monitoring and modeling efforts to explore opportunities for cost saving efficiencies and integration of priorities to include climate factors.	STAR	Watershed	Dec-17	Coordination of modeling; Complexity of monitoring program
Management Approach: Assess past and future trends in sea level, precipitation patterns, temperature and ecosystem response					
Key Action (Description of work/project)	**Performance Target(s)** (Incremental steps to achieve Key Action)	**Participating Entity**	**Geographic Location**	**Timeline** (completion date: month & year)	**Factors Influencing and/or Gap**
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.	STAC	Watershed	Feb-16	Climate science
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.	STAC, STAR, Climate Resiliency Workgroup, PA, MD, DE, DC	Watershed	Dec-17	Vulnerability of the watershed
	Report on PA Climate Impacts and Assessment, a report that is required to be updated every 3 year. PSU researchers have been contracted to provide an assessment report to PA DEP. The most current report was updated in August 2015.	PA DEP	Pennsylvania	2016-2017	Vulnerability of the watershed
	Synthesize latest scientific research on sea level and water level trends; precipitation and evapotranspiration; and temperature change in both air and water	STAC, STAR	Watershed	Dec-17	Climate science
	Review USACE regional literature synthesis for the mid-Atlantic region available online at http://www.corpsclimate.us/docs/rccvarreports/USACE_REGION_02_Climate_Change_Report_CWTS-2015-09_Lo.pdf..	USACE	Watershed	Dec-17	Climate science
Assess Chesapeake Bay (CB) climate sensitivity, utilizing CB National Estuarine Research Reserve (NERR), National Weather Service and other data sets. Assessment will be informed by direct engagement with staff from MD and VA CB NERRS staff.	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.	MD and VA Chesapeake Bay National Estuarine Research Reserve, Chesapeake Environmental Communications, University of Maryland Center for Environmental Science, NOAA/National Centers for Coastal Ocean Science	Chesapeake Estuary	Oct-16	Climate science
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.	Climate Resiliency Workgroup; Fisheries GIT; Maryland Dept. of Natural Resources	Chesapeake Bay	Dec-17	Climate Science
	Use a combination of field, experimental and biogeochemical modeling to delineate contributions of atmospheric and eutrophication drivers to Chesapeake Bay acidification. Identify shellfish restoration areas most and least prone to acidification, and future impacts to long-term oyster restoration goals. Quantify carbonate and nutrient exchange between oyster reefs and surrounding waters and observe the change in those fluxes as a result of reef structures and acidification.	UMCES/CBL (NOAA Ocean Acidification Program)	Chesapeake Bay	Aug-18	Climate science
Management Approach: Develop a research agenda to improve understanding of climate impacts or fill critical data or research gaps					
Key Action (Description of work/project)	**Performance Target(s)** (Incremental steps to achieve Key Action)	**Participating Entity**	**Geographic Location**	**Timeline** (completion date: month & year)	**Factors Influencing and/or Gap**
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.	Climate Resiliency Workgroup	Watershed	Dec-17	Scientific capabilities
	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.	Climate Resiliency Workgroup	Watershed	Jun-16	Scientific capabilities
	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.	Climate Resiliency Workgroup, USFWS, NRCS, USFS, USDA NE Climate Hub, NFW, CBSSC, USGS	Watershed	Dec-17	Scientific capabilities; Lack of collaboration

Undertake targeted research to improve understanding of climate impacts or fill critical data or research gaps.	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).	NCBO	Chesapeake Bay	TBD	Vulnerability of the watershed
	Undertake the NSF Coastal SEES Project: Chesapeake Bay Sustainability: Implications of Changing Climate and Shifting Management Objectives	VIMS, NCBO CAM	Chesapeake Bay	Sep 2013 – August 2016	Vulnerability of the watershed
	Assess effects of climate change on flow, temperature, and water-quality in streams of the Bay watershed. Work will build off USGS analysis examining changes in flow and temperatures in streams. USGS will be working with fish biologists on implications for freshwater populations and will also be looking at potential approaches to assess effects on nutrient and sediment loads.	USGS, CBP Modeling Team	Watershed	2016-2017	Vulnerability of the 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.	State of Delaware	Nanticoke Watershed	Sep-18	Vulnerability of the watershed
	Conduct research on the mechanisms and potential migration path of wetlands and habitat conversion as water levels rise and salt tolerance lines move.	State of Delaware	Nanticoke Watershed	Sep-18	Vulnerability of the 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.	Chesapeake Environmental Communications, MD and VA National Estuarine Research Reserves, University of Maryland Center for Environmental Science	Chesapeake Estuary	16-Oct	Climate science
	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), to include (but not limited to): sea level change, surface elevation change and wetland vegetation dynamics.	Chesapeake Bay Sentinel Site Cooperative (CBSSC)	Sentinel Sites included in the Chesapeake Bay Sentinel Site Cooperative (CBSSC)	Dec-16	Climate science
	Conduct shipboard and autonomous sampling to study the diurnal, seasonal, and interannual variability of the CO2 system in the Chesapeake Bay. Use biogeochemical models to distinguish the impacts between eutrophic and global climate change impacts to the bay's carbonate system.	VIMS	Chesapeake Bay	Sept. 2018	Climate science
	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.	Chesapeake Bay NERRS, CBSSC (Participating)	MD NERRS Sites	Dec-17	Climate science
	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.	USFWS, Landscape Conservation Cooperatives	Watershed	Sep-16	Climate Science
	Provide science on wetlands prioritization by (1) modeling marsh migration due to sea-level rise using monitoring data from near Blackwater National Wildlife Refuge and other coastal wetlands, (2) conducting research on the effects of sea-level rise, salinification, and watershed sediment loading on the resilience and services of tidal freshwater wetlands (along the Pamunkey and Mattaponi rivers), (3) providing forecasts of land development throughout the watershed to help assess potential wetland loss, and (4) better document long-term changes in wetlands due to climate variability.	USGS, CBSSC (Participating)	Watershed	2016-2017	Vulnerability of the watershed
	Develop a vulnerability assessment guidance document for NER parks based on lessons learned from completed and ongoing NER	NPS Northeast Region collaborators at the University of Rhode Island	National Parks	Estimated winter 2016	Vulnerability of the watershed; Lack of capacity
	Undertake a follow up vulnerability assessment building on that guidance for Colonial National Historical Park beginning in 2016.	National Park Service	National Parks	Estimated summer 2017	Vulnerability of the watershed; Lack of capacity

Compile available data, tools and resources that can be used to support Chesapeake Bay watershed vulnerability assessments.	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	USACE Climate Preparedness and Resilience Community of Practice	Watershed	TBD	Vulnerability of the watershed
Management Approach: Undertake public, stakeholder and local engagement					
Key Action (Description of work/project)	**Performance Target(s)** (Incremental steps to achieve Key Action)	**Participating Entity**	**Geographic Location**	**Timeline** (completion date: month & year)	**Factors Influencing and/or Gap**
Increase availability and access to monitoring and assessment data.	Share and disseminate set of projections in temperature and precipitation for the DC metro area: http://green.dc.gov/publication/climate-projections-scenario-development.	District of Columbia	District of Columbia	Projections released September 2015, will inform adaptation plan to be complete mid 2016.	Lack of guidance; Facilitate stakeholder engagement
	Launch climate data portal to provide access to climate projections data (temperature and precipitation) based on downscaling analysis conducted in 2013.	Delaware	Delaware	TBD	Lack of guidance; Facilitate stakeholder engagement
	Develop the Virginia Coastal Adaptation Data Portal	State of Virginia, VIMS	Virginia	Dec-17	Lack of guidance; Facilitate stakeholder engagement
	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.	MWCOG	MWCOG	May-17	Lack of guidance; Facilitate stakeholder engagement
	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.	PA DEP	Pennsylvania	2016-2017	Facilitate stakeholder engagement
Management Approach: Review progress and reassess implementation priorities					
Key Action (Description of work/project)	**Performance Target(s)** (Incremental steps to achieve Key Action)	**Participating Entity**	**Geographic Location**	**Timeline** (completion date: month & year)	**Factors Influencing and/or Gap**
Review progress on a biennial basis.	Evaluate progress toward the closing of gaps in baseline monitoring and gaps in assessment tools and scientific research.	Climate Resiliency Workgroup	Watershed	Dec-17	Lack of indicators

***Note:** As a member of the Chesapeake Executive Council and a signatory to the Chesapeake Bay Watershed Agreement, the Chesapeake Bay Commission (CBC) functions as the legislative arm of the Chesapeake Bay Program working within Maryland, Pennsylvania and Virginia and at the federal level to identify specific Bay management concerns requiring intergovernmental coordination and cooperation. CBC makes recommendations to the federal, state and local governments on legislative and administrative actions necessary to effectuate coordinated and cooperative management for*

Outcome: Climate Adaptation
Goal: Climate Resiliency
Outcome: Continually pursue, design and construct restoration and protection projects to enhance the resiliency of the Bay and aquatic ecosystems from the impacts of coastal erosion, coastal flooding, more intense and more frequent storms and sea level rise.

Management Approach: Compile and assess current adaptation efforts and lessons learned.					
Key Action (Description of work/project)	**Performance Target(s)** (Incremental steps to achieve Key Action)	**Participating Entity**	**Geographic Location**	**Timeline** (completion date: month & year)	**Factors Influencing and/or Gap**
Compile and assess lessons learned from past and ongoing adaptation planning and programmatic efforts within the Chesapeake Bay Watershed.	Develop need and format for information to be gathered and a methodology for updating list and synthesis on a continual basis.	Climate Resiliency Workgroup; State Signatories to provide information on plan updates and programmatic efforts	Watershed	Jun-16	Institutional capacity; Lack of guidance
	Informed by step above, work from Appendix B to compile an expanded list of current planning and programmatic efforts that support key elements of the Management Strategy.	Climate Resiliency Workgroup	Watershed	Dec-16	Institutional capacity; Lack of guidance
	Track local government and water utility climate adaptation efforts in the MWCOG region and develop recommendations for potentially replicating those efforts in other geographic areas (mainly urban/suburban landscapes).	MWCOG	MWCOG	Dec-16	Facilitate stakeholder engagement
	Explore the development of a spatially explicit adaptation project/plan database for the Mid-Atlantic Region modeled after EPA Region 2 effort.	EPA Region 3	EPA Region 3	Dec-16	Facilitate stakeholder engagement
Management Approach: Review and revise conservation, restoration and protection goals and objectives.					
Key Action (Description of work/project)	**Performance Target(s)** (Incremental steps to achieve Key Action)	**Participating Entity** (Partner(s) Responsible)	**Geographic Location**	**Timeline** (completion date: month & year)	**Factors Influencing and/or Gap**
Develop process to revise or reconsider Watershed Agreement Management Strategies to accommodate anticipated climate-related changes or impacts.	Facilitate in-person workshops with Wetlands and Protected Lands Work to complete Matrix Analysis process and revise, modify, prioritize and select management actions for integration into Management Strategies; and 2) to develop recommendations for augmenting existing Management Strategies through the "Adaptive Management" framework.	Climate Resiliency Workgroup, Wetlands Workgroup, Chesapeake Conservation Partnership	Watershed	May-17	Cross-cutting programmatic gap
	Develop recommendations for refinement of matrix and a proposed implementation process to engage one-on-one with GITS and Workgroups to identify, assess, evaluate and revise (as necessary) all individual CB Agreement Management Strategies.	Climate Resiliency Workgroup	Watershed	Sep-17	Cross-cutting programmatic gap
Management Approach: Increase the institutional capacity of the Chesapeake Bay Program to prepare for and respond to climate change.					
Key Action (Description of work/project)	**Performance Target(s)** (Incremental steps to achieve Key Action)	**Participating Entity** (Partner(s) Responsible)	**Geographic Location**	**Timeline** (completion date: month & year)	**Factors Influencing and/or Gap**
Increase opportunities for formal and informal communication and the exchange of ideas among the Chesapeake Bay watershed's "adaptation planning network."	Participate in the Maryland Sea Grant: Climate Change Research Forums	Maryland Sea Grant, Climate Resiliency Workgroup	Maryland Coastal Zone	Sep-16	Facilitate stakeholder engagement
	Conduct a workshop on the role of natural infrastructure/living shorelines as part of adaptation/mitigation strategies for the built environment.	MDSG, NWF, MARCO	Chesapeake Bay Coastal States	Dec-17	Facilitate stakeholder engagement
	Work with partners to host a "Chesapeake Bay Climate Adaptation Workshop" or offer adaptation related trainings at appropriate regional forums and conferences.	Climate Resiliency Workgroup	Watershed	Dec-17	Facilitate stakeholder engagement; Lack of collaboration; Lack of capacity
	Host a workshop or webinar event related to climate change adaptation and resilience for coastal communities.	USACE	Chesapeake Bay Coastal States	TBD	Facilitate stakeholder engagement
	Explore creation of a new Community of Practice around using "Green Infrastructure" for climate resiliency.	The Conservation Fund	CB Watershed and beyond	Mar-16	Facilitate stakeholder engagement; Lack of collaboration; Lack of capacity
	Develop a "Flood Avoidance and Design Guidance" document for Delaware state agencies, under Executive Order 41, to use in the development of state projects.	State of Delaware	Delaware	April 2016. Training and technical workshops to follow throughout 2016.	Lack of guidance
	Conduct a Coastal Resiliency Assessment to identify conservation and restoration priorities based on shoreline and community exposure and social vulnerability to flooding, storm surge, sea level rise, and wave action.	Maryland Dept. of Natural Resources; The Nature Conservancy	Maryland Coastal Zone	Mar-16	Institutional capacity; Linking science to implementation

Facilitate climate adaptation planning and project implementation guidance.	USACE is contributing to the Nation's resilience to climate change through its planning, engineering, design, construction, operations and maintenance, and research and development activities. For more information: http://www.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/219/Article/609942/building-resilience.aspx	USACE	Watershed	Ongoing	Linking science to implementation
	Initiate project to apply EPA's wetlands vulnerability framework to several areas within the Chesapeake Bay to understandwetland vulnerability and the key factors that affect tidal and nontidal wetlands to inform climate adaptation.	US EPA	Chesapeake Bay	Tentative Timeline (to be confirmed) : Application of wetlands vulnerability framework to non-tidal wetlands within the Chesapeake Bay (FY2016); Conceptual approach for wetlands vulnerability framework modified for application to tidal wetlands (FY2017)	Scientific capabilities; Linking science to implementation
	Improve technical understanding for successful restoration projects. USGS activities include research to optimize the design of restored nontidal freshwater wetlands for water-quality benefits and an addition study of the water-quality benefits of floodplain restoration along the Pocomoke River.	USGS in partnership with USDA and TNC	Pocomoke River	2016-17	Scientific capabilities; Linking science to implementation
	Participate in the Hampton Roads Adaptation Forum, a quarterly meeting to bring together stakeholder in the Hampton Roads region to advance sea level rise adaptation.	Virginia Sea Grant, ODU and Hampton Roads Planning District Commission	Hampton Roads	Ongoing	Facilitate stakeholder engagement; Linking science to implementation
	Develop wetland restoration priorities for climate risk reduction and resilience in the Mid-Atlantic region.	Mid Atlantic Regional Council on the Ocean (MARCO)	Chesapeake Bay Watershed	Dec-16	Linking science to implementation
Explore mechanisms to encourage the integration of climate change considerations in the design and implementation of on-the ground "protection" and "restoration" efforts.	Explore applicability of EPA Climate Change and Storm water Design Guide for Chesapeake Bay specific practices, soils, and climate changes. If additional site specific information is needed, use expert elicitation methods to gain that information from across EPA and other Agencies.	US EPA	Chesapeake Bay Coastal States	STAC/CB Program proactive expert urban storm water workshop – 2016 (Q4)/2017(Q1); Draft/final report 2017	Scientific capabilities; Linking science to implementation; Lack of guidance
	Undertake planning project on use of green infrastructure to increase regional resiliency to coastal storms and climate change project supported by NFWF in central MD (parts of 7 counties + major cities)	The Conservation Fund, APA, USGS MD-DE-DC Water Science Center, Chesapeake Conservancy, NFWF	Maryland western Bay shore & Gunpowder, Patapsco, Patuxent watersheds	Sep-16	Scientific capabilities; Linking science to implementation; Lack of guidance
	Undertake beneficial use of dredged material projects for wetland restoration in proximity to Federally maintained navigation channels.	USACE	Coastal Maryland and Virginia	Ongoing	Linking science to implemetnation
	Implement major activities included in Choptank Habitat Focus Area Implementation Plan, focused on the concentrate of resources within the Choptank watershed to improve the decision-making and resilience of coastal communities by improving the delivery of NOAA's habitat and climate science.	NCBO	Choptank Watershed	2016-2017	Linking science to implementation; Stakeholder engagement; Vulnerability of the watershed
Identify funding availability, needs and mechanisms.	Review, update, and prioritize the recommendations of VA's 2008 Climate Change Action Plan and identify sources of revenue to fund the implementation. One recommendation in from the Commission is a green infrastructure bank of resilience projects and clean energy investments.	VA Climate Change and Resiliency Update Commission	Virginia	The final report of the Commission was delivered to the Governor on September 20, 2015. Timeline for the prioritization of recommendations and implementation of activities TBD.	Institutional capacity
	Integrate resiliency into the state's Working Waterfronts Program. DNR to offer Working Waterfronts Enhancement Grants to local governments to support revitalization of working waterfront communities and economies. Maryland will seek projects that consider natural resource conservation and/or restoration, potential flooding, storm surge impacts, and MD's Climate Change and Coast Smart Construction Infrastructure Siting and Design Guidelines.	Maryland Dept. of Natural Resources	Maryland Coastal Zone	Grants to be awarded in February 2016. Projects to be completed by December 2017.	Institutional capacity
	Pennsylvania's TreeVitalize program is a public-private partnership to help restore tree cover, educate citizens about planting trees as an act of caring for our environment, and build capacity among local governments to understand, protect and restore their urban trees. The program is administered through PA Department of Conservation and Natural Resources. TreeVitalize is a funding mechanism that is included in the Chesapeake Bay Program Urban Tree Canopy's Biennial Work plan.	PA DCNR Bureau of Forestry and PSU Extension	Pennsylvania	2016-17	Institutional capacity

Identify and assess institutional barriers.	The Chesapeake Bay Commission will work collaboratively with the Bay Program partners to identify legislative, budgetary and policy needs to advance the goals of the Chesapeake Watershed Agreement. CBC will, in turn, pursue action within our member state General Assemblies and the United States Congress. See CBC Resolution #14-1 for additional information on the CBC's participation in the management strategies.	Chesapeake Bay Commission	Watershed	Dec-17	Institutional capacity
	Explore opportunities to form new partnerships with entities such as the Sea Grant Law Clinic, the William and Mary's Coastal Law and Policy Center or Georgetown's Climate Center, to support projects to conduct targeted policy, legal and regulatory analyses.	Maryland and Virginia Sea Grant programs, National Sea Grant Law Clinic	Watershed	2016-17	Regulatory constraints
Management Approach : Implement Priority Adaptation Actions					
Key Action (Description of work/project)	**Performance Target(s)** (Incremental steps to achieve Key Action)	**Participating Entity** (Partner(s) Responsible)	**Geographic Location**	**Timeline** (completion date: month & year)	**Factors Influencing and/or Gap**
Plan and implement targeted restoration and protection efforts that build community and ecosystem resilience within the Bay watershed.	Implement the Urban and Community Forestry Initiative. The draft plan seeks to utilize the planting and maintenance of trees in urban and community settings to increase carbon storage and to reduce residential, commercial, and institutional energy use for heating and cooling purposes. Targets in this plan are set for 2030, but funding is limited, and DCNR is currently seeking private partners to help with implementation of the plan. Project scoping will occur over the next two years.	Pennsylvania	Pennsylvania	2016-17	Institutional capacity
	Plan, design and pursue construction of 7 on-the-ground resiliency projects in the State of Maryland, (Arundel on the Bay (AA CO), Annapolis Maritime Museum (AA CO) Flag Pond (Calvert Co), Cambridge Beach (Dorchester CO), Ellis Road (St. Mary's CO), Livie Property (St. Mary's CO) and Conquest Wildlife Preserve (QA CO).	Maryland DNR	Maryland Coastal Zone	2016-17	Adaptation
	Project partners to remove the 34-foot high by 220-foot long, state-owned Bloede Dam in the Patapsco Valley State Park (Ilchester, MD). In 2016-2017, major construction activities include removal of the Bloede Dam, relocation of a 42-inch sanitary sewer line, relocation of a 12-inch sanitary sewer line connection at Bonnie Road, replacement of the Grist Mill Trail and placement of stone along a portion of the riverbank for infrastructure protection.	NOAA, MDNR, American Rivers, and USFWS	Patapsko Valley State Park	2016-17	Adaptation
	Elevate & restore failing salt marsh site within Blackwater NWR with locally obtained materials to: 1) Extract eroded marsh material from Blackwater River and 2) elevate target tidal marsh to 30 cm NAVD 88 (for ideal veg. productivity)	USFWS, The Conservation Fund, Audubon MD-DC, USACE, National Fish & Wildlife Foundation	Blackwater NWR (Dorchester Co., MD)	Sept. 2016	Adaptation
	Determine source, solution, of increased ponding at Farm Creek Marsh to 1) assess cause of surface water ponding on tidal marsh; and 2) design tidal exchange network to remediate	Audubon MD-DC, USGS Water Science Center MD-DC-DE, The Conservation Fund, MD DNR	Dorchester Co., MD (Fishing Bay)	Sept. 2016	Adaptation
	The Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island (Poplar Island) is a large-scale, active construction ecosystem restoration project, which includes the beneficial use of dredged materials to restore 1,715 acreas of wetland and upland Chesapeake Bay remote island habitat. Through 2014, approximately 177 acres of tidal wetland habitat has been restored. The Water Resources Development Act of 2007 authorized the expansion of the Poplar Island ecosystem restoration project to achieve the 1,715 acres of restored habitat. Construction for the expansion is anticipated to begin in fiscal year 2017, depending on funding and regulatory permitting schedules. The expansion project would restore an additional 575 acres of remote island habitat. Adaptive management considerations as part of planned design and construction actions will address sea level rise of each new wetland cell in accordance with USACE policy guidance Engineer Regulation 1100-2-8162, dated December 31, 2013.	USACE	Maryland	2017-2043	Adaptation

	Aberdeen Proving Ground will attempt to seek funding in order for USACE, Baltimore District to assist with ecosystem restoration on Poole's Island in the northern Chesapeake Bay and enable USACE, Philadelphia District to provide dredged materials from the Chesapeake and Delaware Canal dredging project for beneficial use as part of the project. The project, when fully funded, will include monitoring actions related to sea level change and its impacts.	Aberdeen Proving Ground, USACE Baltimore and Philadelphia	Maryland	2017-2020	Adaptation
	Identify additional on-the-ground projects proposed or planned by CB partners, to be implemented within the next two years and beyond.	Climate Resiliency Workgroup	Watershed	2016-17	Adaptation
	Opportunistically, assess planned on-the-ground restoration projects, proposed by CB Partners, to evaluate whether project designs accommodate for climate change; and, where possible, develop metrics for and/or monitor a specific projects performance over time.	Climate Resiliency Workgroup	Watershed	2016-17	Adaptation
Pursue implementation of "pilot projects" to test new and emerging design principles and implementation methodologies.	Implement the Trout Unlimited's Potomac Headwaters Home River Initiative. This inititative focuses riparian and in-stream restoration efforts on cold water stremas, specifically in areas that will be resilient to climate change.	Trout Unlimited	West Virginia	2016-2017	Adaptation
	Participate in the SAGE Chesapeake Bay Pilot to develop "living" models of green/gray infrastructure for coastal community protection and improved resilience of natural resources; evaluate alternative SAGE project financing approaches; share information across federal, state, and local agencies, NGOs, academic institutions, and multiple business sectors (e.g., engineering, finance).	CBP, Climate Resiliency Workgroup	Chesapeake Bay Coastal States	2016-17	Lack of guidance; Regulatory constraints; Lack of collaboration; Linking science to implementation
Management Approach: Undertake Local, Public and Stakeholder Engagement & Conduct Targeted Education and Outreach					
Key Action (Description of work/project)	**Performance Target(s)** (Incremental steps to achieve Key Action)	**Participating Entity** (Partner(s) Responsible)	**Geographic Location**	**Timeline** (completion date: month & year)	**Factors Influencing and/or Gap**
Share current efforts, including policy, tools, products, and scientific understanding with interested parties.	Work with CBP Communications Workgroup to release a periodic newsletter to disseminate adaptation-related information.	Climate Resiliency Workgroup	Watershed	Mar-16	Stakeholder engagement
	Connect local policymakers and public advisory committees with information on climate change-related activities.	MWCOG	MWCOG	Nov-17	Cross-cutting programmatic gap; Stakeholder engagement
	The USACE Climate Preparedness and Resilience Community of Practice will release annually its Climate Change Adaptation Plan, which tracks climate preparedness and resilience through annual metrics that address external collaboration, improving knowledge about climate impacts and adaptation, progress assessing vulnerability, and development of policy and guidance. The 2015 CCAP is available online at http://www.corpsclimate.us/docs/USACE_Adaptation_Plan_30-JUN-2015_final_hires.pdf.	USACE	Watershed	Annually	Climate science; Lack of indicators
	PA DEP, in coordination with the PA Climate Change Advisory Committee, is currently drafting a Climate Change Action Plan, which will include climate change adaptation strategies. A 60-day public comment period for the draft plan will begin in November 2015. This plan was drafted with input from and endorsed by the PA Climate Change Advisory Committee.	PA DEP	Pennsylvania	2016-2017	Stakeholder engagement
Test and develop new communication tools that are audience specific so that climate information is accessible and understandable across multiple audiences and communities.	Undertake the Exploration to Explanation, Education to Conservation project, which will use emerging technology to explore and communicate coastal resiliency as sea levels rise and address green infrastructure solutions to climate change impacts specific to coastal areas.	Maryland DNR, MADE CLEAR, NCBO	Coastal Maryland and Delaware	Jun-16	Linking science to implementation
	Support UMD project 'Integrated geospatial, cultural, and social assessment of coastal resilience to Climate Change'.	UMD, MDNR, MDSG	Deale Island, Somerset County, MD	2/2016 - 1/2018	Stakeholder engagement
Develop information products that can be used to inform community-led coastal resiliency planning processes	Support application of Town of Oxford's vulnerability assessment result in community-led adaptation planning and engagement efforts.	NCCOS	Oxford, MD	Jan-16	Vulnerability of the watershed; Stakeholder engagement
	Data collection, indicator refinement, analysis and development of interpretive data products for second integrated vulnerability assessment.	NCCOS	Choptank Watershed	Dec-17	Vulnerability of the watershed; Stakeholder engagement

processes.	Conduct outreach and host educational events to promote aquatic organism passage parojects, as well as, riparian and inland stream restoration in ecosystems expected to be resilient to climate change.	Trout Unlimited	West Virginia	2016-2017	Stakeholder engagement
Management Approach: Foster a larger discussion on the linkage between climate impacts and diversity					
Key Action (Description of work/project)	**Performance Target(s)** (Incremental steps to achieve Key Action)	**Participating Entity** (Partner(s) Responsible)	**Geographic Location**	**Timeline** (completion date: month & year)	**Factors Influencing and/or Gap**
Work with the Diversity Action Team to identify and pursue opportunities to create a strong linkage between the Climate Resiliency and Diversity Management Strategy.	Climate Resiliency Workgroup member to serve on the Diversity Action Team.	Climate Resiliency Workgroup	Watershed	Jan-16	Cross-cutting programmatic gap; Stakeholder engagement
Undertake targeted efforts to engage diverse stakeholders.	Explore the option to use EJSCREEN to help prioritize new public access sites and target communities that might be in areas vulnerable to climate change impacts.	State of Maryland	Watershed	Ongoing	Cross-cutting programmatic gap; Stakeholder engagement
	Add an interpretive component to climate change vulnerability assessments being conducted for each park.	NPS	National Parks within Watershed	Ongoing	Cross-cutting programmatic gap; Stakeholder engagement
	Participate on Greater Baltimore Wilderness Coalition Equity work group.	Greater Baltimore Wilderness Coalition, Climate Resiliency Workgroup; CBP Diversity Communications and Outreach Coordinator	Greater Baltimore Project Boundary (central MD - 7 counties, 3 major cities)	November 2015 -December 2017 (and beyond)	Cross-cutting programmatic gap; Stakeholder engagement
	Community partnership-building in three socially vulnerable communities in Maryland to survey residents' risk perceptions, and climate and energy policy preferences.	GMU, MDSG Extension, JHU, City of Baltimore	Baltimore MD, Cambridge MD. Proposed Prince George's County	Sept. 2015-Aug. 2016	Cross-cutting programmatic gap; Stakeholder engagement
	The District will release a draft climate adaptation plan for public comment in early 2016. Through targeted outreach to the communities identified as most vulnerable, the District will seek to facilitate a discussion about climate change and resilience with underserved communities.	District of Columbia	District of Columbia	Early-mid 2016	Cross-cutting programmatic gap; Stakeholder engagement
Management Approach: Track adaptation action effectiveness and ecological response					
Key Action (Description of work/project)	**Performance Target(s)** (Incremental steps to achieve Key Action)	**Participating Entity** (Partner(s) Responsible)	**Geographic Location**	**Timeline** (completion date: month & year)	**Factors Influencing and/or Gap**
Assess progress towards the full integration of climate resilience considerations into the Chesapeake Bay Program.	Develop a questionnaire or matrix to document programmatic baselines and monitor the status and progress towards incorporating climate factors into individual management strategies.	Climate Resiliency Workgroup	Watershed	Dec-17	Cross-cutting programmatic gap; Lack of indicators
Investigate climate resilience indicators to assess adaptation action effectiveness and ecological response.	Interface with NFWF/DOI, USGRCP and US EPA to review other climate indicator frameworks (DOI Metrics, USGRCP and US EPA Climate Change Indicators (http://www3.epa.gov/climatechange/science/indicators/) to assess suitability for application to CBP related activities.	USGS, FWS, Climate Resiliency Workgroup	Watershed	Dec-17	Lack of indicators
	Track Department of Interior Metrics Expert Group (MEG) recommendations for measuring effects of ecological resilience projects to protect key features/ systems and some forms of grey infrastructure against effects of coastal storms and climate change effects (e.g., sea level rise, storm surge).	Climate Resiliency Workgroup	Chesapeake Bay Coastal States	Dec-17	Lack of indicators
	Explore applications of the Chesapeake Atlantis Model as a tool to integrate available scientific information on the biology, habitats (physical and water column), and physical drivers (climate effects), which could be used to visualize outcomes with regard to the living resources- related management decisions.	NCBO	Chesapeake Bay Coastal States	Dec-17	Linking science to implementation; Lack of indicators
	Work with UMCES, IAN to identify lessons learned through the development process for the Climate Resilience Index (2015).	UMCES, IAN, STAR Workgroup	Chesapeake Bay Coastal States	Dec-17	Lack of indicators
	Work with STAR and STAC to recommend and establish performance metrics and/or indicators to assess Climate Resiliency Goal and Outcome implementation effectiveness, as well as ecological response.	STAR, STAC	Watershed	Dec-17	Lack of indicators

***Note:** As a member of the Chesapeake Executive Council and a signatory to the Chesapeake Bay Watershed Agreement, the Chesapeake Bay Commission (CBC) functions as the legislative arm of the Chesapeake Bay Program working within Maryland, Pennsylvania and Virginia and at the federal level to identify specific Bay management concerns requiring intergovernmental coordination and cooperation. CBC makes recommendations to the federal, state and local governments on legislative and administrative actions necessary to effectuate coordinated and cooperative management for the Bay watershed. The Commission will work collaboratively with Bay Program partners*