



2016 Workplan: National Water Program Response to Climate Change

Office of Water
U.S. Environmental Protection Agency
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Table of Contents

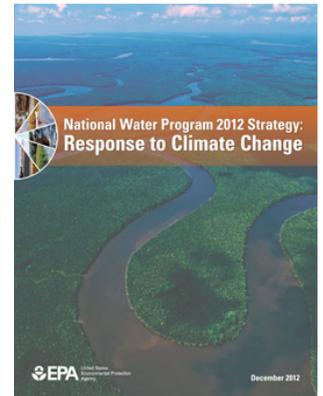
Introduction	1
National Water Program: Climate Change Actions for 2016	3
A) Water Infrastructure	3
B) Watersheds and Wetlands	18
C) Coastal and Ocean Waters	35
D) Water Quality	51
E) Working with Tribes	64
F) Cross-Cutting Program Coordination	70
Appendices	
1. 2016 National Water Program: Climate Change Priority Actions	81
2. EPA Regional Water Programs: Climate Change Common Priority Actions	82
3. EPA Regional Water Programs: 2016 Climate Change Innovations	84
4. EPA National Water Program Climate Change Workgroup Members	87

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Introduction

This *Workplan* describes the actions that the National Water Program is planning to take in 2016 to implement the *National Water Program 2012 Strategy: Response to Climate Change*.

The National Water Program at the U.S. Environmental Protection Agency (EPA) released the [National Water Program 2012 Strategy: Response to Climate Change](#) (2012 Strategy) in December 2012 as an update to the climate change strategy released in 2008. The 2012 Strategy describes long-term goals for the management of sustainable water resources in light of climate change. It is intended to be a roadmap to guide program planning and inform decision-makers during the Agency’s planning and budgeting process.



This *Workplan* builds on substantial work conducted in 2012-2015 to implement the 2012 Strategy. These implementation actions by EPA water programs at the national and regional levels are described in annual “highlights of progress” reports for 2012-2015 (available [here](#)).

The five long-term programmatic “vision areas” described in the 2012 Strategy provide the framework for this *Workplan*. These five areas are:

1. water infrastructure;
2. watersheds and wetlands;
3. coastal and ocean waters;
4. water quality; and
5. working with Tribes.



The *Workplan* includes a brief summary of the 19 goals and 53 supporting actions described in the 2012 Strategy that support each of these five vision areas. For each of the 19 goals, the *Plan* describes specific implementation actions expected to be taken in 2016 by:

- National water program offices within the Office of Water at EPA Headquarters;
- Water programs in the ten EPA regional offices; and
- EPA Office of Research and Development offices and laboratories.

These national and regional actions, supported by research initiatives, constitute the best progress that the Agency is able to make toward achieving climate change adaptation goals for EPA water programs given the resources that are presently available.

The program office within the Office of Water responsible for the national adaptation action is also identified (see text box for abbreviations of national water program offices).

Of the many actions to implement the *2012 Strategy* in 2016, a subset of 15 actions are identified as “National Priority Actions”. These actions are the core work of the National Water Program related to climate change adaptation and are identified throughout the text of this document and are summarized in Appendix 1.

In addition, water programs in EPA’s ten Regional offices play an important role in adapting clean water and drinking water programs to a changing climate. Each regional office developed a climate change adaptation implementation plan last year and many of the actions in these plans relate to water programs. In addition, regional water programs worked with the Office of Water to identify a common set of priority actions and these actions are updated for 2016 and listed in this document under the goal that the action supports and summarized in Appendix 2. Finally, Regional water programs are implementing a range of innovative programs and policies for climate change adaptation that respond to the specific challenges in that Region. These innovations are identified throughout the document and are summarized in Appendix 3.

In 2014, EPA organized a series of Headquarters/Regional office teams to address key policy topics related to climate change and water programs (see text box). The work of teams addressing water quality management and sanitary surveys is now complete. In their place, EPA will establish new teams addressing Total Maximum Daily Loads (TMDLs) and climate change and storm surge readiness of water facilities along the Gulf and Atlantic coasts. Regional co-chairs will also be adjusted. More information on the refresh of the climate policy teams is provided throughout this document and on page 71.

Finally, the National Water Program is committed to implementing the [FY 2016-2017 National Water Program Guidance](#). The *Guidance* describes general direction for work related to climate change (p 23-25; *National Water Program Guidance*).

EPA National Water Program Offices

OGWDW:	Office of Ground Water and Drinking Water
OST:	Office of Science and Technology
OW/IO:	Office of the Assistant Administrator for Water
OWM:	Office of Wastewater Management
OWOW:	Office of Wetlands, Oceans and Watersheds

Headquarters/Region Climate Program/Policy Development Teams

- 1) Clean Water/Drinking Water State Revolving Loan Funds (OWM/OGWDW/Regions 6 and 9)**
- 2) National Pollutant Discharge Elimination (NPDES) Permits (OWM/Regions 5 and 8)**
- 3) Water Quality Planning and Management (OWOW/Region 1 and 10)**
- 4) Water Quality Criteria and Standards (OST/Regions 4 and 7)**

National Water Program: Climate Change Actions for 2016

A) Water Infrastructure:

Vision Statement: In the face of a changing climate, resilient and adaptable drinking water, wastewater and stormwater utilities (water sector) ensure clean and safe water to protect the nation’s public health and environment by making smart investment decisions to improve the sustainability of their infrastructure and operations and the communities they serve, while reducing greenhouse gas emissions through greater energy efficiency.

Goal 1: Build the body of information and tools needed to incorporate climate change into planning and decision making

Goal
1

- ❖ Strategic Action 1: Improve access to vetted climate and hydrological science, modeling, and assessment tools through the Climate Ready Water Utilities program.
- ❖ Strategic Action 2: Assist wastewater and water utilities to reduce greenhouse gas emissions and increase long-term sustainability with a combination of energy efficiency, co-generation, and increased use of renewable energy resources.
- ❖ Strategic Action 3: Work with the States and public water systems, particularly small water systems, to identify and plan for climate change challenges to drinking water safety and to assist in meeting health based drinking water standards.
- ❖ Strategic Action 4: Promote sustainable design approaches to provide for the long-term sustainability of infrastructure and operations.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- In early 2016, EPA will issue an updated **Version 3.0 of the Climate Resilience Evaluation and Awareness Tool (CREAT)** to improve this tool to help water utilities in development of climate resilience plans. CREAT 3.0 will be upgraded from desktop software to a web-based tool, among other improvements. (OGWDW)

- Under the Climate Ready Water Utilities (CRWU) initiative, EPA will **promote use of the new Climate Resilience Evaluation and Assessment Tool (CREAT) 3.0** by developing two instructional videos, conducting three new webinars on the full suite of climate ready tools, and providing direct technical assistance on the tool to four new communities (while continuing to track implementation of adaptive measures progress for the 23 CREAT pilot communities from Fiscal Year 2015). (OGWDW)
- EPA will continue to **cultivate the CRWU peer-to-peer climate networks for the water sector** by populating the CRWU Information Sharing website with case studies and videos of utilities that have initiated or completed climate risk assessment and adaptation planning. (OGWDW)
- EPA **will finalize the Extreme Water Weather Events Workshop Planner 2.0**, which assists the water sector in conducting workshops with critical local, regional, and state officials focusing on climate change impacts and adaptation, and conduct pilot workshops on the Planner for water and wastewater utilities in partnership with the Rural Community Assistance Corporation. (OGWDW)
- EPA will **conduct one in-person training for utilities and environmental trainers on CREAT** and other CRWU products. (OGWDW)
- EPA will provide technical assistance to EPA Regional offices (Regions 1, 2, 3, 4, and 6) to **improve the storm surge and hurricane strike map and vulnerability index, then apply the risk methodology to the subset of drinking water and wastewater utilities** which reside in the National Oceanic and Atmospheric Administration's (NOAA) Sea, Lake and Overland Surges from Hurricanes - SLOSH model zones, and provide virtual outreach and technical assistance sessions for water sector utilities, water sector associations, and States impacted by coastal storm surge. (OGWDW)
- EPA will **conduct one regional workshop in Region 2 to train water and wastewater utilities and States on the use of CREAT 3.0 and the Storm Surge Inundation and Hurricane Strike Frequency Map**, then provide follow-up assistance with a webinar for attendees of the in-person training. (OGWDW)
- EPA will publish a **Drought Response and Recovery Guide** that will help drinking water and wastewater utilities become more resilient to drought by presenting real-world examples, best practices and lessons learned in drought response and recovery, and conduct several regional training sessions on the guide for water utilities in drought prone areas. (OGWDW)
- EPA will work with States and national water organizations to **support and strengthen state Water/Wastewater Agency Response Networks (WARN)**, including holding a national

meeting of state WARN directors to share successful practices and identify support needs. (OGWDW)

- EPA will encourage the **State Clean Water and Drinking Water State Revolving Funds (CWSRF and DWSRF)** to incorporate climate change considerations into their processes. (OWM/OGWDW) Activities planned in 2016 include:



- **Finalize a paper on CWSRF eligibilities in mid-2016 that** will include information on eligible climate and extreme weather resilience projects. (OWM)
- **Continue meetings of the Headquarters-Regional SRF climate project team to explore ways to further promote the incorporation of climate change considerations at the state level.** The Team will build on its benchmarking work to communicate to States what is being done in the SRFs to consider climate change and to encourage States to build on those efforts. Actions will include sharing and highlighting best practices and tracking **results of an indicator measure for the Fiscal Year 2016-2017 National Water Program Guidance** concerning integration of climate resilience into SRF programs. (OGWDW and OWM and Regions 6 and 9)
- **EPA will continue meeting with the CWSRF Outreach Workgroup** consisting of a number of States, EPA Headquarters, and 6 EPA Regions. Activities of the CWSRF outreach effort include:
 - **a recognition program** that highlights high quality projects, including those that mitigate the effects and progression of climate change, so that future projects can replicate this work;
 - **an annual report, newsletter, and write-ups on projects of interest**, all which highlight innovative projects, including climate change mitigation practices; and
 - **identifying outreach opportunities** for a wide range of project types, including climate change resiliency projects. (OGWDW and OWM)
- EPA will continue to provide technical input to the U.S. Department of Energy (DOE) and state energy offices to initiate **energy training and technical assistance management training programs for drinking water and wastewater utilities in New Hampshire, Nebraska, Tennessee, Alabama, and New Mexico.** DOE has awarded funds to each of these States for **2-3 year cooperative agreements.** The training programs will focus on helping water and wastewater utilities assess their current energy usage, undertake energy audits, identify energy efficiency projects, and help these utilities identify and apply for federal, state, or local funding, as necessary. (OWM)

- The National Water Program, in cooperation with the Office of Air and Radiation (OAR), will continue work to **develop a series of upgrades to the wastewater and water elements of the Portfolio Manager** energy management system. These upgrades are designed to make the system more user friendly and encourage wider use of the system by water utilities. (OW/IO)
- In collaboration with utility stakeholders, including the Water Environment Federation (WEF), National Association of Clean Water Agencies (NACWA) and others, EPA will **continue to promote the use Effective Utility Management (EUM) practices for utilities**, including those that help build climate resilience based on the 2016 report *Taking the Next Step: Findings of the Effective Utility Management Review Steering Group*. (OWM)

Regional Program Actions

Actions Common to All Regions

- **Promote Community Engagement on Climate Resilience Using Tools from the Climate Ready Water Utilities (CRWU) and Climate Ready Estuaries (CRE) Programs:** EPA will work with municipal and private utilities to promote use of the new Climate Resilience Evaluation and Awareness Tool (CREAT) Version 3.0 to recognize and respond to climate change risks and support communities in building climate resilience using tools such as the new workbook for developing risk-based climate adaptation plans developed by the National Estuary Program. In addition, EPA Regions will work with States to establish goals for the use of the new CREAT tool and the use of the new workbook for watershed climate resilience planning in 2017 (e.g.; a goal of initiating one CREAT project and one watershed climate resilience plan in each State in 2017).
- **Strengthen State WARN Networks:** Work with state Water/Wastewater Agency Response Networks (WARN) in each State to strengthen the networks' operational capacity and encourage water utility membership.
- **Work with State Revolving Loan Fund Programs to recognize climate change impacts.**

Additional Regional Actions

Region 1

- In 2016, Region 1 will **conduct several workshops related to climate resiliency including:**
 - **a Tri-State Water Resiliency Workshop** in the western Massachusetts/southern New Hampshire/southern Vermont area for water sector and community responders;
 - **a Drinking Water Emergency Response workshop** in Rhode Island, with focus on flooding and water-emergency sector interdependencies;
 - **a Hospitals/Healthcare Water Sector workshop** in Connecticut to improve resiliency, as part of a national pilot; and

- a **Water/Wastewater Agency Response Network (WARN) Tabletop Exercise/Workshop** in New Hampshire.
- **The Region will continue two Water Resilience Pilots in Hinsdale, New Hampshire and Lawrence, Massachusetts** as part of the Region’s “**Making a Visible Difference in Communities**” initiative work. These pilots are based on tools developed through the national pilot with the Berwick, Maine water system.
- The Region will continue to **assess drinking water infrastructure vulnerable to flooding in Mattapoisett, Massachusetts**, through a collaboration with the EPA Office of Research and Development (ORD), utilizing Regional Applied Research Effort (RARE) and Regional Sustainable Environmental Science (RESE).
- Region 1 will continue to coordinate with state Emergency Management Assistance Compacts and water sector contacts to discuss ways to **establish or improve existing inter-state water mutual aid programs for New England**.
- The Region will work with EPA Climate Ready Water Utilities to **complete two CREAT drinking water/wastewater projects** in Hull, Massachusetts and Keene, New Hampshire.
- The Region will continue to work with States to promote use of geographic information system (GIS) **mapping of wastewater and drinking water assets at risk and** develop a pilot project with the New Hampshire Department of Environmental Services to connect potential SRF projects with needed resilience upgrades.
- With a grant from EPA, Massachusetts Water Works Association **held a workshop in March 2016 for water suppliers and consultants to look at the current design standards for drinking water systems and evaluate their adequacy in light of expected impacts of climate change**. Massachusetts will take feedback from this workshop into account in future efforts of design and energy efficiency guidelines/standards revisions in the State.



Region 2

- EPA Region 2 continues to be involved in **Superstorm Sandy recovery** efforts through coordination teams:
 - The **New York-New Jersey Federal Leadership Resiliency Collaborative** holds meetings that covers topics including the East Side of Manhattan Coastal Resiliency project, how federal agencies can coordinate better with the States to help municipalities make appropriate decisions in the face of storms, and key infrastructure projects over the past three years.
 - **Water Supply Technical Coordination Team** activities include holding a meeting at the New Jersey American Raritan Millstone Water Treatment Plant in Bridgewater, New

Jersey. In addition to a site tour, the agenda includes presentations by the Federal Emergency Management Agency (FEMA) about flood mapping and flood risk management and by New Jersey American, who will discuss \$31 million flood wall elevation project funded through the New Jersey State Revolving Fund.

- EPA Region 2 continues to **serve as the facilitator for the interagency Wastewater Technical Coordination Team**, bringing together FEMA, EPA, U.S. Department of Housing and Urban Development (HUD), U.S. Army Corps of Engineers (USACE), U.S. Department of Transportation (DOT), U.S. Department of Energy (DOE), New York State, State of New Jersey, and New York City to discuss funding opportunities and regulatory coordination of Sandy recovery projects. This team also provides expertise on wastewater issues to other geographically based Sandy Recovery Infrastructure Resilience Coordination teams.

Region 3

- In 2016, the Region will continue efforts to work with state and local partners to **raise awareness of water utility energy efficiencies** by:
 - partnering with the Commonwealth of Virginia to develop a water/wastewater energy efficiency partnership with the goal of assisting local facilities in obtaining a free energy assessment and educating staff, management, and governance on energy usage and costs;
 - conducting energy audits at wastewater treatment plants, and holding energy workshops for water and wastewater operators;
 - Visiting small wastewater treatment plants in the Pennsylvania portion of the Chesapeake Bay watershed and following-up with report of possible ways to reduce nutrients and save energy through optimization and offer of on-site technical assistance to systems;
 - continuing to work with existing clients on energy efficiency projects in Pennsylvania and Delaware;
 - Delivering a “DIY (Do-It-Yourself) Energy Audit” course at the West Virginia Rural Water Association workshop and Maryland Rural Water Association annual conference; and
 - Publishing articles in trade magazines.
- The Region will **continue use of annual State Revolving Loan Fund (SRF) reviews to encourage States to consider climate change**, resiliency, and sustainability projects in their SRF funding decisions each year.
- Work will continue in 2016 to **provide up-to-date information on projected impacts from climate change to state drinking water programs and drinking water utilities.**
- The Region’s **District of Columbia drinking water direct implementation program will evaluate options for incorporating climate change considerations** in the Safe Drinking Water Act Sanitary Survey program.

- The Region will work with the **Washington Aqueduct on energy resilience.**
- The Region will continue to encourage State Capacity Development programs to include energy efficiency in their workplans by incorporating:
 - energy conservation in the assessment and ranking of drinking water systems, and
 - energy conservation in a State’s Capacity Development Strategy when revising its Strategy.

Region 4

- The Region will assist and support the **development of Energy Management Initiatives** with Tennessee Department of Environment and Conservation, Alabama Department of Environmental Management, Mississippi Department of Environmental Quality, and Region 4 Tribes with United South and Eastern Tribes. (As resources allow, additional States will be added.)
- Region 4 will include **assistance to utilities in developing vulnerability assessments** to the anticipated effects of climate change through the Region’s Energy Management Initiative to reduce energy consumption at wastewater and drinking water utilities.
- The Region will continue **developing the proposal for a National Wastewater Optimization Effort** for energy management and nutrient reduction that would be supported by the Office of Wastewater Management and the OGWDW Technical Support Center.
- The Region will continue **coordinating with Clean Water SRF Managers on incorporating components of green infrastructure and energy management** into water and wastewater capital project loans.
- The Region will work on development of **screening criteria to identify water and wastewater facilities on the Atlantic and Gulf Coasts that may be at risk of inundation** in a tropical storm using the Storm Surge Inundation Map and other tools.
- The Region will provide **outreach to States on available resources to assess drinking water and wastewater sector resiliency** to severe climate impacts.

Region 5

- **Region 5 will increase climate-readiness at water utilities using sustainable water infrastructure approaches** by:

- Promoting energy management and other sustainable at utilities as resources allow;
 - Promoting awareness and encourage use of the Climate Ready Water Utilities Tools with an aim toward incorporating climate change impacts into resiliency planning by drinking water and wastewater utilities.
- **The Region will address energy efficiency and reduce methane emissions by** providing energy assessments at wastewater treatment plants in partnership with Industrial Assessment Centers.
 - The Region will conduct **energy efficiency training at utilities.**
 - The Region will provide outreach/education on climate readiness to States and systems vulnerable to impacts of climate change.

Region 6

- The Region will continue **focus on drought planning** and response.
- Region 6 will promote energy efficiency at water utilities through an **energy management workshop** to assist water and wastewater utilities, focusing on the U.S.-Mexico Border area.
- The Region will **host a Climate Resiliency Workshop featuring CREAT in Houston, Texas** and provide presentation on resiliency financing for water utilities. The workshop will encourage water utilities to use CREAT in their planning processes.
- The Region will distribute information on **businesses in Region 6 with sustainable features to promote the incorporation of climate change adaptation into decision-making.**
- The Region will **cooperate with the Good Neighbor Environmental Board** to respond to the December 2015 letter from the Board to President Obama on climate change risks along the Mexico Border.

Region 7

- The Region will follow up with the three water utilities which participated in the Fiscal Year 2015 **CREAT Training** with the Climate Ready Water Utilities Initiative.
- The Region will work with States regarding options related to **inclusion of climate change considerations in the Safe Drinking Water Act Sanitary Survey program.**
- Region 7 will encourage the Clean Water and Drinking Water State Revolving Funds to **incorporate climate change considerations into their intended use plans and point systems.**

- The Region will **use the SRF's revised Annual Review Checklists which incorporate sustainability and climate change questions** and communicate with state programs regarding nontraditional program eligibilities, including an entire section on climate and extreme weather resilience.
- The Region will **encourage sustainable practices such as green infrastructure and energy reduction in supplemental environmental projects (SEPs) when negotiating enforcement** and monitor results of such actions consistent with the terms of the SEP.
- The Region will coordinate with EPA Headquarters to bring **Water and Waste Water Utility Flood Resiliency Workshops to two communities in Iowa** where our federal and state partners have identified utility or water infrastructure priorities.
- Region 7 will partner with federal partners in mitigation and resilience to leverage resources and **share tools such as EPA's Flood Resilience Guide with flood plain managers, hazard mitigation planners**, and other stakeholders.
- The Region will work with States, WARNs (water/wastewater agency response network), and other local organizations **to identify and plan for climate change challenges by using the Climate Ready Water Utility toolbox**.
- The Region will continue work with the EPA Office of Research and Development to **demonstrate green infrastructure approaches** through our Net Zero partnership in Ft. Riley, Kansas.

Region 8

- Region 8 will **support water utilities through the use of CREAT**. Region 8 has two water utilities in Colorado and potentially one in Montana prepared to apply the CREAT tool to better plan for the effects of climate change and to provide information to make their facilities more resilient. Region 8 continues to recruit water utilities to use the CREAT tool.
- Region 8 continues **education and outreach on the use of green infrastructure** and implementation of green infrastructure in planning, design, and construction; the use of a systems approach; and the integration of efforts with the Urban Waters Partnership and the Partnership for Sustainable Communities.

Region 9

- During 2016, Region 9 will continue to **provide training to water utilities by conducting at least four water loss control workshops**. These workshops will help utilities determine the magnitude of losses from their distribution systems, and take steps to make the improvements necessary to reduce losses. The 2016 workshops will target utilities that have not been included in prior training for California's urban water systems.

- In summer 2016, in conjunction with the EPA Office of Research and Development, Region 9 will publish *Wasted Food Generation in the US – Sources, Amounts, and Estimation Methodologies*. This report builds on **Region 9’s Waste to Biogas Mapping Tool**, an interactive tool created to connect organic waste producers (e.g. food processing facilities) and potential users (e.g. wastewater treatment facilities) **for the purpose of increasing biogas production through co-digestion to increase renewable energy generation**. The new report will be the foundation of a to-be expanded tool, which will include national information, an expanded universe of sources, and diversion options.
- In the summer of 2016, in partnership with the University of California, Davis and ORD, Region 9 will publish a report entitled, “Evaluating the Air Quality, Climate & Economic Impacts of Biogas Management Technologies,” which considers biogas generated from sources such as anaerobic digesters at wastewater treatment plants. This report is intended to provide a more complete **understanding of the environmental and economic performance of biogas-to-energy technologies**, allowing state and local governments, regulators, and potential project developers to identify cleaner, geographically-appropriate, and cost-effective biogas management options.
- Region 9 will participate with the American Water Works Association (AWWA), the California State Water Resources Control Board (SWRCB), water and wastewater utilities, and other involved organizations in the **development of appropriate operator training and certification requirements for the advanced treatment technologies associated with wastewater recycling systems** to help ensure reliability and consistency in facility operations and maintenance. A draft proposal for review from AWWA for new operator requirements is expected by June 2016.
- In 2016, Region 9 will continue **collaboration to promote new technology and regulatory approaches for advancing wastewater recycling**, working with university and industry representatives at the Engineering Research Center for Reinventing the Nation’s Urban Water Infrastructure (ReNUWIt). Region 9 plans to co-sponsor a western regional conference with ReNUWIt to explore ways to overcome institutional barriers to wastewater recycling.
- Region 9 will continue to serve on the California State Water Resource Control Board’s Advisory Group for Direct Potable Reuse, considering precedent-setting work to develop state regulations and guidance on the potable use of recycled wastewater. Proposed regulations for indirect potable reuse via surface water augmentation will be reviewed in early-2016, and **by late 2016 recommendations regarding direct potable reuse are expected for review**.

Region 10

- Region 10 will work with Bremerton, Washington as part of the **Administrator’s “Making a Visible Difference” Initiative to utilize the Climate Resilience Evaluation and Assessment Tool to better understand the threats to their water utilities** and to develop measures to adapt to those threats. Completion is expected in April 2016.
- Region 10 will work with the **SRF Managers on incorporating components of green infrastructure and energy management into water and wastewater capital project loans.** SRF managers will work throughout the year.

Office of Research and Development (ORD) Projects and Initiatives

- In 2016, ORD will complete an **assessment of the feasibility of an Integrated Waste and Stormwater Management Wizard/ Analytical tool**, in partnership with the Office of Water and the Office of Policy. The tool is intended to support community decisions related to implementation and funding of green infrastructure, integrated planning and low impact design, compliance issues and realizing added benefits of green infrastructure (i.e. improved air quality). The wizard will leverage existing EPA tools and efforts that identify most pertinent information based on background and decision needs provided by end users.
- In 2016, ORD will **publish two volumes of a report evaluating adaptation of national water infrastructure.** The first volume analyzes adaptation readiness, and the second evaluates impacts on water infrastructure adaptation planning and engineering. The volumes apply integrated modeling of land use and changes in climate, as well as analyze sewer rates and storm runoff hydrograph in typical inland watersheds. The results are then incorporated into models such as the Stormwater Calculator to develop implications for practical design of infrastructure adaptation measures.

Goal 2: Support Integrated Water Resources Management (IWRM) to sustainably manage water resources

Goal
2

- ❖ Strategic Action 5: Understand and promote through technical assistance the use of water supply management strategies.
- ❖ Strategic Action 6: Evaluate and provide technical assistance on the use of water demand management strategies.
- ❖ Strategic Action 7: Increase cross-sector knowledge of water supply climate challenges and develop watershed specific information to inform decision making.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- In cooperation with EPA Regional offices, **expand the number of WaterSense partners** nationally and in each Region, with a goal of a 150 additional partners annually. (OWM)
- WaterSense plans to release **draft specifications for soil moisture-based irrigation controllers and landscape irrigation sprinklers**. (OWM) (<http://www.epa.gov/watersense>)
- WaterSense, working with ENERGY STAR, **plans to release a benchmark for water use in multi-family residential buildings through Portfolio Manager**. The two programs are also collaborating on a series of webinars for ENERGY STAR building partners to highlight opportunities for saving water in their facilities. (OWM)
- EPA will conduct the **annual Fix-a-Leak Week 2016** (March 14–20, 2016) that will include sponsoring events around the country ranging from family fun runs to leak detection contests to WaterSense demonstrations. All events are geared to teaching how to find and fix household leaks. (OWM)
- **EPA will publish a Drought Resilience Guide for water utilities in the spring of 2016**. The *Drought Resilience Guide* is similar to the recent *Flood Resilience Guide* and is designed to assist small-to-medium-sized water utilities responding to or threatened by drought. The *Guide* will focus on short-term/emergency actions but will also touch on longer-term resilience planning. Through short videos, text and worksheets, the *Guide* will relay lessons learned from six diverse water utilities nationwide and will provide guidance for other water systems to mitigate severe drought impacts. EPA will conduct three drought workshops in 2016. (OGWDW)

National
Priority
Action

Regional Program Actions

Actions Common to All Regions

- **Develop Regional WaterSense Partners:** Work with States, Tribes, municipalities, non-profit organizations, and businesses to promote the WaterSense Program in the region.

Additional Regional Actions

Region 1

- **The Region will promote the WaterSense Program** and support New England WaterSense Partners including:
 - Support regional WaterSense partners in program campaigns (i.e. Partner Awards, Fix-a-Leak-Week; Shower Better; Sprinkler Spruce-up etc.);
 - Conduct recruitment, outreach, media support, and presentations at various Region 1 meetings, events;
 - Participate in New England Water Works Association Water Resources Committee; and
 - Participate in the WaterSense Coordinators National Workgroup.

Region 2

- In 2016, Region 2 will **promote the WaterSense** Program and support our WaterSense Partners by carrying out the following activities:
 - Support regional WaterSense partners in **program campaigns** (i.e. Partner Awards, Fix-a-Leak-Week, Shower Better, Sprinkler Spruce-up);
 - Conduct recruitment, **outreach, media support, and presentations** at various Region 2 meetings and events;
 - Work on **Executive Order 13693 Section 10** requirements for regional cooperation by participating on Region 2's Water Resource Management and Drought Response Team; and
 - Promote WaterSense at **events** including the New Jersey Water Environment Association annual conference, the New York State Association of Towns and Supervisors annual conference, and Earth Day activities.

Region 3

- In 2016, the Region will participate in national WaterSense program planning and promote the WaterSense program at events including:
 - Fix-a-Leak Week (March 2016);
 - Earth Day activities (April 2016)
 - Pennsylvania State Association of Township Supervisors (May 2016)
 - National Drinking Water Week (May 2016);
 - Maryland Rural Water Conference (May 2016); and
 - Pennsylvania Municipal Authorities Conference (August 2016).

- Region 3 is conducting a study in the Delmarva Peninsula to evaluate the **effects that climate change imposes on socio-economic and natural resources**. The objective of this study is to build upon the integrated sustainability approach championed by the Office of Research and Development using the Triple Value Model. This study will set the stage to developing a cohesive, integrated strategy for achieving environmental, economic, and social progress. The project is a collaborative effort among the Region, ORD, and Delaware, Maryland, and Virginia.

Region 4

- The Region will develop consumer water conservation awareness and **regional metrics of water conservation**.

Region 5

- Region 5 will participate in national WaterSense program planning and **promote the WaterSense program**.

Region 6

- The Region will recruit six additional WaterSense partners as part of a regional water efficiency and conservation campaign.

Region 7

- The Region will engage with federal partners, States, and Tribes in **discussions on drought management**.
- Through a federal partnership with the U.S. Army Corps and FEMA, Region 7 will **promote collaboration and awareness of federal funding by developing a matrix of federal funding available for flood and drought mitigation and response**.
- The Region will **host a discussion with federal partners on EPA's initiatives and projects related to climate change**.
- The Region will broaden outreach on WaterSense by **reaching out to federal partners in Kansas City as part of Executive Order 13693**.

Region 8

- Region 8 is co-leading the **Montana Drought Demonstration Project (MDDP)** in partnership with the Montana Department of Natural Resources and Conservation (DNRC). The goal of the MDDP is to leverage multiple resources to engage communities in drought preparedness planning and



put forward implementation projects that build resiliency in the Missouri Headwaters Basin. The MDDP is poised to assist local groups with the development of drought plans, facilitate communication regarding drought conditions, and implement on-the-ground projects that build resiliency. EPA, DRNC, and NOAA are collaborating to host a series of conference calls, webinars, and in-person meetings to develop a drought monitoring network that meets local and regional scale needs and identifies data gaps related to soil moisture, streamflow, and precipitation. In addition, the Region has funded DNRC to develop tools to provide creative and consistent methods for communicating about drought at the local level. This work will be accomplished by convening a communications workshop and aggregating drought-related information into a centralized portal.

Region 9

- In 2016, Region 9 is contributing \$50,000, adding to funds contributed by the U.S. Bureau of Reclamation, Southern Nevada Water Authority, and the Central Arizona Project, for the Metropolitan Water District of Southern California's Innovative Conservation Program. After a solicitation of proposals, program funding will be sub-awarded to **support the development of selected innovative water saving devices, technologies, and strategies.**

Region 10

- **The Region will expand outreach opportunities to potential WaterSense partners as well as broadening the use of WaterSense certified fixtures** through the following activities:
 - Work with EPA Region 9, EPA Headquarters, and HUD on a series of webinars to introduce HUD Headquarters and Regional staff to WaterSense and related programs.
 - Enhance the H2otel Challenge by holding a Sustainable Lodging Workshop for up to 80 hotels from Washington State in May 2016.
 - Work with Seattle Public Utilities on a Public Service Announcement.
 - Present on WaterSense at continuing education courses for real estate agents and appraisers.
 - Work with Cascade Water Alliance and the Master Builders Association joint BuiltGreen/WaterSense certification and incentive program for builders including Habitat for Humanity.
 - Partner with our entities in Idaho and Eastern Washington on Fix-A-Leak Week press and social media to encourage the public to reduce the more than a trillion gallons of treated water that is wasted every year on leaks.

B) Watersheds and Wetlands:

***Vision Statement:* Watersheds are protected, maintained and restored to ensure climate resilience and to preserve the social and economic benefits they provide; and the nation's wetlands are maintained and improved using integrated approaches that recognize their inherent value as well as their role in reducing the impacts of climate change.**

Goal 3: Identify, protect, and maintain a network of healthy watersheds and supportive habitat corridor networks

Goal
3

- ❖ Strategic Action 8: Develop a national framework and support efforts to protect remaining healthy watersheds and aquatic ecosystems.
- ❖ Strategic Action 9: Collaborate with partners on terrestrial ecosystems and hydrology so that effects on water quality and aquatic ecosystems are considered.
- ❖ Strategic Action 10: Integrate protection of healthy watersheds throughout the National Water Program core programs.
- ❖ Strategic Action 11: Increase public awareness of the role and importance of healthy watersheds in reducing the impacts of climate change.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- The Healthy Watersheds Consortium Grant Program (<https://www.epa.gov/hwp/healthy-watersheds-consortium-grant>) launched in summer 2015 will continue to accelerate and expand the strategic protection of healthy freshwater ecosystems and their watersheds across the country. The grant and its sub-grant awards **will leverage a moderate federal investment with other partners and resources to grow state healthy watersheds programs and to sponsor local projects to protect and maintain intact watersheds and build resilience to a changing climate.** (OWOW)
- The EPA's Healthy Watersheds Program **will continue to work with public and private sector collaborators to enhance their capacity to identify and protect the Nation's healthy watersheds** and to build the resilience of these watersheds to a changing climate. (OWOW)

Regional Program Actions

Region 1

- Using funding through the Southeast New England Program, the Region will **identify, promote, and implement watershed-, landscape-, and ecosystem-based approaches to protection and restoration and promote integrated community and ecological resilience, including resilience to climate change.**
- Region 1 will continue to **review general and individual U.S. Army Corps of Engineers permits** for tide gates (and modifications of existing tide gates) for required operation and maintenance **plans to ensuring they are taking into account increase precipitation events and rising sea levels, allowing gates** to provide both flood protection and prevention of salt marsh wetlands from converting to invasive species dominated brackish or freshwater systems (that can result from conventional tide gate installation, or improper operation of self-regulating tide gates).

Region 3

- In coordination with the EPA Office of Research and Development, the Triple Value Simulation effort has been initiated in the Delmarva with input from stakeholders. The process aims to **capture decision options, potential benefits, and trade-offs associated with various sustainability strategies on the Delmarva Peninsula** especially in light of climate and land-use change and provide this information to decision-makers.
- In 2016, Region 3 will continue to work with the District of Columbia and Virginia to **establish a Watershed Resources Registry (WRR) in those jurisdictions.** The WRR has potential to be used as a tool for climate change adaptation planning. The WRR team will work to ensure climate change related information layers are included in in the WRR.
- In 2016, the Delaware River Urban Waters Federal Partnership's Climate Resilience Community of Practice **merged with the Partnership for the Delaware Estuary (PDE) Climate Outreach Roundtable for more efficiency and effectiveness.** PDE will host/lead this merged workgroup.
- The Partnership for the Delaware Estuary is exploring an evolution in the Weathering Change program with a shift from push to pull: instead of asking communities to sign onto the Take Action for Weathering Change statement, it will **explore the idea of identifying and working with innovative communities to be presented with an award for their efforts.**
- In 2016, EPA will continue to **work with its partners in the Chesapeake Bay Partnership to assess various ways in which climate change may affect the science and data and**



strategies for Bay restoration. This work will come together as part of the Mid-Point Assessment of the Bay TMDL and its implementation. Policy level decisions will be framed for the Bay partners to consider how climate change factors will be incorporated into the decision tools and strategies going forward. The 2014 Chesapeake Bay Agreement includes a Climate Resiliency goal with associated management strategies. By April 2016, the Chesapeake Bay Partnership will develop an implementation workplan for these strategies. Additionally, these activities will support the 2014 Agreement and the 2017 midpoint assessment.

- In March 2016, the Chesapeake Bay Partnership Scientific and Technical Advisory Committee (STAC) will **sponsor a climate change workshop geared toward generating a set of recommendations on which climate models** are most appropriate to downscale and integrate with the Partnership's other models.
- In July 2016, the Chesapeake Bay STAC will convene an independent review panel to evaluate available decision-making tools **and provide recommendations on incorporation of climate change considerations in 2017 and 2018.**

Region 7

- The Region will continue to coordinate with state and tribal partners to develop ways to **respond to effects of nitrogen loading and effects of climate change in watersheds.**

Region 10

- Throughout 2016, Region 10 will work with partners to integrate climate change into:
 - the 2016 **Puget Sound Action** Agenda and 5-year strategic plan;
 - the update to the Comprehensive Conservation and Management Plan for the **Tillamook Estuary**; and
 - the **Lower Columbia Estuary** protection plan.

Office of Research and Development Projects and Initiatives

- In 2016, ORD will document the process of defining and generating scenarios of air deposition and water quantity and quality inputs to the Gulf of Mexico at the mouth of the Mississippi River. These scenarios will be used in modeling studies to **evaluate the potential impacts of alternative nutrient management strategies under different climate and land use futures.**
- ORD will develop **national maps, including GIS data and scenario documentation, of "edge-of-field" water quantity and quality conditions for selected climate change scenarios.** The database will contain 12-kilometer scale edge-of-field surface runoff volume, surface sediment loss, nitrate loss in surface runoff and subsurface flow and

loss of nitrate and phosphorus attached to sediment for the continental US. Data layers will be made available for inclusion in the EPA *Enviro Atlas*.

- ORD will complete a research manuscript designed to **identify useful predictors and indicators of resilient watersheds**. The manuscript will describe results of modeling studies using a full fish assemblage model that incorporates habitat effects, biotic interactions, and movement. The model is spatially-explicit, reach based, and can incorporate habitat attributes as desired by the user, and will enable users to examine correlations among indices of watershed condition and trends in populations of salmon and other native fishes.

Goal 4: Incorporate climate resilience into watershed restoration and floodplain management.

Goal
4

- ❖ Strategic Action 12: Consider a means of accounting for climate change in EPA funded and other watershed restoration projects.
- ❖ Strategic Action 13: Work with federal, state, interstate, tribal, and local partners to protect and restore the natural resources and functions of riverine and coastal floodplains as a means of building resiliency and protecting water quality.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- The National Water Program will work with water programs and other EPA programs as the Agency implements the newly established **Flood Risk Management Standard**. This work will include review of interagency implementing guidelines for the Standard and application of the Standard to water programs as appropriate. (OWM and OW/IO)

Regional Program Actions

Region 1

- The Region will work with the Vermont Agency of Natural Resources and a community (probably Colchester, Vermont) to **pilot flood resilience checklist** and consider ways to connect wetland restoration and flood protection for climate resilience.

Region 2

- EPA Region 2 is supporting New York State on **developing implementation guidance for the 2014 Community Risk and Resiliency Act**. This Act requires decision makers to use the best available science in order to proactively consider sea level rise, storm surge, and flooding when issuing certain state funding and permits.

Regions 2 and 3

- The **Partnership for the Delaware Estuary continues efforts toward climate change adaption planning** by expanding upon the work of the climate change adaptation plan of 2010 developed through Climate Ready Estuaries funding. They continue to host workshops and develop education materials for municipalities within the basin. Projects underway include:
 - promoting a living shorelines process document that combines their knowledge of the Delaware Estuary Living Shorelines Initiative planning, installation, and outreach processes and best practices;

- holding biannual climate outreach roundtables; and
- recruiting communities for the Weathering Change program in which the agencies work with the community to help them understand the weather-related changes that are beginning to happen in their community.

Region 4

- The Region will work with the Gulf of Mexico Alliance to **include climate change considerations in projects and programs under the British Petroleum (BP) Deepwater Horizon** Natural Resource Damage Assessment and Restore Act procedures.
- Region 4 will work with **Mobile Bay National Estuary Program (NEP) to complete the 3 Mile Creek Watershed Management Plan and initiate additional efforts in the Toulmin Springs** subwatershed to address its climate change vulnerabilities.

Region 6

- The Region will continue efforts with Urban Waters small grants grantees in **education and outreach of green infrastructure**, wetland recitation, and awareness of the Lake Pontchartrain ecosystem in Louisiana.

Region 7

- The Region will work with federal partners through Executive Order 13693 to **host a state and/or tribal meeting on flood resiliency**. The Region will also continue to host quarterly meetings with staff members who work on flood resiliency issues through the Region 7 Climate Action Team.
- Region 7 will coordinate with green infrastructure leads, urban waters team lead, and 319 Coordinators **to account for climate change in EPA-funded and other watershed projects**.
- The Region will coordinate with FEMA to **compare hazard mitigation plans with 319 nine element plans** in order to identify possible opportunities to integrate information resources and implementation efforts.

Region 9

- Region 9 will continue work with the Pacific Islands Climate Change Cooperative and NOAA on the Administration's Climate Resilient Lands and Waters Initiative in Hawaii. Efforts will include **mapping of climate resilient partnership activities in each of the three geographic areas (Heeia (Oahu), West Maui, and West Hawaii)**, providing climate change information for the three partnership areas, and working with EPA's Corals and Climate Adaptation Planning Project to review the West Maui watershed plan, which relies upon the Climate-

Smart Planning Cycle with an Adaptation Design Framework. All work will be completed by August 2016.

- Region 9 will partner with researchers from the Bill Lane Center for the American West and Stanford University to **explore methods of permit streamlining for multiple-benefit projects along the San Francisco Bay shoreline**. These include projects that would treat wastewater, restore wetlands, and increase resilience to sea level rise. An example is the proposed Oro Loma Ecotone horizontal levee project. Such projects require permits from many state and federal agencies. EPA will work with state and federal regulatory agencies to evaluate permit streamlining recommendations.
- The goals of the San Francisco Bay Water Quality Improvement Fund include restoring wetlands and restoring water quality within the Bay and its watersheds. Region 9's 2016 Request for Proposals, expected to be released in March 2016, **will specify that projects should "account for climate change to help ensure that the project achieves its expected outcomes even as the climate changes,"** and notes that the "scope and approach should include a brief discussion of climate change considerations." Proposals are evaluated on a range of criteria, including whether or not they provide, "appropriate considerations for anticipated climate change effects."



Regional
Climate
Innovation

Goal 5: Watershed protection practices incorporate source water protection to protect drinking water supplies

Goal
5

- ❖ Strategic Action 14: Encourage States to update their source water delineations, assessments or protection plans to address anticipated climate change impacts.
- ❖ Strategic Action 15: Continue to support collaborative efforts to increase state and local awareness of source water protection needs and opportunities, and encourage inclusion of source water protection areas in local climate change adaptation initiatives.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- A Headquarters/Regions team **recently completed updates the Sanitary Survey Trainers' Guide** that provides guidance to States on developing a training regimen for staff in conducting sanitary surveys. This trainers' **guide now includes numerous examples of climate change adaptation measures that States could pass along to drinking water utilities in the course of conducting sanitary surveys.** This guidance document has been posted on the website of the Association of State Drinking Water Administrators (<http://www.asdwa.org/index.cfm?fuseaction=Page.viewPage&pageId=606>). (OGWDW)
- EPA will **release the public version of Drinking Water Mapping Application for Protection source Waters (DWMAPS) in early 2016.** DWMAPS brings together a suite of resources that can provide users with information to update source water assessments and prioritize source water protection measures in any location or watershed in the country. DWMAPS provides water systems, state programs, federal agencies and other interested stakeholders with data critical to drinking water source protection and allows users to easily inventory potential sources of contamination to water supplies. **This tool can help States and public water systems plan for potential climate change effects on their water resources.** (OGWDW)
- The Office of Water will seek opportunities to encourage federal agencies, States, and public water systems to **include climate change adaptation in state or local source water protection initiatives, and to include source water protection in climate change adaptation initiatives,** as time and resources allow. (OGWDW)

Regional Program Actions

Region 1

- The Region will participate in the **Connecticut Source Water Protection Collaborative,** an effort to protect Connecticut's drinking water resources and their associated environmental

assets in order to provide safe, adequate, and sustainable drinking water for the benefit of all citizens.

- The Region will continue its drinking water program's partnerships with the U.S. Department of Agriculture National Resources Conservation Service (USDA-NRCS) and U.S. Forest Service **to support source water protection in priority watersheds**. This includes a \$3 million joint project in the White Mountains National Forest watershed (headwaters of the Merrimack River) and a \$10 million, six state Regional Conservation Partnership Program (RCP) project focused on land conservation, drinking water protection, resiliency and water quality improvements in the Connecticut River Watershed/Long Island Sound.
- The Region will coordinate regional efforts among the Region's drinking water, emergency preparedness and enforcement programs to implement **key actions of the Merrimack River Initiative to protect source water quality**. Key actions including GIS mapping of contaminant threats within a one mile buffer of the river; outreach to aboveground storage tank owners; funding healthy community grants; coordinating with water utilities; and holding emergency preparedness workshops.

Region 2

- The Puerto Rico Department of Natural and Environmental Resources formed the **South Puerto Rico Coastal Aquifer Restoration Workgroup** which EPA is a part to address the critical state of the South Puerto Rico Coastal Aquifer. Not only have water withdrawals exceeded the recharging capacity in some areas, but in the central portion of the aquifer, salt water intrusion has been reported. Climate change and the current drought crisis have exacerbated the problem. The South Puerto Rico Coastal Aquifer is the major source of drinking water to South Puerto Rico and also provides irrigation water to the area, where most of the local produce in Puerto Rico comes from.

Region 3

- In 2016, Region 3 will work with **States and source water protection partners to raise awareness of climate change impacts** and encourage the incorporation of climate adaptation actions into source water assessments and protection plans.

Region 5

- The Region will revise guidance/process documents for technical assistance providers and inter-agency agreements to **include climate change considerations in source water assessments and protection plans**.
- The Region will revisit climate language and **make revisions to the State Annual Resource Deployment Plans**.

Region 7

- Region 7 will work with States and Tribes to increase Clean Water Act and Safe Drinking Water Act **collaboration for source water protection and reduction of non-point source pollution.**
- The Region will work with States during **SRF set-aside workplan reviews to encourage source water delineations, assessments or protection plans.**
- The Region will work with Kansas who **has incorporated source water protection into their Capacity Development plan utilizing SRF Set-Asides funds** for more intensive source water assessments/investigation to identify potential threats to drinking water as well as identify current threats such as nitrates. Funds will also be applied to the development of a drinking water protection plan from the investigation results.
- Region 7 will address **source water protection at State Nonpoint Source meetings** and other discussions with state/tribal partners.
- The Region will enhance partnerships with other regions and stakeholders regarding **harmful algal blooms and their impact on drinking water systems and coordinate with Headquarters** on harmful algal bloom issues to address human health and recreational impacts within the Region.

Region 8

- Region 8 is supporting States and Tribes working to develop strategies for how to deal with Harmful Algal Blooms. In addition, the Region 8 lab is planning to provide **analytical support for drinking water utilities and recreational areas to help them determine whether cyanotoxins are present during blooms.**

Goal 6: Incorporate climate change considerations into the wetlands program, including the Clean Water Act 404 program

Goal
6

- ❖ Strategic Action 16: Consider the effects of climate change, as appropriate, when making significant degradation determinations in the Clean Water Act (CWA) Section 404 wetlands permitting and enforcement program.
- ❖ Strategic Action 17: Evaluate, in conjunction with the U.S. Army Corps of Engineers, how wetland and stream compensation projects could be selected, designed, and sited to aid in reducing the effects of climate change.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- The National Water Program and Office of Research and Development will collaborate on a wetland vulnerabilities project **to identify wetland types and functions vulnerable to climate change impacts and assess approaches for integrating climate science into clean water programs** including Clean Water Act Section 404 Wetlands Program, Healthy Watersheds Initiative, and National Wetlands Condition Assessment.

In the next phase of work (2016 and beyond) both technical and applied areas will be further developed, including:

- extension of the conceptual framework and technical approach to coastal wetlands, allowing a comparison with inland wetlands; and
 - development of a qualitative approach to parallel the quantitative methods; and
 - follow-on collaborations with both Office of Water and Regional partners to translate/tailor the results to inform adaptation of specific programs and activities. (OWOW)
- EPA will continue the analysis and implementation phase of the Clean Water Act Section 404 Program Assessment in cooperation with the USACE which may include **evaluating the potential to propose one or more climate change action items as an area of joint work.** (OWOW)

Regional Program Actions

Region 1

- The Region will continue co-chairing a regional **climate working group with federal resource agencies and the USACE to identify opportunities to integrate climate change considerations into Clean Water Act Section 404** and Section 10 permits. The workgroup

meets quarterly to discuss joint training, mitigation, compliance, and grant programs; and is developing climate information materials for permit applicants and project managers.

- The Region will continue partnering with USACE to **promote low-impact development (LID) in Clean Water Act (CWA) Section 404 projects** through the pre-application process and permit reviews.
- The Region will provide **priority points in the Wetland Program Development Grants Competition for projects targeting climate change adaptation**. In Fiscal Year 2015-2016, the request for proposals (RFP) stated as priority, those projects which: “ensure that wetland complexes of high ecological value, blocks of unfragmented habitat, and/or areas or practices that provide resilience for wetland and aquatic resource impacts from climate change (including stream buffers, connected aquatic habitats, and improved stream crossings/culverts) are protected and maintained.”

Region 2

- Region 2 awarded \$1.5 million in Fiscal Year 2015-2016 **Wetland Program Development Grants**. Funding was awarded to:
 - The Meadowlands Environmental Research Institute (of the New Jersey Sports and Exposition Authority) **to examine greenhouse gas exchange and carbon sequestration potential throughout the Meadowlands** to inform wetland preservation and mitigation decisions.
 - The **New York City Department of Parks and Recreation to develop core indicators of wetland vulnerability to storm water disturbance** and prepare preliminary guidelines for storm water management to better protect downstream wetlands.
 - The Barnegat Bay Program, partnering with Partnership for the Delaware Estuary, to develop **methods to evaluate the progress of tidal wetland restoration projects**, compare restoration to regional tidal wetland conditions and use these data to improve restoration practices and success.
 - The New Jersey Department of Environmental Protection, who will **collect statewide wetland reference data**, determine reference baselines to enable evaluations of impacts and change, and expand its network of surface elevation table stations **to monitor coastal marsh trends in elevation**.
- EPA Region 2 continues to consider **climate change and sea level rise when reviewing proposals for wetland mitigation and mitigation banking** (e.g. Hackensack Meadowlands projects) **and infrastructure projects**, including those funded through the Department of Housing and Urban Development's Rebuild By Design process.
- Region 2 collaborates with other federal agencies on infrastructure and wetland restoration projects through a number of venues. One such venue is the **New York-New Jersey Federal Leadership Resilience Collaborative**. As an example, a wetland restoration project in

Suffolk County, New York which will enhance coastal resilience is being funded by the Department of Interior.

Region 3

- In Phase 2 of an EPA Office of Research and Development (ORD) project on integrating climate science into water programs including CWA Section 404 and Healthy Waters initiatives, Region 3 scientists are working with ORD to assess implications of climate change on wetland ecosystems. Specifically, the Region is working with the Clean Water Act section 404 wetlands program to **evaluate assessment methods in pilot watersheds in Region 3 to help practitioners and managers take into account climate change considerations in state and regional programs.**
- In 2016, Region 3 will work with state wetland monitoring and assessment programs to **develop climate change indicators for wetlands**, focusing on reference wetlands. Region 3 scientists are participating in 2016 National Wetland Condition Assessment.



Region 4

- **The Region will consider effects of climate change as appropriate when evaluating Least Environmentally Damaging Practicable Alternatives** in the context of CWA Section 404 Wetlands Permitting.
- **Region 4 will ensure water conservation and efficiency measures are considered, where appropriate, as part of wetlands 404 permitting** before new water resource projects are approved.

Region 6

- Region 6 will initiate planning discussions about **incorporating climate science considerations into the Wetlands Section program responsibilities.**

Region 7

- Through Executive Order 13693, the Region will continue to work with federal partners on ways to consider **and promote low impact development and integrate climate change in the CWA Section 404** wetlands permits and Section 10 permits.
- The Region will work with the USACE and Clean Water Act Section 404 programs to **incorporate climate change impacts in compensation plans and draft Environmental Impact Statement (EIS) documents.**

Goal 7: Improve baseline information on wetland extent, condition and performance to inform effective adaptation to climate change

Goal
7

- ❖ Strategic Action 18: Expand wetland mapping by supporting wetland mapping coalitions and training on use of the new federal Wetland Mapping Standard.
- ❖ Strategic Action 19: Produce a statistically valid, ecological condition assessment of the nation's wetlands.
- ❖ Strategic Action 20: Work with partners and stakeholders to develop information and tools to support long term planning and priority setting for wetland restoration projects.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- The EPA will continue to support a number of Regional Wetland Program Development Grants to **support updating the National Wetlands Inventory** to ensure that wetland mapping efforts are current. (OWOW)
- In 2016, EPA will **release a final report on the results of the 2011 National Wetland Condition Assessment (NWCA)**. The NWCA is a statistical survey of the quality of our Nation's wetlands. These assessment data will help provide a baseline of wetland condition for **increasing our understanding of changes in wetland condition over time as a result of climate change** and other factors. In addition, the field sampling for the 2016 NWCA will be conducted across wetland sites in the conterminous U.S. (OWOW)
- EPA will use wetland soil carbon data from the 2011 NWCA survey to **support the EPA Office of Air and Radiation's annual emissions reporting** for the Greenhouse Gas Inventory program under the Intergovernmental Panel on Climate Change. (OWOW)
- In 2016, Wetland Program Development Grants and targeted technical assistance will continue to support various projects for **developing information and tools related to climate change** and long-term planning and priority setting for wetland restoration projects. The EPA will continue to work with the Association of State Wetland Managers on a grant to "raise the bar" on wetland restoration. (OWOW)
- EPA will cooperate with the Association of State Wetland Managers and the Association of Fish and Wildlife Agencies on an initiative **to increase understanding and to share best practices regarding the role of beavers to potentially improve landscape-scale resilience** and mitigate drought conditions in the Western States. (OWOW)
- Using a Wetland Program Development Grant, Restore America's Estuaries (RAE) will develop and **operate a Living Shorelines Academy** to advance the use of living shorelines by providing targeted outreach and training to a range of stakeholders. In 2016, RAE is

planning to launch a web-based national “portal” for information related to living shorelines and will hold two regional meetings with key stakeholders and practitioners. (OWOW)

Regional Program Actions

Region 1

- The Region will hold a state-federal workshop in May 2016 to further the protection of buffers to streams, wetlands, lakes and ponds. **Climate change considerations will be a significant driver in our discussions and the format of the agenda.**
- Under **Wetland Program Development Grants**, the Region will undertake several projects in 2016, including:
 - The Massachusetts Department of Environmental Protection will create coastal hazard maps and develop policies for coastal wetland resilience;
 - Massachusetts Coastal Zone Management will develop a program to monitor and assess long-term impacts of climate change on tidal marshes through the application of image analysis and remote sensing techniques; use CAPs (Conservation, Assessment and Prioritization) tools to map trends in tidal marsh microhabitats, and marsh condition through time;
 - The University of Massachusetts, Amherst will make CAPS assessments and tools available to all the New England States to allow users to create scenarios for restoring aquatic connectivity (culvert replacement, dam removal);
 - The New Hampshire Department of Environmental Services will work to enhance technical resources, develop tools, and conduct outreach to assist municipalities in identifying and prioritizing areas that are vulnerable to threats from climate change and areas to improve inadequate river crossings for habitat, public safety, and overall ecosystem function; and
 - The Rhode Island Department of Environmental Management, in collaboration with the Rhode Island Coastal Resources Management Council, will carry out a multi-year project to strengthen the wetland monitoring and assessments components of state programs in order to support adaptation of wetland protection and restoration programs to changing climate conditions, with an emphasis on coastal wetlands.
- The Region will continue to participate in regional **Marsh Migration and Living Shorelines** projects and workgroups through the Northeast Regional Ocean Council.
- The Region will continue to **work with Massachusetts Office of Coastal Zone Management (CZM) and Department of Environmental Protection (DEP) to address the threats of sea level rise to coastal wetlands.** CZM is generating site-specific information and maps to identify and communicate vulnerability, risk, and impacts to Massachusetts's coastal wetlands under various scenarios of sea level rise. The data and information generated will result in more accurate and informed forecasting of coastal wetland changes, including

areas of loss, areas where marsh migration may be supported, and areas that are predicted to undergo changes in wetland types.

- The Region will continue to **work with the Maine Department of Conservation’s Natural Areas Program to start identifying sites with high resilience to climate change** for targeted protection efforts, based on the results of the “Conservation Planning for Tidal Marsh Migration Due to Sea Level Rise” project. The goal of this project is to minimize net loss of tidal marsh habitat and its incumbent functions and values by identifying and initiating conservation planning for landscapes that will be needed to accommodate marsh migration.

Region 2

- Region 2’s Regional Applied Research Effort (RARE) grant program is funding **testing of tidal marsh shoreline restoration tactics to enhance ribbed mussel densities, sizes, and spatial coverage**. The project’s realized level of mussel recruitment and establishment will be translated to water quality ecosystem services by applying ribbed mussel physiological rate data established in prior field based experiments from previous RARE research. The project will report the level of total suspended solids and nitrogen removal realized from shoreline restoration tactics that are designed to improve ribbed mussel establishment with the goal to improve the success of tidal marsh restoration efforts and concurrently improve water quality ecosystem services in those restorations.
- In 2013, Region 2 provided \$323,000 in Section 319 funds to New Jersey Department of Environmental Protection and the Partnership for the Delaware Estuary (PDE) for **Mussels, Water Quality, and Living Shoreline work**. The ongoing work on associated projects include:
 - Assessing the **potential for incorporating freshwater mussel beds into urban living shoreline projects**, and to estimate any attendant benefits to water quality. PDE scientists surveyed mussels near to identify restoration needs and is building research partnerships that will help them quantify habitat suitability indices for species targeted for living shorelines. Researchers will begin water quality experiments in 2016 to quantify the benefits of three top species of mussels for removing suspended particulate pollutants.
 - Holding several meetings in 2015 with key state, federal, and local groups to discuss the feasibility of several **conceptualized living shoreline designs at the Harrison Avenue Landfill Site**. PDE will prepare a Request for Proposals for a qualified engineering partner to help refine the conceptual designs and to determine what additional site characterization data will be needed. The urban living shoreline final design is slated for 2017.
- The Barnegat Bay Program is partnering with Partnership for the Delaware Estuary to develop **methods to evaluate the progress of tidal wetland restoration projects**, compare restoration to regional tidal wetland conditions and use these data to improve restoration

practices and success.

Region 3

- Region 3 will work collaboratively with **state partners to build their capacity to develop and implement wetland monitoring and assessment programs to establish current wetland condition**. Region 3 has several States with comprehensive wetland monitoring programs. Collection of wetland condition data will help States to predict and adapt to future climate changes. Region 3 affectively using the Wetland Program Development Grants to do this work incorporating climate adaptation priorities in the Request for Proposals.

Region 4

- The Region will work with the **Governors South Atlantic Alliance to include climate change considerations into Alliance efforts**, such as including shoreline protection for resiliency as a component of a state wetlands grant project.

Region 7

- Region 7 will collaborate with state and tribal partners to help build their capacity and **implement wetland monitoring and assessment programs through the Enhanced State and Tribal Program**.
- The Region will work with States and Tribes to set up, prepare, host, and execute the **2016 National Wetland Condition Assessment Survey**. This involves providing Regional National Wetlands Condition Assessment training, site evaluations, site assistance, site audits, and technical assistance for the States and Tribes.

Region 8

- The Region will emphasize the importance of preservation, restoration, and management of wetlands and riparian areas as potential tools in response to climate change impacts. Region 8 is including identifying how and why **projects proposed under the Wetland Program Development Grant will address the impacts of climate change**, how it will help ecosystems become more resilient, and increase the ability of state, local, and tribal decision makers prepare for the effects of climate change as a regional priority.

Region 9

- The San Francisco Bay Water Quality Control Board was awarded EPA wetland grant funds to analyze California's permitting process for wetland restoration projects in the San Francisco Bay Area. During 2016, these grant funds will be used to **recommend changes to California policy by maintaining environmental protection while reducing barriers for projects that are critical for sea level rise resilience**.

C) Coastal and Ocean Waters

***Vision Statement:* Adverse effects of climate change and unintended adverse consequences of responses to climate change have been successfully prevented or reduced in the ocean and coastal environment. Federal, tribal, state, and local agencies, organizations, and institutions are working cooperatively; and information necessary to integrate climate change considerations into ocean and coastal management is produced, readily available, and used.**

Goal 8: Collaborate to ensure information and methodologies for ocean and coastal areas are collected, produced, analyzed, and easily available

**Goal
8**

- ❖ Strategic Action 21: Collaborate to ensure that synergy occurs, lessons learned are transferred, federal efforts effectively help local communities, and efforts are not duplicative or at cross-purposes.
- ❖ Strategic Action 22: Work within EPA and with the U.S. Global Change Research Program and other federal, tribal, and state agencies to collect, produce, analyze, and format knowledge and information needed to protect ocean and coastal areas and make it easily available.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- Through involvement with the U.S. Coral Reef Task Force, **EPA will work to protect coral reefs from the impacts of climate change.** This requires federal, state, and territory governments to form partnerships with other key players, including industry, to reduce the rates of greenhouse gas emissions. Further, as coral reefs continue to decline globally, reef managers must strengthen efforts to build resilience into their ecosystems by working with communities to address local threats. (OWOW)
- In its response to ocean acidification, EPA will provide three National Estuary Programs with **funding for high-frequency and high-precision measurement of pH and dissolved carbon dioxide.** This water quality monitoring in the near-shore coastal environment has the ability to record small, seasonal, and long-term changes in seawater chemistry. (OWOW)

- The EPA coastal program will continue a partnership with ORD **to develop a monitoring standard operating procedure for acidification** indicators that are appropriate for estuarine environments. (OWOW)
- In 2016, EPA’s coastal program will continue support for the **Salish Sea Acidification Model Development project** which examines how various regional land-based sources of carbon and nutrients exacerbate acidification in the Salish Sea. (OWOW)
- In 2016, the EPA Coastal Program will **develop a communication strategy that will assist in informing stakeholders of the interconnectivity of nutrient pollution, coastal acidification, and coral reef health.** (OWOW)
- The EPA coastal program will work with the Association of Clean Water Administrators (ACWA) and the Coastal States Organization (CSO) to **develop a workshop or webinar series for state and EPA participants to discuss CWA and other pertinent authorities that could be used to control land-based sources of pollution that are exacerbating ocean acidification.** After the workshop a guidance document that identifies the most practicable options for addressing acidification in coastal waters will be developed. (OWOW)
- EPA’s coastal program will continue its collaboration with the National Center for Environmental Economics on the **development of ecosystem services valuation methodologies and will develop a user’s guide** that will allow state agencies to modify the models to predict local impacts. (OWOW)
- EPA will continue working with other federal agencies to identify the carbon sequestration benefits associated with coastal wetlands. These **“blue carbon” ecosystems** are significant in national greenhouse gas (GHG) accounts and are being lost at a rapid rate. These ecosystems also provide benefits such as habitat, storm protection, water quality and recreation. (OWOW)
- In Fiscal Year 2014, EPA funded its first blue carbon pilot project with the Tampa Bay National Estuary Program (NEP). The Tampa Bay project will quantify greenhouse gas reductions from acres of blue carbon ecosystems protected and restored by the NEP over past 10 years. In 2016, EPA will work with NEPs to **develop potential blue carbon projects.** (OWOW)

Regional Program Actions

Region 1

- Region 1 will continue to co-chair a steering committee that is leading a joint effort by the Northeast Regional Ocean Council and the Northeastern Regional Association of Coastal and Ocean Observing Systems to develop and release a draft “science and implementation plan” for an **Integrated Sentinel Monitoring for Change in Northeastern Marine and Estuarine**

Ecosystems. The plan will be finalized in 2016 and used to help secure additional funding to implement the regional strategy and establish a sentinel monitoring network.

- The Region will continue to participate on the **Northeast Coastal Acidification Network (NECAN) Steering Committee to help coordinate research and management of coastal acidification issues.**
- The Region will work with EPA Office of Research and Development in 2016 to **support two research projects:**
 - investigating impacts of coastal acidification on the ecological health of shellfish in Southern New England; and
 - assessment of eelgrass and “Blue Carbon” to determine if eutrophication negatively effects ecosystem function and carbon accretion in eel grass meadows.
- As EPA’s Federal representative for the Northeast Regional Ocean Council (NROC) and co-chair of NROC’s Ocean and Coastal Ecosystem Health Committee, EPA Region 1 will continue to **participate in a wide range of interagency efforts to collect and disseminate data** on ocean uses and natural resources that will support climate change vulnerability assessments and adaptation planning (see www.northeastoceandata.org).

Region 3

- The Region will support the Chesapeake Bay Program Office (CBPO) efforts to **develop a Climate Resiliency Workplan for Chesapeake Bay** to integrate climate considerations into Wetland and Land Use Goal Implementation Teams (GITs).
- The Region will **develop a Regional Ocean Assessment** to capture the current state of Mid-Atlantic waters based on all of the current human use and ecological datasets collected to date and to establish a baseline for ocean indicators related to climate change. Once this information has been analyzed, the data will be released to the Mid-Atlantic States to **assist and contribute to sound environmental management decisions regarding climate change and the associated effects of climate change.** The Region will continue to collect Mid-Atlantic Bight water quality data during annual ocean surveys.

Region 6

- The Region will participate in the **application of blue carbon principles as management tools** for the conservation and restoration of coastal wetlands.

Region 9

- In 2016, Region 9 will continue **to work with the Coral Reef Task Force to coordinate with other agencies on coral reef protection actions in the Pacific Islands.** Ocean Acidification,

point source and non-point-source pollution all add stress to the critical coral reef resources. The aim is to coordinate in order to control stressors and increase protection on Pacific coral reef systems.

- EPA's Climate Ready Estuaries program provided \$50k in funding to the San Francisco Estuary Partnership and its partner, the California Coastal Conservancy, to conduct a "Blue Carbon" study in 2016. The study will **assess methane fluxes associated with pond management at the South Bay Salt Pond Restoration Project in South San Francisco Bay**, an area undergoing large-scale tidal wetlands restoration as well as ongoing management of former salt ponds.
- Region 9 is participating in the Coastal Hazards Adaptation Resiliency Group (CHARG), a regional effort in the San Francisco Bay Area **to address the impacts of future sea level rise and current challenges with extreme tides, and implement regional flood protection solutions**. CHARG consists of several working groups of over 100 engineers, planners, scientists, and policy makers from local, state, and federal entities.

Region 10

- Region 10 will work with the States of Washington, Oregon, and Alaska to **develop a better understanding of the impacts of ocean acidification**, understand the contribution of local sources to ocean acidification, and possible actions. This work will continue throughout the year with States.

Goal 9: EPA geographically targeted programs support and build networks of local, tribal, state, regional and federal collaborators to take effective adaptation measures for coastal and ocean environments

Goal
9

- ❖ Strategic Action 23: Work with the National Water Program's larger geographic programs to incorporate climate change considerations, focusing on both the natural and built environments.
- ❖ Strategic Action 24: Address climate change adaptation and build stakeholder capacity when implementing National Estuary Program Comprehensive Conservation and Management Plans and through the Climate Ready Estuaries Program.
- ❖ Strategic Action 25: Conduct outreach and education, and provide technical assistance to state and local watershed organizations and communities to build adaptive capacity in coastal areas outside the NEP and Large Aquatic Ecosystem programs.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- In 2016, the Climate Ready Estuaries Program will **provide funding for new climate change vulnerability assessment** projects and support revision of Comprehensive Conservation and Management Plans (CCMPs) to address climate change as called for in National Estuary Program grant guidance. These projects will increase NEP capacity for climate resilient, risk-based decision-making, and serve as examples for other place-based programs. (OWOW)
- In 2016, the Climate Ready Estuaries Program will continue to promote the use of the *Being Prepared for Climate Change* workbook to help place-based organizations make decisions when they are faced with high risks from climate change and **will develop a follow-on tool** addressing hard to address impacts to support this work. (OWOW).
- In 2016, the Climate Ready Estuaries Program will **develop a "high risks handbook"** to provide place-based organizations with decision support for high risks from climate change that cannot be mitigated. (OWOW)
- Working with the Long Island Sound Program and NASA, the Climate Ready Estuaries Program will develop a **tool to provide easy access to data on sea surface temperatures and application of the data to estuary vulnerability assessments.** (OWOW)

National
Priority
Action

Regional Program Actions

Action Common to All Regions

- **Promote Use of Tools from the Climate Ready Water Utilities (CRWU) and Climate Ready Estuaries (CRE) Programs:** Work with municipal and private water utilities to promote their use of the new Climate Ready Resilience and Awareness (CREAT) Version 2.0 to recognize and respond to climate change risks, and with National Estuary Program partners to promote the use of the new Climate Ready Estuaries Vulnerability Assessment Handbook to develop local climate resilience plans. EPA regions will work with States to establish goals for the new workbook for watershed climate resilience planning in 2017 (e.g.; a goal of initiating one watershed climate resilience plan in each State in 2017).

**National
Priority
Action**

Additional Regional Actions

Region 1

- In 2016, the Region will support work by the six New England **National Estuary Programs (NEPs) to assess the vulnerability of their study areas to the impacts of climate change** and to promote actions that prioritize adaptation and resilience in the Comprehensive Conservation Management Plans (CCMPs).
- The Region will support the Casco Bay Estuary Partnership as it **completes an independent Climate Ready Estuaries Program funded climate change vulnerability assessment** in conjunction with the completion of their CCMP update.
- The Region will continue to work with the Department of Homeland Security (DHS) on their **Casco Bay Maine Climate Change Adaptation Project as part of their Regional Resiliency Assessment Program** that is focusing on critical infrastructure, including wastewater and drinking water.
- The Region will continue to work with EPA ORD and the Buzzards Bay National Estuary Program to **initiate RARE (Regional Applied Research Effort) and RESES (Regional Sustainable Environmental Science) climate change projects for the Mattapoisett Water System** and other watershed communities in Massachusetts.
- The Buzzards Bay National Estuary Program will continue work with state and local partners to **implement its recently completed vulnerability assessment of water infrastructure and environmental justice communities in the New Bedford Harbor** area funded under the Climate Ready Estuaries Program.

Region 2

- The **Barnegat Bay Partnership** (NJ) will be working on two projects:
 - The **Sea Level Rise and Barnegat Bay's Wetlands** project will examine Barnegat Bay shorelines to identify potential areas of marsh migration and possible impacts to existing developed areas due to tidal inundation from sea level rise.
 - The **Blue Carbon Storage in Natural Estuarine Wetlands and Living Shorelines of Delaware and New Jersey** project will evaluate the carbon dioxide mitigation benefits provided by natural and restores coastal wetlands in Delaware and New Jersey.

- The **Peconic Estuary Program**, with funding from the Climate Ready Estuary Program, will conduct a **climate vulnerability assessment** in cooperation with the **Shinnecock Nation** in 2016.

- The **Partnership for the Delaware Estuary** received Climate Ready Estuaries funds to perform a **climate change vulnerability assessment** in conjunction with its CCMP revision process beginning in October 2016.

- In 2016 the NY/NJ Harbor & Estuary Program (HEP) will adapt EPA's "**Being Prepared for Climate Change**" **workbook methodology** to its region, seizing the opportunity to coincide with the Program's Action Plan and Comprehensive Conservation and Management Plan (CCMP) **re-visioning process**.

- As part of Association of National Estuary Programs (ANEP) "Climate Change Capacity Building in Three Estuaries of National Significance", **HEP is working with its local partners to build capacity for climate change adaptation in disadvantaged communities via building resiliency**. HEP is working with North Shore Waterfront Conservancy of Staten Island to undertake the local Harbor Estuary project. This effort is being coordinated with various New York City agencies, including the Office of Recovery and Resiliency.

- **The Long Island Sound Study continues to work on the Sunken Meadow Restoration Project**, a Hurricane Sandy funded project, which began in March 2014. This project includes a **large green infrastructure** installation in the parking lot to help reduce run off to the Sound, **wetland planting and restoration**, a fish passage feasibility study and design and hiring a seasonal education and outreach staff person for the site.

- EPA Region 2 and state and local agencies continue to collaborate on the **Long Island Smart Growth Resiliency Partnership to guide post-Hurricane Sandy redevelopment and recovery on Long Island**. Their efforts focused on three areas:
 - **Health Impact Assessments** uses scientific data, health expertise and public input to help guide local governments to avoid and resolve impacts on public health that result from their decision-making and actions taken. The Partnership is supporting the State's

efforts to develop implementation recommendations for the NY Community Risk and Resiliency Act and implementing a pilot Health Impact assessment (HIA) in Suffolk County that is evaluating proposed code changes for onsite sewage disposal systems.

- **Ecosystem Services Valuation** will specifically key on Long Island eco-systems to help guide decisions on infrastructure projects. This project is looking at key communities in both Nassau and Suffolk and is focusing on New York Rising Community Reconstruction plan projects.
- EPA Region 2 is providing **targeted technical assistance** for three Long Island communities in order to produce, develop and explore the potential options for communities to **update their local laws to become more resilient to climate risks**. Options can include zoning ordinances, coastal zone management plans, subdivision ordinances, stormwater management, post disaster recovery ordinances, floodplain ordinances, National Flood Insurance Program Community Rating Systems participation and green infrastructure guidelines. Specifically, EPA will:
 - Refine a resilience assessment tool for use in the demonstration communities;
 - Identify potential “code fixes” for the demonstration communities land use laws/codes, policies, and regulation that, if adopted, would make communities more resilient to flooding, storm surge, and sea level rise;
 - Encourage collaborative planning and implementation within the community and inter-agency and inter-governmental coordination for resilience and risk reduction in written products and the technical assistance meetings; and
 - Publish a report that will assess the project and identify lessons learned that will assist other New York communities.

Regions 2 and 3

- Working with the Partnership for the Delaware Estuary, the Region will **continue to provide resources and information to municipalities within the Delaware Estuary regarding climate change** adaptation efforts and working through hurdles. The Partnership for the Delaware Estuary, a Climate Ready Estuary, will continue to find resources to conduct living shoreline pilot installations and maintenance within the Estuary

Region 2

- The Region will support the **Maryland Center for Inland Bays and the Delaware Inland Bays National Estuary Programs in their climate change adaptation efforts**, through activities including: incorporation of climate change and sea level rise in public outreach and communications; including climate change considerations in comprehensive conservation management plans (CCMPs); and convening partners to consider climate change adaptation across watersheds.

- The Chesapeake Bay Program (CBP) has an active collaboration with several climate change researcher teams using the CBP's integrated airshed, watershed, and estuary models of the Chesapeake. **The work is providing the CBP information for a 2017 assessment of the influence of climate change on the Chesapeake TMDL.** Collaborators include Penn State, U.S. Geological Survey (USGS), EPA's Global Change Research Program, and the University of Maryland. Products to date include progress on an optimized watershed management for the Patuxent that estimates additional management needed to offset climate change impacts, and a case study application in the Chesapeake Bay Program addressing water quality management decisions in the face of climate change and other relevant uncertainties.

Region 4

- The Region will promote **Climate Ready Estuaries program in Region 4** National Estuary Programs (NEPs), and work with the NEPs to **revise and update the NEP Comprehensive Conservation and Management Plans (CCMPs) to address vulnerabilities to climate change.**

Region 5

- In 2016, the Great Lakes National Program Office (GLNPO) **will continue to restore and maintain the chemical, physical, and biological integrity of the Great Lakes ecosystem in the face of climate change by:**
 - Adjusting long-term monitoring program schedules and methodologies, as appropriate.
 - Integrating climate change into Great Lakes Restoration Initiative-funded projects and other GLNPO funding mechanisms to ensure that the latest science informs project design.
 - Directing necessary revisions to Great Lakes strategic implementation documents, while working with federal, state, tribal and binational partners, using the latest climate change information.

Region 6

- The Region will support three NEPs (Coastal Bend Bays and Estuaries Program, Galveston Bay Estuary Program, and Barataria-Terrebonne National Estuary Program) and the Gulf of Mexico Program as they **develop climate change vulnerability assessments, implement sea level rise adaptations, and augment coastal natural resource and community resiliency.**
- The Region will provide project engineering and design services, project management, ecological science technical services, and public outreach support in the ongoing efforts of the **interagency Coastal Wetlands, Planning, Protection and Restoration Act program to restore coastal wetland habitat in Louisiana.**

Region 9

- “As part of the “Making a Visible Difference” Initiative, Region 9 is working with **American Samoa on climate change resiliency**. The effort will include long-term infrastructure planning, potentially using the CREAT tool (late Fiscal Year 2015 – Fiscal Year 2016), and assessing coral reef vulnerability as a result of ocean acidification and nonpoint source and stormwater pollution.”
- The Region will update the **Coral Reef Strategy for Hawaii and the Pacific Islands** to highlight accomplishments from the 2013 strategy and lay out actions for the next year to reduce pollution threats to coral reefs. This work will include coordination of coral reef programs (e.g. Coral Reef Task Force, local watershed projects, local coral management efforts) and integration of coral reef protection with EPA programs across divisions at Region 9 and at Headquarters. The Region will provide leadership on ocean acidification and impacts to coral reefs within EPA and to the Coral Reef Task Force.

Region 10

- The Region will work with the Puget Sound National Estuary Program to continue funding projects that promote and **support adaptation and resiliency to climate change impacts**. The Region will draft and/or incorporate grant assistance agreement criteria - consistent with regional and national programs- to integrate climate adaptation and resiliency into Puget Sound Geographic Program funded projects.
- The Region will work with several Tribes to **host a two-day workshop on “Making Sense of Sea Level Rise”**. The workshop will provide an overview of the state of knowledge for modeling and projecting sea level rise in Puget Sound, the impacts on sea level rise on treaty trust resources and tribal culture, and what changes to planning policy, and regulations are needed to address anticipated sea level rise impacts.



Goal 10: Address climate driven environmental changes in coastal areas and ensure that mitigation and adaptation are conducted in an environmentally responsible manner

Goal
10

- ❖ Strategic Action 26: Support coastal wastewater, stormwater, and drinking water infrastructure owners and operators in reducing climate risks and encourage adaptation in coastal areas.
- ❖ Strategic Action 27: Support climate readiness of coastal communities, including hazard mitigation, pre-disaster planning, preparedness, and recovery efforts.
- ❖ Strategic Action 28: Support preparation and response planning for diverse impacts to coastal aquatic environments.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- In 2016, the National Water Program will work with EPA Regions and States along the Gulf of Mexico and Atlantic coasts to **evaluate risks of storm-driven inundation of coastal water and wastewater facilities as a result of a storm surge event** comparable to Hurricane Sandy and work with utilities to address risks. (OW/IO, OGWDW, and Region 1, 2, 3, 4 and 6)
- In 2016, EPA will offer **Storm Surge/CREAT Training Workshops** to train groups of environmental trainers via webinars and in-person sessions. Twenty to thirty trainers will be trained in each workshop. Locations will be held in coastal areas along the Atlantic and Gulf coasts. (OGWDW)
- **EPA will host at least one webinar in coordination with NOAA on the water sector and climate change** that will include a session will include a presentation on CREAT 3.0 and pilots. (OGWDW)
- EPA will promote the **Extreme Events Workshop Planner** designed to provide everything a utility needs to plan, customize, and conduct a workshop focused on planning for more frequent and more intense extreme events. Five extreme event scenarios are included in the Workshop Planner: flooding; drought; sea level rise; wildfire; and reduced snowpack. (OGWDW)
- EPA will **monitor the blue carbon projects it launched in 2015, as well as continue developing an EPA blue carbon strategy**. Education and outreach about blue carbon continues with EPA partners. (OWOW)

National
Priority
Action

Regional Program Actions

Region 2

- EPA Region 2 continues to be involved in **Superstorm Sandy recovery** efforts through Coordination teams:
 - The **Coastal Hudson County Technical Coordination Team** has provided input on the criteria that New Jersey Department of Environmental Protection will use to evaluate project concepts for the Rebuild By Design (RBD) Hudson River Project in Hoboken, Weehawken, and Jersey City.
 - The **New York City Technical Coordination Team (TCT)** is working on the East Side Coastal Resilience Project from the New York City Department of Design and Construction and the Living Breakwaters (Tottenville) project from the New York State Governor's Office of Storm Recovery.

- **Long Island Sound Study's website will add new web pages to describe a computer model's predictions on how salt marshes in Long Island Sound may to respond to sea level rise.** Information about how the Sea Level Affecting Marshes Model, known as SLAMM, was applied to Long Island Sound was developed as a resource to assist land use planners and natural resource managers in making decisions on how to manage the region's changing salt marsh habitats. The web pages can be viewed at:
<http://longislandsoundstudy.net/research-monitoring/slammm/>.

- The Barnegat Bay Program is partnering with Partnership for the Delaware Estuary to develop **methods to evaluate the progress of tidal wetland restoration projects**, compare restoration to regional tidal wetland conditions and use these data to improve restoration practices and success.

- The ORD National Health and Environmental Effects Research Lab Atlantic Ecology Division is sponsoring a study, "**Impacts of climate change and wastewater discharges on integrated human health and environmental endpoints**", in the San Juan Bay Estuary that will focus on the Cano Martin Peña. The research to be performed will address critical priorities to characterize the co-occurring impacts of climate change and wastewater discharges on the sustainable delivery of ecosystem services and health of communities.

- EPA Region 2 continues to work with the Puerto Rico Coastal Zone Management Program of the Puerto Rico Department of Natural and Environmental Resources (DNER). This collaboration includes participation in the **Puerto Rico Climate Change Council (PRCCC)**, which has been very important in the **development of the latest Land-Use Plan (LUP)** for Puerto Rico and ensured that Climate Change vulnerabilities were included in the LUP; and the **Caribbean Regional Ocean Partnership (CROP) which focuses on coastal and marine planning issues.**

Region 3

- In 2016, the Region will support the **Hampton Roads Sea Level Rise Adaptation Pilot** as it moves forward by providing the science and tools necessary to respond to the impacts of climate change. This is a two year “whole government” initiative aimed at bringing the full force of coordinated government and the community together to address sea level rise and other climate induced changes expected in the Hampton Roads region.

Region 4

- The Region will continue to **cooperate with FEMA on implementing the Memorandum of Agreement signed in 2010** on the use of smart growth approaches in communities that have been impacted by disasters, and to provide information to communities that are planning to minimize weather-related impacts.
- Region 4 will promote the beneficial use of **suitable dredged material to support environmentally sound projects to protect from sea level rise and storm surge.**
- The Region will develop protocols to address the likely **increase in emergency dredging from hurricanes of increased intensity and other extreme precipitation events** that may cause unexpected sedimentation and shoaling.
- Region 4 will work with EPA Headquarters in the development of **screening criteria to identify water and wastewater facilities on the Atlantic and Gulf Coasts** that may be at risk of inundation in the event of a storm event and storm surge comparable to Hurricane Sandy.
- The Region will work with EPA Headquarters in **piloting Regional Flood Resilience Pilot Project for groups of water and wastewater utilities in Florida.**



Region 6

- The Housing and Urban Development Resiliency competition announced that they awarded to the City of New Orleans \$141 Million for a variety of activities that include; coastal restoration and supporting the Gentily Neighborhood in planning, development and implementation of a more resilient community. EPA through the Urban Waters Federal **Partnership will support the local co-leads, City of New Orleans and Sewage and Water Board staffers in planning for up-coming community meetings/workshops as needed.** EPA will support any project work that can incorporate Green Infrastructure into any new revitalization or redevelopment scoped in storm water management for the Genti Neighborhood.



- The Region will promote the beneficial use of suitable dredged material to support environmentally sound projects to **provide protection from sea level rise and storm surge**.
- The Region will promote **landscape scale coastal protection** by constructing and providing technical and planning assistance for coastal restoration and adaptation projects.

Office of Research and Development Projects and Initiatives

- ORD will develop and release a **web-based decision support and outreach tool to predict vulnerability of near-coastal species and species and habitats to the impacts of climate change and ocean acidification**. The tool will allow users to input data for use by the broader research and application communities. By taking a trait-based approach to vulnerability evaluation, the Coastal Biodiversity Risk Analysis Tool (CBRAT) provides information on a substantially larger number of species than would otherwise be possible.

Goal 11: Ocean environments are protected by EPA programs that incorporate shifting environmental conditions and other emerging threats

Goal
11

- ❖ Strategic Action 29: Consider climate change impacts on marine water quality in National Water Program ocean management authorities, policies, and programs.
- ❖ Strategic Action 30: Use available authorities and work with the Regional Ocean Organizations and other federal and state agencies through regional ocean groups and other networks so that offshore renewable energy production does not adversely affect the marine environment.
- ❖ Strategic Action 31: Support the evaluation of sub-seabed sequestration of CO₂ and any proposals for ocean fertilization.
- ❖ Strategic Action 32: Participate in interagency development and implementation of federal strategies through the National Ocean Council (NOC) and the NOC Strategic Action Plans.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- The EPA will continue to work with the international community to support the effective **regulation of sequestration of carbon dioxide in sub-seabed geological formations** (i.e., offshore carbon capture and storage, CCS) and marine geoengineering (e.g., fertilization of the ocean) under the London Convention (LC) and London Protocol (LP). (OWOW)
- EPA will continue participation in the **Resiliency and Adaptation to Climate Change and Ocean Acidification Subcommittee of the National Ocean Council** to develop and implement Action Plans, including interagency initiatives related to climate change. (OWOW)
- As part of EPA's ongoing efforts to assess the current state of the science regarding ocean and coastal acidification, the Agency will continue to **collaborate with the West Coast Ocean Acidification and Hypoxia Science Panel and the Northeast Coastal Acidification Network (NECAN)**. Moving forward in 2015, the Agency will be seeking to expand our collaborations to include other regional scientific groups, interested States, and other stakeholders. (OWOW)
- EPA will continue to examine the role that the Clean Water Act and existing voluntary programs could play in addressing ocean and coastal acidification. The Agency will also **assess how lessons learned from efforts to address ocean and coastal acidification might be transferable amongst regions** of the US encountering ocean and coastal acidification. (OWOW)
- EPA will continue to work with other agencies and the international community to **provide technical guidance on sub-seabed carbon sequestration and marine geo-engineering** and

coordinate with federal partners in addressing proposals for carbon sequestration in the sub-seabed or other proposals, such as potential fertilization of the ocean. (OWOW)

- The EPA Coastal Program will collaborate with EPA National Center for Environmental Economics to **develop ecosystem services valuation methodologies to quantify the economic impacts of acidification** on fisheries in the Pacific Northwest (Puget Sound) and Northeast (Gulf of Maine). (OWOW)
- EPA will partner with Washington State Department of Ecology to **develop models to determine relative contributions of land-based pollution sources to acidification** conditions in Puget Sound. (OWOW)

Regional Program Actions

Region 2

- The **Long Island Sound Study** is participating in the **Northeast Coastal Acidification Network**. In January, 2016 a workshop will be held in conjunction with the Connecticut and New York Sea Grant Programs to discuss ocean and coastal acidification science, the potential impacts to marine resources and ecosystems; the capacity at the national, regional and local levels for research and monitoring; and where to find reliable and science-based sources of information on ocean acidification.

Region 3

- Region 3, along with Region 2, is a member of in the Mid-Atlantic Regional Planning Body. This group was created as a result of the National Ocean Policy and an Executive Order to collaborate more effectively and efficiently with state and tribal governments regarding ocean planning. The Charter for the Mid-Atlantic Regional Planning Body (Mid-Atlantic RPB) was signed in 2014. The Mid-Atlantic RPB is currently working on finalizing the outline of a Regional Ocean Action Plan. **The objective of the Regional Ocean Action Plan is to set forth clear goals and objectives associated with sound decision making regarding ocean planning while considering the effects of anthropogenic (i.e. offshore drilling) and natural (climate change) activities.**

Region 10

- Region 10 is **funding several projects to better understand the impacts of local sources on ocean acidification**. In addition, Region 10 is a member of the Washington State Marine Resources Advisory Committee that provides recommendations to the Governor on actions to mitigate and adapt to the threats from ocean acidification. Also, Region 10 works with University of Washington's Ocean Acidification Center and NOAA to understand the information needed for EPA's regulatory programs.

D) Water Quality

Vision Statement: Our Nation's surface water, drinking water, and ground water quality are protected, and the risks of climate change to human health and the environment are diminished, through a variety of adaptation and mitigation strategies.

Goal 12: Protect waters of the United States and promote management of sustainable surface water resources

Goal
12

- ❖ Strategic Action 33: Encourage States and communities to incorporate climate change considerations into their water quality planning.
- ❖ Strategic Action 34: Encourage green infrastructure and low-impact development to protect water quality and make watersheds more resilient.
- ❖ Strategic Action 35: Promote consideration of climate change impacts by National Pollutant Discharge Elimination System permitting authorities.
- ❖ Strategic Action 36: Encourage water quality authorities to consider climate change impacts when developing wasteload and load allocations in TMDLs where appropriate.
- ❖ Strategic Action 37: Identify and protect designated uses that are at risk from climate change impacts.
- ❖ Strategic Action 38: Clarify how to re-evaluate aquatic life water quality criteria on more regular intervals; and develop information to assist States and Tribes who are developing criteria that incorporate climate change considerations for hydrologic condition.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- In 2016 EPA will continue work through the [Green Infrastructure Collaborative](#) to **build capacity for implementing green infrastructure practices** by leveraging joint efforts to promote the multiple community benefits of green infrastructure; building and sharing knowledge around emerging green infrastructure technologies and policy issues; and facilitating shared inquiry into the best ways to encourage adoption of green infrastructure technologies at the community level. (OWM)
- EPA will **publish lessons learned on how four communities can use green infrastructure to increase climate resiliency**. The case studies are based on charrettes held in 2015 in Albuquerque, New Mexico; Grand Rapids, Michigan; Los Angeles, California and New

Orleans, Louisiana. These charrettes were designed to assist communities in using green infrastructure as a climate change adaptation tool to address issues such as local flooding and drought. (OWM)

- EPA will publish a report describing tools, strategies, and **lessons learned from the EPA green infrastructure technical assistance**. (OWM)
- EPA will promote use of the **Climate Change Extension within the Stormwater Calculator**. The Climate Change Extension provides climate change information and scenarios that local site planners can use to estimate future stormwater conditions at sites around the country and develop stormwater management practices that are designed to manage future stormwater flows. (OST/ORD)
- EPA will publish a **study on flood loss avoidance benefits from green infrastructure**. Green infrastructure and low impact development avoid increased runoff volumes associated with impervious area is less flooding. This modeling study was commissioned by the EPA to estimate the flood loss avoidance benefits from application of small storm retention practices for new development and redevelopment nationwide. The results show that, over time, the use of green infrastructure can save hundreds of millions of dollars in flood losses. (OWOW)
- A Headquarters/Regional team will review issues related to the impacts of climate change on Clean Water Act **water quality criteria and standards** and identify possible options for addressing climate change in the context of water quality standards. This work will include a **Frequently Asked Questions (FAQs) document to address incorporation of climate change into water quality standards**. (OST)
- EPA will release a Federal Register notice seeking public comment on a draft white paper providing information States and Tribes can use to **protect aquatic life from negative effects associated with alteration of hydrologic conditions**, including potential effects from climate change. (OST)
- EPA staff from HQ and Regional **offices will review information and issues related to climate change and TMDL development and implementation** and consider any needed program or policy changes. (OWOW)
- Climate change presents potential risk of increased drought frequency and magnitude, which can result in increased water temperature, reduced mixing volume and shallower discharge depths. These changes present challenges in managing thermal discharges to meet temperature standards and discharge limits. EPA is **producing a package of tools to**

Headquarters/Region
Climate Project Team:
Water Quality Criteria
and Standards

National
Priority
Action

assist with the assessment and management of thermal discharges, including the development of thermal tolerance databases for indicator aquatic species in select regions of the country, exploration of a screening method to characterize spatial and temporal extent of cool water refugia, a review and evaluation of thermal models, an assessment of thermal monitoring tools, an annotated checklist for development of thermal studies, and an evaluation of temperature mitigation technologies. The tools will be presented in a national webcast in June 2016. (OWM)

Regional Program Actions

Region 1

- The Region will continue to serve on the steering committee of the U.S. Geological Survey (USGS) Northeast Climate Science Center and the Department of Interior's North Atlantic Landscape Conservation Cooperative to **identify key research needs for effects of climate induced changes on thermal regimes.**

Region 2

- The City of Camden, one of the most economically distressed cities in the US, has a **combined sewer system that is in a serious state of disrepair** which is prone to cause flooding in the homes, streets and parks of Camden City. **The Camden County Municipal Utilities Authority (CCMUA) received a \$2 million grant (principal forgiveness) and a \$3.6 million low interest loan from the NJ-CWSRF program to:**
 - Construct 17 new **rain gardens** to capture stormwater flow.
 - **Daylight a stream**, which had been paved over in the 1920's, to capture stormwater flow.
 - Convert an abandoned factory into a 5.5 acre **riverfront park** for the environmental justice community of Waterfront South in Camden City.
 - **Separate a portion of the City's combined sewer system** to reduce the potential for flooding and overflows.
- Region 2, with \$25,000 from the Office of Water, will be providing **technical assistance for green infrastructure in Newark, NJ.** Region 2 obtained contractor support to evaluate existing city business processes in order to streamline the development of Green Infrastructure in Newark, NJ, a "Making a Visible Difference" Initiative community.
- Region 2 is working with Cooper's Ferry Partnership and EPA contractors to host a **Building Blocks for Sustainable Communities technical assistance workshop in Camden, NJ on Green and Complete Streets** in April 2016. The workshop will build off of past EPA green infrastructure technical assistance to develop policy change to facilitate replication of the City's green streets pilot project on 7th St between Linden St. and Elm St.

- Region 2 will participate on the New York-New Jersey Harbor Estuary Program’s advisory committee for the **Perth Amboy Green Infrastructure Project**. This project will document the benefits of green infrastructure and an integrated approach to Long Term Control Plans and stormwater management for one or more specific catchment areas in Perth Amboy, New Jersey.
- Region 2 is providing contractor support to the **City of Trenton**, NJ to identify localized flooding locations within the city and their associated drainage areas which could be **possible locations for green infrastructure installations**.
- The objective of the RARE **Green Infrastructure Project in Puerto Rico** is to design and construct a **bioretention facility** in the Martín Peña Channel community in the San Juan metropolitan area. EPA will then monitor and evaluate the performance and maintenance practices at the facility. The idea is to develop a technology that can be successfully adopted throughout the island.
- EPA Region 2 is supporting Rutgers University (NJ) on **implementing two Health Impact Assessments**. One is looking at Hoboken’s proposed stormwater management plan and second one is exploring Little Egg Harbor’s proposed buy-out program.

Region 3

- In 2016, Region 3 will finalize **several fact sheets on the subject of opportunities for flooding mitigation through use of porous pavements**, and will develop an outreach plan to share information on this approach.
- In 2016, Region 3 will continue to **support green infrastructure implementation through events, outreach, and workshops**. EPA will also continue to partner with Maryland DNR and the Chesapeake Bay Trust on the Green Streets, Green Jobs, Green Towns (G3) grant initiative.
- The Region will provide **outreach to States on Wetland water quality standards** and encourage their use for understanding and managing wetlands in light of climate change.

Region 4

- The Region will use the **Triennial Review of state water quality standards to work with States on changes in stream use classification or standards**, where necessary, due to climate change induced increasing temperatures or changes in stream flow.
- The Region will encourage States to develop **explicit criteria for low flow protection**.

- Region 4 will encourage States to **update fact sheets at permit reissuance to include the most up-to-date critical low flow as possible** and to calculate reasonable potential based on those values.
- The Region will continue to work with States on the **incorporation of green infrastructure components in MS4 permitting**.
- The Region will work with States to include **climate change adaptation provisions in the state's revised Nonpoint Source Management Plans** to provide flexibility to fund programs and projects to assess, evaluate, plan and implement climate change adaptations.
- The Region will work with **urban and environmental justice communities to promote and implement green infrastructure into the communities** to reduce flooding, combined sewer overflows, and water quality impairments in these urban communities.
- Region 4 **will promote the use of the Stormwater Management Model with the Climate Adjustment Tool (SWMM-CAT)** to utilities doing planning on improvements to their stormwater infrastructure.

Region 5

- The Region will **continue encouraging the use of Green Infrastructure** and integrate efforts with Region 5's Sustainability and Communities Team.
- The Region will **incorporate Sustainable Water Infrastructure conditions into NPDES permits**, compliance assistance and enforcement settlements, where appropriate.

Region 7

- The Region will continue to co-chair EPA Headquarters/Regional project team working to identify ways to **better integrate climate change considerations into water quality standards**.
- The Region will work within the Region and with outside agencies to promote low impact development practices (i.e.; green infrastructure, water conservation practices, and energy conservation). These actions include **green infrastructure technical assistance to States, Tribes, and "Making a Visible Difference" communities**.
- Region 7 will **highlight one Clean Water Act Section 319 watershed project a year that incorporates the use of green infrastructure**.
- The Region will **encourage green infrastructure through participating in discussions with Federal partners** such as HUD and the General Services Administration through EO 13693.



- During the States' Triennial Review of state water quality standards, the Region will use the public comment period to **encourage States to consider climate change in stream use classification or standards**, where necessary, due to climate change induced increasing temperatures or changes in stream flow.
- The Region will serve on the Office of Water's Climate Change TMDL white paper work group with the goal of exploring ways to make TMDLs more resilient to climate change.

Region 8

- In 2016, Region 8 will explore opportunities **to collaborate with the State of Colorado to incorporate climate change considerations** into TMDLs, Alternative Plans, Nonpoint Source Management Planes and Water Quality Standards in response to the State's release of its Climate Adaptation Plan.
- Through the Montana drought demonstration project, Region 8 is providing funding to **facilitate development of a drought monitoring network for the Upper Missouri Headwaters basin**. Working with NOAA/NIDIS, DNRC, the Montana Climate Office, and other state and federal partners, the workgroup will compile existing data (e.g., snowpack, soil moisture, streamflow, and precipitation) and identify data gaps. The network will consider data needs to make short and long-term discussions at the local landowner scale and for the larger basin.

Region 9

- In 2016, Region 9 will continue to collaborate on climate change issues with American Samoa, a "Making a Visible Difference" initiative community. Given sufficient financing, the American Samoa EPA aims to complete the Sustainable Groundwater Plan in conjunction with EPA, and the University of Hawaii. The Plan would identify and **prioritize drinking water sources which are free of contaminants and upstream of climate change impacts**. Potential climate change impacts on drinking water sources include salt water intrusion as a result of sea level rise, extreme weather events, and groundwater depletion.
- The Region will promote the inclusion of climate change and asset management planning requirements for sanitary and storm sewer systems in NPDES permits. The region launched a website (<http://www.epa.gov/region9/water/npdes/asset-mgmt/index.html>) in the first quarter of Fiscal Year 2015 to provide recommendations and **examples of how to include asset management provisions in NPDES permits, including a focus on climate change**. Region 9 began drafting relevant language in EPA-issued permits in Guam in 2015 and will continue to work with the California State and Regional Water Boards on possible inclusion of relevant provisions in state permits.

Region 10

- Region 10 will work with the State of Oregon and the National Marine Fisheries Service to **develop coldwater refugia plans for the Columbia River and the lower 50 miles of the Willamette River**. The purpose of the plans is to adequately interpret Oregon's narrative cold water refugia criterion to allow for implementation of the criterion through Oregon's Clean Water Act authorities. Where they are of sufficient dimension, type, and distribution, coldwater refuges can shelter migrating salmon from otherwise lethally warm mainstem temperatures as the salmon migrate upstream to their spawning grounds. This is a several year activity.
- Region 10 has a Regional Applied Research Effort with the EPA Office of Research and Development to examine the impacts of climate change on thermal suitability for salmonids for a subset of Pacific Northwest basins now and in the future. The results will be used to **determine whether or not stream temperatures will meet the Pacific Northwest Temperature Guidance recommended temperature criteria for different salmonids and life stages**. Another objective of the project is to use the NorWest model and database to identify the distribution of colder tributaries that act as potential coldwater refuges along the Columbia and the lower 50 miles of the Willamette River.



Regional
Climate
Innovation

Office of Research and Development Projects and Initiatives

- ORD will publish a **final report on the collaborative effort with OW and Region 10 to consider how projected climate change impacts can be incorporated into a TMDL to inform restoration actions in the Nooksack River Basin Salmonid Recovery Plan**. The final report will provide a summary and synthesis of the research as well as describing lessons learned during the research and coordination effort.

The report will include summaries of a quantitative and a qualitative assessment. The quantitative assessment provides comparison of modeled stream temperatures, including riparian shading, with and without projected changes in climate for the 2020s, 2040s and 2080s. The qualitative assessment is a comprehensive analysis of climate change impacts on freshwater habitat and an evaluation of the effectiveness of restoration actions to reduce the risks of climate change on salmonids.

Goal 13: As the Nation makes decisions to reduce its greenhouse gas emissions and develop alternative sources of energy and fuel, the National Water Program will work to protect water resources from unintended adverse consequences

**Goal
13**

- ❖ Strategic Action 39: Continue to provide perspective on the water resource implications of new energy technologies.
- ❖ Strategic Action 40: Provide assistance to States and permittees to assure that geologic sequestration of carbon dioxide (CO₂) is responsibly managed.
- ❖ Strategic Action 41: Continue to work with States to help them identify polluted waters, including those affected by biofuels production, and help them develop and implement Total Maximum Daily Loads (TMDLs) for those waters.
- ❖ Strategic Action 42: Provide informational materials for stakeholders to encourage the consideration of alternative sources of energy and fuels that are water efficient and maintain water quality.
- ❖ Strategic Action 43: As climate change affects the operation or placement of reservoirs, EPA will work with other federal agencies and EPA programs to understand the combined effects of climate change and hydropower on flows, water temperature, and water quality.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- In 2014, EPA issued an interpretive memorandum and revised technical guidance for DFHF permitting (see note above). Permitting recommendations in the technical guidance were written for EPA permit writers but States with primary enforcement authority will find them useful in protecting USDWs in their individual States and programs. Throughout 2016, **OGWDW will work with co-regulators and other stakeholders to encourage best practices and ensure that oil and gas development occurs safely and responsibly, in a way that protects drinking water resources.** (OGWDW)
- EPA will continue working with the Class VI carbon dioxide **(CO₂) geologic sequestration permit applicants to evaluate applications and issue Class VI permits for geologic sequestration projects.** (OGWDW)

Regional Program Actions

Region 2

- Region 2's Caribbean Environmental Protection Division (CEPD) is working with the Non-PRASA **Borinquen Praderas Community, in Caguas, and is in the process of installing a**

solar powered package filtration plant as an alternative to comply with the Surface Water Treatment Rule.

Region 7

- With EPA Headquarters assistance, the Region will **review and process anticipated Class 6 underground injection control (UIC) permit applications.**
- Through a Wichita State University Environmental Finance Center grant, the Region will **encourage energy efficiency and alternate sources of energy during workshops and energy assessments.**

Region 8

- **Region 8 will continue to participate in the Geological Sequestration (GS) workgroup** to develop guidances, share permitting experiences, resources, and technical information, to facilitate implementation of CO2 geological sequestration final rules designed to protect drinking water resources, while encouraging successful deployment of commercial scale sequestration projects. Work with States (notably Montana, Wyoming and North Dakota) to help them obtain primacy for the Class VI UIC program, and issue permits for projects where state primacy has yet to be established.

Office of Research and Development Projects and Initiatives

- ORD will develop an assessment of possible future regional water usage for energy production. The study is examining **how energy system water demands might change under different scenarios that constrain greenhouse gas emissions and water use limits,** and is evaluating some of the environmental implications for the different scenarios.

Goal 14: Collaborate to make hydrological and climate data and projections available

Goal
14

- ❖ Strategic Action 44: Monitor climate change impacts to surface waters and ground water.
- ❖ Strategic Action 45: Collaborate with other federal agencies to develop new methods for use of updated precipitation, storm frequency, and observational streamflow data, as well as methods for evaluating projected changes in low flow conditions.
- ❖ Strategic Action 46: Enhance flow estimation using National Hydrography Dataset Plus (NHDPlus).

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- A Headquarters and Region team is working to improve the tools and methods for developing **National Pollutant Discharge Elimination System (NPDES) permits as the climate changes.** This project includes collaborative work with USGS on the *SW Toolbox*, a tool for estimating critical flow statistics in streams, that will be released for beta-testing with state and EPA permit writers in 2016. The tool calculates a wide array of flow statistics, including biologically based flows. Features include a batch run option and automated testing for trends, serial correlation, outliers, and unusually large skew. (OWM)
- In 2016, EPA is supporting USGS work **to evaluate techniques to provide estimates of low flow statistics at ungaged locations.** This study will evaluate multiple methods of predicting 7Q10 using geospatial information and information on upstream basin characteristics. Evaluations will consider each method based on performance in predicting the 7Q10, ease of implementation and ability to handle zero flows. A case study of select gages in the Southeast U.S. will be used to test and compare regionalization methods. In addition, previous work to develop the Surface Water Toolbox with improved methods for gaged stations will undergo peer review and be made publicly available. (OWM and OW/IO)
- In partnership with USGS, EPA is implementing the **Hydrology Futures Project.** This project is based on the **USGS Water Balance Model and is designed to help watershed managers evaluate the impacts of climate change on future hydrologic parameters for rivers and streams covering the entire coterminous US.** The model has been initialized with precipitation and atmospheric temperature projections from approximately 230 climate model/greenhouse gas emission scenario combinations. In 2015, a peer review of a web portal USGS developed to disseminate project results was completed and the web portal and initial underlying data are scheduled for launch in 2016. (OWOW)

Headquarters/Region
Climate Project Team:
NPDES Permits

- In 2016, EPA **will continue work to incorporate the ability to evaluate climate impacts in the new Hydrologic and Water Quality System (HAWQS) model.** HAWQS will include the ability to allow modelers to modify parameters to conduct ‘what-if’ evaluations both with user generated data and with pre-set scenarios. A user’s guide will accompany the new features. Additional improvements will be included in the official release of HAWQS 1.0 in 2016 including incorporation of CMIP5 data from the newest LOCA downscaled data. Working with the Office of Air and Radiation, a climate impacts analyses using HAWQS 1.0 will be included as part of the 2018 National Climate Assessment. (OW/IO)
- Climate change presents potential risk of increased drought frequency and magnitude, which can result in increased water temperature, reduced mixing volume and shallower discharge depths. These changes present challenges in managing thermal discharges to meet temperature standards and discharge limits. EPA is **producing a package of tools to assist with the assessment and management of thermal discharges, including the development of thermal tolerance databases for indicator aquatic species in select regions of the country,** exploration of a screening method to characterize spatial and temporal extent of cool water refugia, a review and evaluation of thermal models, an assessment of thermal monitoring tools, an annotated checklist for development of thermal studies, and an evaluation of temperature mitigation technologies. The tools will be presented in a national webcast in June 2016. (OWM)

Regional Program Actions

Region 1

- **The Region will support Citizen Science in Brattleboro, Vermont community** through volunteer monitoring for a stream in Brattleboro, also a “Making a Visible Difference” initiative community, to better understand the challenges of this urban watershed in a changing climate, and holding a citizen science workshop to educate the community on the issues.

Region 4

- The Region will evaluate Region 4 States’ current monitoring and assessment practices to encourage the **capturing of extreme low flow or other climate related conditions,** including: 1) appropriate biological monitoring and assessment techniques, and 2) water monitoring system design.
- Region 4 will work with States and other water monitoring partners to help establish a long term monitoring program to **track potential changes in temperature, flow, aquatic biological communities, habitat, and chemical constituents that are occurring over time at important sentinel reference sites in the Southeast Region.**

Region 5

- Region 5 will **improve information on climate change impacts on surface water quality and quantity** available and used for regulatory and assistance actions, including:
 - Continue to identify key climate change data sources and parameters for monitoring different waterbody types;
 - Determine what data are not currently being collected by state and tribal monitoring programs; and
 - **Develop a climate change water monitoring strategy in conjunction with Region 5 States and Tribes.**
- Region 5 will continue development of a **Regional Monitoring Network for streams designed to track changes due to climate change.**
- In 2016, the Region will **establish a workgroup to explore development a regional monitoring network for inland lakes for tracking climate change impacts.**



Regional
Climate
Innovation

Region 7

- Region 7 will coordinate with the Regional Environmental Science and Technology Division **in work with States and Tribes to deploy remote sensors in Midwest streams to monitor changes that may be attributed to regional changes in climate.**

Region 8

- The large number of national parks located within EPA Region 8 offers a unique opportunity to monitor climate change impacts at minimally impacted wetlands, streams and rivers. In 2016, building from efforts initiated by USGS, the National Park Service and the Great Northern Landscape Conservation Collaborative, EPA will **explore opportunities to leverage existing efforts to develop a regional climate change monitoring network.**



Regional
Climate
Innovation

Office of Research and Development Projects and Initiatives

- ORD is working to incorporate the capability to **estimate the effects of climate change on water temperature into linked atmospheric, hydrologic, watershed and ecosystem models.** This project will assess and develop appropriate connections between a coupled meteorological/atmospheric/hydrology model set and ecosystem models and benefit cost models to support multi-media, multi-pollutant and health and welfare benefit/cost assessments of management strategies.

- ORD is working with Region 5 to **support a Regional Monitoring Network** to detect climate change impacts on streams by developing an appropriate stream classification, conducting site screening, and providing training on sensor deployment and data management.
- ORD is working with Regions 1 and 5 to provide the initial research into **developing regional climate change monitoring networks for lakes** that leverage existing monitoring activities and support detection of climate change effects.

E) Working With Tribes

Vision Statement: Tribes are able to preserve, adapt, and maintain the viability of their culture, traditions, natural resources, and economies in the face of a changing climate.

Goal 15: Incorporate climate change considerations in the implementation of core programs and collaborate with other EPA Offices and federal Agencies to work with Tribes on climate change issues on a multi-media basis

**Goal
15**

- ❖ Strategic Action 47: Through formal consultation and other mechanisms, incorporate climate change as a key consideration in the revised National Water Program Tribal Strategy and subsequent implementation of CWA, SDWA, and other core programs.
- ❖ Strategic Action 48: Incorporate adaptation into tribal funding mechanisms, and collaborate with other EPA and federal funding programs to support sustainability and adaptation in tribal communities.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- EPA will continue to support the EPA National Water Program **State and Tribal Climate Change Council** as a vehicle for sharing information and hearing the views of States and Tribes on climate change issues. (OW/IO)
- The National Water Program will develop a **white paper summarizing approaches that Tribes have taken to address climate change with a particular focus on water quality/water resources**. The paper seeks to identify:
 - key impacts of climate change on tribal communities;
 - approaches Tribes have taken to address climate change and water concerns; and
 - resources available to Tribes to perform climate adaptation work.

The white paper is intended as a technical informational resource for Tribes. EPA presented an outline of the paper to the National Tribal Water Council and EPA-Tribal Science Council in the early Fall of 2015. EPA plans to finalize and publish the white paper in 2016. (OW/IO)

Regional Program Actions

Region 1

- In 2016, the Region will coordinate with U.S. Army Corps of Engineers and other federal agencies in providing support and developing a path forward for **addressing shoreline erosion as a result of higher intensity storms** which is threatening tribal homes and the Tribe's wastewater treatment facility at the Passamaquoddy Tribe – Pleasant Point reservation.
- The Region will continue to work towards establishing a Federal-tribal communications collaborative, involving **dialog among tribal environmental directors and regionally-based federal tribal liaisons on climate change** and other cross-cutting issues.

Region 2

- EPA Region 2 and the Seneca Indian Nation Health Service are co-funding the Cattaraugus Pump Station Renovations Project, which will **replace aging infrastructure and install new and more energy efficient pumps.**

Region 4

- Region 4 will work with two Tribes to perform **energy management initiative assessments** of water and wastewater system.
- The Region will coordinate with the Indian Health Service on **energy efficiency analysis tools** that can be used when designing water system modifications.

Region 5

- The Region will incorporate climate change adaptation **into the EPA Indian Environmental General Assistance (GAP) grant program** and review results of GAP-funded initiatives.

Region 7

- The Region 7 Water Division will assist the Regional Office of Tribal Affairs with **tribal climate change adaptation plans being funded through EPA Indian Environmental General Assistance Program (GAP) grant funds.**
- The Region will coordinate with the Bureau of Indian Affairs through the North Central Climate Science Center with our other federal/tribal partners to **share funding opportunities for Tribes with the goals of completing climate risk assessments,** developing tribal hazard mitigation plans, and evaluating drought mitigation strategies.



Region 8

- In 2015, the Bureau of Indian Affairs awarded \$250,000 to the Center for Large Landscape Conservation (CLLC) to the Blackfeet and the Confederated Salish and Kootenai Tribes (CSKT) to **develop climate adaptation plans** and hire two Climate Change Coordinators – one for the Blackfeet and one for CSKT. EPA staff will be collaborating with CLLC and the Tribes to assist with the development and implementation planning of these plans.
- Region 8 is participating in Confederated Salish and Kootenai Tribes (CSKT) Climate Change Oversight Committee charged with initiating “collective beneficial climate impact mitigation and adaptation solutions.” This interdepartmental, inter-agency committee is currently **revising the CSKT’s 2013 Climate Change Strategic Plan to include updated information, activities, and additional emphasis on incorporating traditional ecological knowledge into the planning and mitigation efforts.** Recently, other nearby Tribes to participate in the CCOC, including representatives from Chippewa Cree (Rocky Boy’s), Blackfeet, and Gros Ventre and Assiniboine (Fort Belknap) Tribes.
- Region 8 is also working with CSKT, the Gros Ventre and Assiniboine Tribes at Fort Belknap, and the Assiniboine and Sioux Tribes at Fort Peck to **incorporate climate change adaptation planning into their FY17 work plans and EPA Tribal Environmental Plans (ETEPs).** EPA is facilitating strategic planning retreats at Fort Peck and on the Flathead Nation towards the development of these five-year planning documents and climate change is a critical part of this discussion. The work at Fort Peck, and specifically in the Town of Poplar, is part of the national “Making a Visible Difference” initiative focused around creating sustainable communities with efforts targeting sustainable and energy efficient housing, green infrastructure and storm water management, integrated infrastructure planning and economic development in the face of a changing climate.

Region 9

- Region 9 will work with Tribes specifically at risk to drought to use EPA General Assistance Program funding and to seek funding through programs provided by partner agencies to **prepare drought contingency plans**, pursue rate studies and structures, develop ordinances, and foster drought-resiliency and self-sufficiency on tribal lands as a hedge against future droughts and climate change.
- In 2016, Region 9 will partner with at least two Tribes as **“early adopters” of water use efficiency tools and other water conservation measures** in tribal communities who can lead change and foster widespread acceptance and installation of water efficiency technologies.
- The Region will use revised project ranking criteria for the Fiscal Year 2016 **Drinking Water State Revolving Fund Tribal Set-Aside grant program to give higher priority to tribal**

systems experiencing serious drought impacts (i.e. systems with water supply deficiencies that present a serious health risk). The revised criteria also incentivize water conservation by requiring a cost share for projects from systems where water usage is greater than 150 gallons/person/day.

Region 10

- As a part of the Administrator’s “Making a Visible Difference” initiative, Region 10 will provide **assistance to three Alaska Native Communities to make their drinking water and wastewater infrastructure more resilient from climate change.**
- The Region will partner with the Institute for Tribal Environmental Professionals **to conduct monthly webinars and periodic workshops.**

Office of Research and Development Projects and Initiatives

- Conduct research to evaluate associations between extreme weather events and health endpoints using existing health and weather databases. This work includes waterborne disease; how weather events associated with climate change alter the risk of waterborne and infectious disease; and **the sub-populations at increased risk of disease associated with climate change.**

Goal 16: Tribes Have Access to Information on Climate Change for Decision-making

Goal
16

- ❖ Strategic Action 49: Collaborate to explore and develop climate change science, information, and tools for Tribes, and incorporate local knowledge.
- ❖ Strategic Action 50: Collaborate to develop communication materials relevant for tribal uses and tribal audiences.

[Note: Text above from 2012 Strategy: Response to Climate Change]

2016 Implementation Actions

National Program Actions

- Continue to support the EPA National Water Program **State and Tribal Climate Change Council** as a vehicle for sharing information and hearing the views of States and Tribes on climate change issues. (OW/IO; see also Goal 17)

Regional Program Actions

Region 1

- Region 1 will conduct sessions on climate change impacts, vulnerability assessments, and adaptation planning at the **annual Tribal Environmental Workshop**.

Region 6

- Region 6 will initiate discussions with tribal members and other Federal Agencies, such as the Indian Health Service, to **assess tribal climate change needs**.

Region 7

- The Region will work with Federal partners through the Federal Mitigation and Resilience work group to **host a Federal and tribal conversation on climate change**.
- The Region will coordinate with Federal partners to host a **workshop on climate change adaptation** for Tribes in the Region.

Region 8

- A local climate change adaptation and planning workshop is planned for April 2016 and EPA is participating in on-going discussions with Institute for Tribal Environmental Professionals

(ITEP) and others regarding a regional, possibly international, **climate change summit to be held in Montana in late FY16 or 2017.**

- In addition to one-on-one technical assistance to individual Tribes, Region 8 also **plans to offer a climate change webinar to interested Tribes.**

Region 9

- Region 9 will continue to work with the California Landscape Conservation Cooperative's Tribal Committee to **increase technical assistance to Tribes on climate adaptation planning and implementation**, and to promote more exchange of climate adaptation information between Tribes and other agencies and organizations in California.

Region 10

- Region 10 will:
 - **provide trainings** to Tribes on the impacts of climate change;
 - assist in the organization of a **tribal climate forum** to help Tribes share information and better coordinate the development of vulnerability assessments and adaptation plans; and
 - conduct trainings to **increase awareness for Region 10 staff and managers on traditional ecological knowledge.** The trainings and working with Tribes will occur throughout the year.
- The Region will work with several Tribes **to host a two-day workshop on "Making Sense of Sea Level Rise"**. The workshop will provide an overview of the state of knowledge for modeling and projecting sea level rise in Puget Sound, the impacts on sea level rise on treaty trust resources and tribal culture, and what changes to planning policy, and regulations are needed to address anticipated sea level rise impacts.

F) Cross-Cutting Program Support

The cross-cutting program support element of the 2012 Strategy includes three goals:

- Goal 17: Communicate, Collaborate, and Train;
- Goal 18: Track Progress and Measure Outcomes; and
- Goal 19: Identify Climate Change and Water Research Needs.

Specific actions to be implemented in 2015 in support of these goals are described below.

Goal 17: Communicate, Collaborate, and Train

- ❖ Strategic Action 51: Continue building the communication, collaboration, and training mechanisms needed to effectively increase adaptive capacity at the federal, tribal, state, and local levels.

[Note: Text above from 2012 Strategy: Response to Climate Change]

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2016 Implementation Actions

National Program Actions

- In 2015 EPA worked with State water agency organizations to identify and describe ten climate change practices related to the clean water and safe drinking water programs they administer. **In 2016, EPA will build on this work to add an additional six state practices.** These state practices can serve as useful models for other state agencies seeking to make water programs more resilient to climate change. The practices are the result of a collaborative effort among EPA and the [Association of Clean Water Administrators \(ACWA\)](#), [Association of State Drinking Water Administrators \(ASDWA\)](#), and [Association of State Wetland Managers \(ASWM\)](#). The most recent practices are posted on the internet at: <http://www.epa.gov/climate-change-water-sector/state-water-agency-practices-climate-adaptation>. (OW/IO)
- EPA will engage key stakeholders in climate change adaptation work by continuing to support the EPA National Water Program **State and Tribal Climate Change Council** that advises the National Water Program and engaging additional stakeholders using a range of forums and mechanisms. (OW/IO)
- EPA will **continue to publish the Climate Change and Water Newsletter** by email to an estimated 2,500 subscribers. (OW/IO)
- EPA will **maintain and periodically review and assess the “Addressing Climate Change in the Water Resources Sector”** EPA website. (OW/IO)

A red square icon with the text "National Priority Action" in white. The icon is slightly offset to the right and top relative to the text it represents.

- EPA will **continue efforts to strengthen internal communication on climate change and water topics**, including holding “brown bag” speaker sessions, sharing key information about climate change and water with employees, and reviewing options for awards for innovative efforts to adapt clean water program to a changing climate. (OW/IO)
- In early 2016, EPA will release a new **training module on climate change and water programs** included within the internet-based modules that constitute the Watershed Academy. (OW/IO)
- The Office of Water will work with EPA water program offices, Regional offices, and State agencies to **encourage clean water and drinking water program managers to take the new Watershed Academy climate change and water training**, track training participation over time, and report training engagement to senior water program managers. National Water Program offices and Regional Water Divisions will make this training mandatory for new employees. (OW/IO and other water offices)
- In 2016, the National Water Program will **revise and refresh the Headquarters/Regional office climate change policy teams** originally created in 2014. The purpose of these policy teams is for EPA managers in HQ and Regions to work together to identify key climate change issues and opportunities in key water program areas.



As indicated in the table below, teams addressing State Revolving Funds, NPDES permits, and water quality criteria and standards will continue in 2016. Teams addressing sanitary surveys and climate change and water quality management/state agency climate practices have completed their work and **will be replaced by new teams addressing climate change in core program areas to be determined.**

Updated HQ/Regional Climate Change Policy Team Framework

Climate Change Policy Team	HQ Co-Chair	Regional Co-Chair 2014-2015	Regional Co-Chair 2016	Key Work Underway or Completed
Clean Water and Drinking Water State Revolving Funds	OWM/ OGWDW	Region 6 Region 9	TBD TBD	Team Work Underway: addition of climate considerations to SRF checklists and outreach to SRFs
NPDES Permits	OWM	Region 5 Region 8	TBD TBD	Team Work Underway: development of updated methods for estimating low stream flows
Water Quality Criteria and Standards	OST	Region 4 Region 7	TBD TBD	Team Work Underway: draft hydrologic flow paper, draft climate change and water quality standards FAQs

Sanitary Surveys	OGWDW	Region 2 Region 3 Region 6		Team Work Completed: addition of climate information to new Sanitary Survey Learners' Guide (see: Sanitary Survey Learners' Guide (updated October 16, 2015))
Water Quality Management and State Practices	OWOW	Region 1 Region 10		Team Work Completed: creation of 10 State climate and water best practice descriptions(see: https://www.epa.gov/climate-change-water-sector/state-water-agency-practices-climate-adaptation)
TBD	TBD	NA	TBD TBD	
TBD	TBD	NA	TBD TBD	

- EPA will **convene a workshop in the fall of 2016** with EPA water program managers and ORD partners to compare newly developed climate and water tools. The outcome of the workshop will be a **summary of EPA's climate change and water modelling tools** in order to lay the foundation for structured outreach and training effort on how to use them to incorporate climate change considerations into CWA and SDWA programs. (OW/IO)
- EPA will work with the State-Tribal Climate Change Council to **conduct a needs assessment on climate and water training.** (OW/IO)
- EPA will work with Federal interagency groups, such as the Climate Change and Water Workgroup (CCAWWG), to promote **technical training on climate change and water issues.** Drawing on the results of workshop and training needs assessment), EPA will consider development of a training course on through the University Corporation on Atmospheric Research (UCAR) using climate information in decision-making related to Clean Water Act and Safe Drinking Water Act programs. (OW/IO)
- In 2016, EPA is renewing a broad cooperative agreement with the Association of Clean Water Administrators to support work on a range of Clean Water Act topics. This **cooperative agreement includes new provisions providing for cooperation on climate variability** including:
 - continue to assist with identification and showcasing of water program elements and practices that incorporate climate and/or resiliency as an important and relevant factor for decisions making;
 - organize and/or promote regular conference calls/webinars with States, EPA, and other important stakeholders to discuss climate considerations and impacts to the CWA programs giving particular emphasis will be given to technical and training needs; and

- continue to promote national climate change tools (e.g. CREATE 3.0) and models, while identifying future short and long term needs, including potential pilot initiatives and research projects. (OWM and OW/IO)
- EPA will continue to serve as Co-chair of the interagency **Federal Water Resources and Climate Change Workgroup** charged with implementing the *National Action Plan: Priorities for Managing Freshwater Resources in a Changing Climate*. (OW/IO)
- EPA will continue to serve as Co-chair of the climate change resilience workgroup of the **Advisory Committee on Water Information (ACWI)** made up of 40 water related stakeholder organizations and Federal agencies. Provide staff support and related services to the Committee. (OW/IO)
- The Office of Water will continue to represent EPA on the interagency Joint Implementation Working Group (JIWG) that is implementing the national ***Fish, Wildlife and Plants Climate Change Adaptation Strategy***. This work includes EPA service on the Management Committee for the JIWG and leadership of the Gap Assessment and New Initiatives Subcommittee. (OW/IO)
- EPA will continue to support development and implementation of interagency climate adaptation actions related to water resources called for in ***Report to the President*** by the State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience and in the ***Priority Agenda: Enhancing Climate Resilience of America's Natural Resources***. (OW/IO)

Regional Program Actions

- ***Program Actions Common to All Regions***
 - **Participate in the National Water Program Climate Change Workgroup:** Maintain current participation in the EPA National Water Program Climate Change Workgroup, including identifying a single point of contact for the regional water program.
 - **Support the EPA Office of Water Climate Change Adaptation Implementation Plan:** Help to develop and implement the EPA-wide Climate Change Adaptation Implementation Plan and coordinate between the National Water Program 2012 *Strategy* and the EPA regional climate change adaptation implementation plans.
 - **Build Internal Climate Change Communications:** Draw on materials developed by the Office of Water to provide training for regional water program staff on the challenges that climate change poses for water programs and familiarize them with the National Water Program 2012 *Strategy* and regional climate adaptation plans through a variety of means such as “all hands” meetings, webinars, seminars, and dissemination of the

plans. EPA Regions will encourage water program staff to take new climate change and water training on the internet based Watershed Academy and consider making this training mandatory for new employees.

- **Build External Climate Change Communications:** Support national program efforts to inform and educate water program managers in the public and private sectors on climate change and water issues through a variety of means such as identifying key stakeholders and expanding professional networks, improving educational outreach efforts on national and regional EPA climate change websites and in other media, and disseminating clear and credible messaging on climate change science and impacts.
- **Address Climate Change in Meetings with States and Tribes:** In annual water program planning meetings with States and Tribes in 2016 for work to be conducted in FY 2017, include discussion of ongoing Agency and regional climate change adaptation planning, the National Water Program *2012 Strategy*, and climate change activities related to state water programs as appropriate. In 2016, Regions will encourage States and Tribes to make a commitment to promoting climate literacy among state and tribal water program staff (e.g.: encourage taking basic climate change literacy training, such as the Watershed Academy climate module or other similar training, in 2017).
- **Support Coordination Among Federal Agency Regional Offices:** Coordinate with the Regional offices of other Federal agencies on climate change adaptation matters and participate, where appropriate, with related interagency cooperative and collaborative efforts to address climate change challenges on a regional scale, including work to implement regional Federal agency climate change adaptation coordination elements of Section 10 of the Presidents Sustainability Executive Order (EO 13693).

Additional Regional Actions

Region 1

- The Region will release and continue to update and promote the publicly available version of the Region's **new Resilience and Adaptation in New England (RAINE) data base**, <http://www.epa.gov/raine>, an on-line tool showcasing communities that have conducted vulnerability assessments and climate adaptation planning.
- The cross-office climate mapping workgroup will continue to work on **creating intranet resources for Region 1 staff on climate adaptation and resilience mapping**. The group will also keep working on five mapping questions and analysis to focus on possible EPA actions and results, including analyzing climate change impacts to regulated facilities to support R1's Climate Adaptation Plan (RCAP) for resilience prioritization.



Region 2

- In 2016 EPA Region 2 will **train inspectors along with attorneys who support the work of inspectors on opportunities to advance Region 2's climate change goals** through our compliance and enforcement efforts. The training will include pre-inspection planning on how to identify if facility is located in a flood zone, nonattainment area or sole source aquifer. Training materials will include climate change connections to regulations (e.g. oil and hazardous waste storage, stormwater) and voluntary measures facilities could consider (e.g. moving hazardous waste storage to indoors with secondary containment).
- **The Puerto Rico and the Virgin Islands Memorandum of Understanding (MOU) to reduce the risks of climate change** will be signed in 2016 and will formally establish a mutually beneficial working relationship with EPA Region 2 with Puerto Rico and the US Virgin Islands to promote climate change resilience. The parties will identify, develop, promote and carry out cooperative activities to implement climate change mitigation and adaptation strategies to foster resilience and the regional capacity to adapt to climate change in the Caribbean.



Regions 1, 2, and 3

- Region 1 will continue working with NOAA to develop and manage the www.NEClimateUS.org website, which will be a **website where regional climate change related documents will be made available to the public**. Region 1 will work to engage other Northeast EPA Regions to continue to populate the website with regional climate change related document, tools, reports and data.

Regions 2 and 3

- Regions 2 and 3 will continue to **participate in this group the Mid-Atlantic Federal Climate Partners forum**, using this established group as a platform for the Regional climate sub-group coordination on EO 13693 (Planning for Federal Sustainability in the Next Decade) as well as for regional coordination of climate preparedness priorities and communication with Federal agencies, state governments, local governments, and tribal communities.

Region 3

- Region 3 will **develop a database of Mid-Atlantic climate adaptation plans, policies, programs** using Region 1's RAINE database as a template.
- The Region will **build climate literacy within Regional water programs** through 1) workshops and training developed by Office of Water, and 2) NOAA's Climate Adaptation for Coastal Communities Training.

- The Region will **support the Resilient Virginia Conference**, focused on climate adaptation, (March 22-23, 2016 in Richmond, Virginia) with planning and other assistance.
- The Region will **provide Enviro Atlas outreach and training to Old Dominion University** and Norfolk State University in spring 2016, focusing on climate adaptation and communities.
- The Region will continue work to implement EO 13693 on Federal Sustainability, including the **Region 3 EPA/GSA chaired Climate Adaptation Subgroup** to identify and discuss activities in Mid-Atlantic related to climate change preparedness and resilience planning in coordination with state, local, and tribal communities.
- The Region will work with the HQ Climate Change Division within the Office of Air and Radiation to **downscale results of the National Climate Indicators report for use by Region 3**. The Region plans to produce in 2016 an atlas of environmental conditions including a suite of climate indices to be used for assessing historic changes in climate across the region and provide insights into potential vulnerability to future climate change.

Region 5

- The Region will continue to **engage the Midwest Natural Resources Group of Federal agency managers to promote cooperation on climate change** and implement the “Guiding Principles for Adapting to Climate Change for the Midwest Natural Resources Group.”

Region 6

- The Region will **survey Region 6 employees on climate change adaptation knowledge** and behavior to gather information about what areas of climate change adaptation education and training need to be prioritized.
- The Region will meet with Tribes, environmental justice communities, and/or the South Central Climate Science Center Stakeholder Advisory Committee at least once a year to **provide training on climate science and adaptation** opportunities and practices.
- The Region will establish a **Sustainability Forum in EPA Region 6** for employees and partners, and employees across various Federal agencies, to increase collaboration, communication, and cohesion on climate change adaptation work.

Region 7

- To **promote cooperation among Federal agencies on climate change adaptation** initiatives, Region 7 will serve on the US Joint Stakeholder Committee (JSC) for the USDA Northern Plains Climate Hub and the Department of Interior North Central Climate Science Center.
- Region 7 plans to **work with state/tribal partners and other organizations** to:

- promote water and climate change adaptation training for water program staff;
- be a WaterSense partner;
- promote Use of CREAT by local water utilities;
- adapt SRFs to climate change;
- implement updated NPDES permit tools related to flows and water temperature; and
- address climate change in the capacity development program.

Region 8

- Region 8 plans to create **inventories of groups which are currently active in the States preparing for climate change**. This inventory will help the Region identify collaborative opportunities which will help to provide a showcase for the tools EPA has developed to enhance adaptation and resilience at the state and local levels.

Region 9

- Region 9 will work with the Local Government Commission, as well as government and other non-government partners to **develop and present the bi-annual California Adaptation Forum in Long Beach, CA, in September, 2016**. This is a key venue for sharing past lessons and building partnerships for effective adaptation planning and action throughout the State of California.
- Region 9 will continue a **speaker series for Region 9 staff on climate change issues in order to increase staff understanding of climate science, climate mitigation, and climate adaptation** at the EPA and at partner agencies and organizations. For example, in January, 2016, speakers from the National Oceanic and Atmospheric Administration and the Bay Conservation and Development Commission provided an engaging presentation on the features of the NOAA Digital Coast website and the Adapting to Rising Tides Project to Region 9 staff from a range of programs.

Region 10

- Region 10 will work **with the Army Corps of Engineers and the University of Washington Climate Impacts Group to explore possible climate change futures in the Pacific Northwest**. The project is called the Time of Emergence (ToE) and is using climate information to characterize when and where climate change signals are estimated to emerge from historical variability (noise) throughout the Pacific Northwest. The project was designed to assist practitioners in exploring a range of possible ToEs for a variety of scenarios composed to address program interests and risk tolerances. A pilot will be completed by early 2016.
- Region 10 will continue to coordinate with other federal, state, local, and tribal governments by **serving on the executive/steering committees of the USFWS North Pacific Landscape Conservation Cooperative, USGS Climate Science Center, and USDA Climate Change Hubs**.



Regional
Climate
Innovation

Goal 18: Tracking Progress and Measuring Outcomes

Goal
18

- ❖ Strategic Action 52: Adopt a phased approach to track programmatic progress towards Strategic Actions; achieve commitments reflected in the Agency *Strategic Plan*; and work with the EPA Workgroup to develop outcome measures.

[Note: Text above from *2012 Strategy: Response to Climate Change*]

2016 Implementation Actions

National Program Actions

- The National Water Program will support the internal **Climate Change Workgroup** including monthly meetings, development of annual highlight reports and annual workplans, and an in-person meeting in April 2016. (OW/IO)
- In the spring of 2016, the National Water Program will publish a report describing **highlights of progress** in implementing the *2012 Strategy* in 2015. This report includes the 2015 assessment of progress using the seven phases of implementation described in the *2012 Strategy*. (OW/IO)
- In the spring of 2016, the National Water Program will publish a **workplan describing the actions that national water program offices and regional offices will** implement in 2016 to advance the *2012 Strategy*. (OW/IO)
- The National Water Program will work with Regions to monitor reporting of progress under four **measures relating to progress in adapting water programs to climate change newly included in the Fiscal Year 2016-17 National Water Program Guidance**. These measures will provide information to form a basis for assessment of progress in key areas of climate change adaptation and greenhouse gas mitigation. Measures supporting the *Strategic Plan* goal of reducing greenhouse gas releases include:
 - number of WaterSense partners working to improve water use efficiency.
 - number of water and wastewater facilities that use the Energy Star Portfolio Manager to manage energy.

Measures relating to adapting clean water programs as the climate changes include:

- number of water or wastewater utilities that have registered to use Climate Resilience Evaluation and Awareness Tool (CREAT) tool.
- number of CWSRFs and DWSRFs that used financial incentives to promote climate resilience projects in the last year. (OW/IO program offices and Regions)

- EPA will review and evaluate data related to water utility energy use and generation resulting from utility participation in the Portfolio Manager program operated by the EPA Office of Air and Radiation and **consider options for establishing baseline information for energy use by water utilities of various types and sizes.** (OW/IO)
- In 2016, the National Water program will work with EPA Regions and EPA Large Aquatic Ecosystem programs to **develop an inventory of climate change adaptation plans and practices being implemented as part of work by EPA and partner agencies and organizations to restore and protect large ecosystems across the country.** The goal of this inventory work is to identify and describe successful climate adaptation plans and programs and share this information among the Large Aquatic Ecosystem programs. (OW/IO)

The Large Aquatic Ecosystem programs address:

1. Chesapeake Bay;
 2. The Great Lakes;
 3. The Gulf of Mexico;
 4. Long Island sound;
 5. Puget Sound;
 6. The U.S. Mexico Border;
 7. Pacific Island Territories;
 8. The South Florida Ecosystem;
 9. The Columbia River Basin; and
 10. The San Francisco Bay Delta Estuary.
- The National Water Program, in cooperation with the EPA Office of Research and Development and EPA Region 4, will cooperate in **developing updated reports under the existing measure in the EPA Report on the Environment addressing ecological connectivity** (see: <https://cfpub.epa.gov/roe/indicator.cfm?i=80>). This indicator is derived from the National Ecological Framework (NEF). The NEF captures the connectivity of important natural areas and ecological systems across the contiguous United States and is based on land cover data obtained from the 2001 National Land Cover Database (NLCD). This effort will update the existing measure using more recent land use data. This work is also recognized as an EPA contribution to the implementation of the *National Fish, Wildlife and Plants Climate Change Adaptation Strategy*. (OW/IO)
 - The National Water Program will work with EPA Regional offices to develop **an inventory of Regional programs and practices related to understanding and managing the impacts of sea level rise** in the context of Clean Water Act programs (e.g., wastewater treatment facilities, wetlands) and Safe Drinking Water Act programs (e.g., drinking water treatment facilities and water supplies).

Goal 19: Climate Change and Water Research Needs

Goal
19

- ❖ Strategic Action 53: Work with ORD, other water science agencies, and the water research community to further define needs and develop research opportunities to deliver the information needed to support implementation of this 2012 Strategy, including providing the decision support tools needed by water resource managers.

[Note: Text above from *2012 Strategy: Response to Climate Change*]

2016 Implementation Actions

National Program Actions

- The National Water Program will **continue close engagement with the EPA Office of Research and Development in setting research priorities** related to climate change and water and communicating results of EPA research on climate and water to EPA water program staff and other interested parties. (OW/IO)
- In 2016, the National Water Program and ORD will **publish a set of nine reports synthesizing research on climate change and water quality topics**. The goal of the “Water Quality Assessment” (WQA) project, is make scientific information about climate change more useful and accessible to managers and staff in EPA Program Offices and Regions and to promote mainstreaming climate concerns into all aspects of the national water program. (OW/IO and ORD)

Key elements of the project are:

- synthesis reports providing summaries of the science literature relevant to selected issues of concern to the EPA water program
- program links providing short summaries of relevant scientific information specifically tailored to the needs of different EPA water programs and activities; and
- a web portal will make this information accessible and will be updated over time.

The seven report topics are:

- streamflow;
- water temperature;
- nutrients (N and P);
- sediment;
- pathogens/HABs;
- salt water intrusion and sea level; and
- aquatic communities.

In addition, there are two other supporting documents:

- framework and methods for assessing vulnerability; and
- sources of scenario information.

Appendix 1: 2016 National Water Program Climate Change Priority Actions

1. Under the Climate Ready Water Utilities (CRWU) initiative, EPA will **promote use of the new Climate Resilience Evaluation and Assessment Tool (CREAT) 3.0.** (OGWDW)
2. EPA will encourage the **Clean Water and Drinking Water State Revolving Funds** to incorporate climate change considerations into their processes. (OWM and OGWDW)
3. In cooperation with EPA Regional offices, EPA will **expand the number of WaterSense partners** nationally, with a goal of 150 additional partners annually. (OWM)
4. The Climate Ready Estuaries will **provide funding for new National Estuary Program climate change vulnerability assessment** projects and support revision of Comprehensive Conservation and Management Plans to address climate. (OWOW)
5. EPA will work with States along the Gulf of Mexico and Atlantic coasts to **evaluate risks of storm-driven inundation of coastal water and wastewater facilities as a result of a storm surge event** comparable to Hurricane Sandy and work with utilities to address risks. (OW/IO, OGWDW, and Region 1, 2, 3, 4 and 6)
6. EPA will seek public comment on a draft white paper providing information States and Tribes can use to **protect aquatic life from negative effects associated with alteration of hydrologic conditions**, including potential effects from climate change. (OST)
7. EPA will **develop a white paper summarizing approaches that Tribes have taken to address climate change** with a particular focus on water quality/water resources. (OW/IO)
8. EPA will work with state water agency organizations to add to the existing set of ten **state water agency climate change practices** already identified with a goal of adding six new practices in 2016. (OW/IO)
9. EPA will work with EPA water program offices, Regional offices, and state agencies to **encourage clean water and drinking water program managers to take the new Watershed Academy climate change and water training.** (OW/IO)
10. EPA will **revise and refresh the Headquarters/Regional office climate change policy teams**, originally created in 2014, including shifting Regional Water Division participation in the reformed teams and initiating new efforts to consider climate resiliency in key program areas to be determined.

Appendix 2: EPA Regional Water Programs: Climate Change Common Priority Actions

The Office of Water *Climate Change Adaptation Implementation Plan* identifies climate change adaptation activities that each Regional water program will attempt to carry out in 2014 and following years.

- **Participate in the National Water Program Climate Change Workgroup:** Maintain current participation in the National Water Program Climate Change Workgroup, including identifying a single point of contact for the regional water program.
- **Support the EPA Office of Water Climate Change Adaptation Implementation Plan:** Help to implement the EPA-wide Climate Change Adaptation Implementation Plan and coordinate between the National Water Program *2012 Strategy* and the EPA regional climate change adaptation implementation plans.
- **Build Internal Climate Change Communications:** After the completion of the EPA Climate Change Adaptation Implementation Plan, draw on materials developed by the Office of Water to provide training for regional water program staff on the challenges that climate change poses for water programs and familiarize them with the National Water Program *2012 Strategy* and regional climate adaptation plans through a variety of means such as “all hands” meetings, webinars, seminars, and dissemination of the plans. EPA Regions will encourage water program staff to take new climate change and water training on the internet based Watershed Academy and consider making this training mandatory for new employees.
- **Build External Climate Change Communications:** Support national program efforts to inform and educate water program managers in the public and private sectors on climate change and water issues through a variety of means such as identifying key stakeholders and expanding professional networks, improving educational outreach efforts on national and regional EPA climate change websites and in other media, and disseminating clear and credible messaging on climate change science and impacts.
- **Address Climate Change in Meetings with States and Tribes:** In program meetings with States and Tribes in 2015, include discussion of ongoing Agency and regional climate change adaptation planning, the National Water Program *2012 Strategy*, and climate change activities related to state water programs as appropriate. In 2016, Regions will encourage States and Tribes to make a commitment to promoting climate literacy among state and tribal water program staff (e.g.: encourage taking basic climate change literacy training, such as the Watershed Academy climate module or other similar training, in 2017).

- **Support Coordination among Federal Agency Regional Offices:** Coordinate with the Regional offices of other federal agencies on climate change adaptation matters and participate, where appropriate, with related interagency cooperative and collaborative efforts to address climate change challenges on a regional scale, including work to implement regional Federal agency climate change adaptation coordination elements of section 10 of the Presidents Sustainability Executive Order (EO 13693).
- **Promote Community Engagement on Climate Resilience Using Tools from the Climate Ready Water Utilities (CRWU) and Climate Ready Estuaries (CRE) Programs:** Work with municipal and private utilities to promote use of the Climate Resilience, Evaluation and Awareness Tool (CREAT) Version 3.0 to recognize and respond to climate change risks and support communities in building climate resilience using tools such as the new workbook for developing risk-based climate adaptation plans developed by the National Estuary Program. Work with States to establish goals for the use of the new CREAT tool and the use of the new workbook for watershed climate resilience planning in 2017 (e.g.; a goal of initiating one CREAT project and one watershed climate resilience plan in each State in 2017).
- **Develop Regional WaterSense Partners:** Work with States, Tribes, municipalities, non-profit organizations and businesses to promote the WaterSense Program in the region, with a goal of a 150 additional partners annually across the country.
- **Strengthen State WARN Networks:** Work with State Water/Wastewater Agency Response Networks (WARN) in each State to strengthen the networks' operational capacity and encourage water utility membership.
- **Work with State Revolving Loan Fund Programs to recognize climate change impacts.**

APPENDIX 3

EPA Regional Water Programs: 2016 Climate Change Innovations

Water programs in EPA's ten Regional offices play an important role in adapting clean water and drinking water programs to a changing climate and are implementing a range of innovative programs and policies for climate change adaptation that respond to the specific challenges in that Region. These innovations are identified throughout the document and are summarized below by the goal that they support.

A) Water Infrastructure

1. Region 1 will continue to work with States to promote use of **GIS mapping of wastewater and drinking water assets at risk** and develop a pilot project with NHDES to connect potential SRF projects with needed resilience upgrades.
2. Region 9 will publish *Wasted Food Generation in the US – Sources, Amounts, and Estimation Methodologies* as part of a larger effort to increase **biogas production through co-digestion to increase renewable energy generation.**
3. Region 8 is co-leading the **Montana Drought Demonstration Project (MDDP)** to engage communities in drought preparedness planning and put forward implementation projects that build resiliency in the Missouri Headwaters Basin.

B) Watersheds and Wetlands

4. Region 3 will work with the District of Columbia and Virginia to **establish a Watershed Resources Registry (WRR) in those jurisdictions.** The WRR can be used as a tool for climate change adaptation planning and the Region will ensure climate change related information layers are included in the WRR.
5. Region 9's 2016 Request for Proposals for the San Francisco Bay Water Quality Improvement Fund **will specify that projects should "account for climate change to help ensure that the project achieves its expected outcomes even as the climate changes."**
6. Region 3 is working with the Clean Water Act section 404 wetlands program to **evaluate assessment methods in pilot watersheds in Region 3 to help practitioners take climate change considerations into account in state and regional programs.** The Region will also work with state wetland programs to **develop climate change indicators for wetlands,** focusing on reference wetlands.

C) Coastal and Ocean Waters

7. Region 6 will support the **City of New Orleans in planning for up-coming community meetings/workshops for HUD funded coastal restoration project** to assist the Gently Neighborhood in developing a more resilient community. EPA will support work to incorporate green infrastructure into any new revitalization or redevelopment.
8. Region 4 will continue to **cooperate with FEMA on implementing the Memorandum of Agreement signed in 2010** on the use of smart growth approaches in communities that have been impacted by disasters, and to provide information to communities that are planning to minimize weather-related impacts.
9. Region 10 will work with the Puget Sound National Estuary Program to continue funding projects that promote and **support adaptation and resiliency to climate change impacts**. The Region will draft and/or incorporate grant assistance agreement criteria - consistent with regional and national programs- to integrate climate adaptation and resiliency into Puget Sound Geographic Program funded projects.

D) Water Quality

10. Region 10 is examining the impacts of climate change on thermal suitability for salmonids for a subset of Pacific Northwest basins now and in the future. The results will be used to **determine whether or not stream temperatures will meet the Pacific Northwest Temperature Guidance recommended temperature criteria for different salmonids and life stages and** to identify the distribution of colder tributaries that act as potential coldwater refuges along the Columbia and Willamette Rivers.
11. During triennial reviews of state water quality standards, Region 7 will **encourage States to consider climate change in stream use classification or standards**, where necessary, due to climate change induced increasing temperatures or changes in stream flow.
12. The large number of national parks located within EPA Region 8 offers a unique opportunity to monitor climate change impacts at minimally impacted waters. In 2016, building from efforts initiated by USGS, the National Park Service and the Great Northern Landscape Conservation Collaborative, the Region will **explore opportunities to leverage existing efforts to develop a regional climate change monitoring network**.
13. Region 5 will **improve information on climate change impacts on surface water quality and quantity available for regulatory and assistance actions**. The Region will continue development of a Regional Monitoring Network for streams designed to track changes due to climate change and establish a workgroup to explore development a regional monitoring network for inland lakes for tracking climate change impacts.

E) Working with Tribes

14. Region 7 will coordinate with the Bureau of Indian Affairs through the North Central Climate Science Center with other partners to **share funding opportunities for Tribes with the goals of completing climate risk assessments, developing tribal hazard mitigation plans, and evaluating drought mitigation strategies.**

F) Cross-cutting Program Coordination

15. Region 1 will release and continue to update and promote the publicly available version of the Region's **new Resilience and Adaptation in New England (RAINE) data base**, <http://www.epa.gov/raine>, an on-line tool showcasing communities that have conducted vulnerability assessments and climate adaptation planning.
16. **The Puerto Rico and the Virgin Islands Memorandum of Understanding (MOU) to reduce the risks of climate change** will be signed in 2016 and will formally establish a mutually beneficial working relationship with EPA Region 2 to promote climate change resilience. The parties will identify, develop, promote and carry out cooperative activities to implement climate change mitigation and adaptation strategies to foster resilience and the regional capacity to adapt to climate change in the Caribbean.
17. Region 10 will work **with the Army Corps of Engineers and the University of Washington Climate Impacts Group to explore possible climate change futures in the Pacific Northwest**. The project is called the Time of Emergence (ToE) and is using climate information to characterize when and where climate change signals are estimated to emerge from historical variability (noise) throughout the Pacific Northwest.

Appendix 4

National Water Program Climate Change Workgroup Principal Members

EPA Headquarters

Office of Water: Immediate Office – Mike Shapiro (Chair), Elana Goldstein, Karen Metchis, Iqra Nasir, Jeff Peterson

Office of Ground Water and Drinking Water – Curt Baranowski, Mike Muse

Office of Science and Technology – Stephanie Santell, Dana Thomas

Office of Wastewater Management – Veronica Blette, Sarita Hoyt, Lynn Stabenfeldt

Office of Wetlands, Oceans, and Watersheds – Michael Craghan, Kathleen Kutschenreuter, Bernice Smith

EPA Regions

Region 1 – Mel Cote, Regina Lyons

Region 2 – Alexandre Remnek

Region 3 – Regina Poeske, Jennie Saxe

Region 4 – Robert Burns, Linda Rimer

Region 5 – Kate Balasa, Tim Henry

Region 6 – Meaghan Bresnahan, Jim Brown

Region 7 – Mary Mindrup, Amy Shields

Region 8 – Brent Truskowski

Region 9 – John Kemmerer, Suzanne Marr

Region 10 – Angela Bonifaci, Mike Cox

