

2013 Highlights of Progress: Responses to Climate Change by the National Water Program

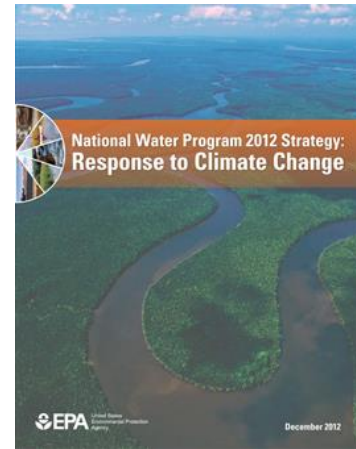


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TABLE OF CONTENTS

Introduction	1
Part I: National Program Highlights	5
Water Infrastructure	
Watersheds and Wetlands	
Coastal and Ocean Waters	
Water Quality	
Working with Tribes	
Cross-cutting Program Support	
Part II: Highlights from EPA Regional Programs	14
Region 1	
Region 2	
Region 3	
Region 4	
Region 5	
Region 6	
Region 7	
Region 8	
Region 9	
Region 10	
Part III: Assessment of Progress: 2013 Assessment	19
Appendix A: Compendium of Additional 2013 Accomplishments for Climate Change Adaptation	30
➤ National Water Program Climate Change Adaptation Accomplishments	
➤ Climate Change Adaptation Accomplishments Related to Water in EPA Regions	

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Introduction

The National Water Program at the U.S. Environmental Protection Agency released the *National Water Program 2012 Strategy: Response to Climate Change* (2012 Strategy) in December 2012 as an update to an initial climate change and water strategy released in 2008.

The *2012 Strategy* describes long-term goals for the management of sustainable water resources for future generations in light of climate change and is intended to be a roadmap to guide future programmatic planning and inform decision makers during the Agency's annual planning process. The *Strategy* is available at <http://water.epa.gov/scitech/climatechange/2012-National-Water-Program-Strategy.cfm>.

This *2013 Highlights of Progress* report provides a summary of the major accomplishments of national water programs and EPA regional water programs in 2013. In addition, major research projects addressing climate change and water that were completed in 2013 by the EPA Office of Research and Development (ORD) are described.

This is the fifth climate change progress report for the National Water Program and is modeled after the *2012 Highlights of Progress* report released in March 2013 <http://water.epa.gov/scitech/climatechange/upload/FINAL-NWP-2012-Climate-Highlights-Report.pdf>. Like the *2012 Highlights of Progress* report, it is organized around the six long-term programmatic vision areas described in the *2012 Strategy*:

- water infrastructure;
- watersheds and wetlands;
- coastal and ocean waters;
- water quality;
- working with tribes; and
- cross-cutting program support.



Part I of this report presents key “highlight” projects and products implemented by the National Water Program and Office of Research and Development in 2013 in each of these six vision areas. Part II of this report includes descriptions of key 2013 “highlights” of climate change and water work in each of the 10 EPA Regional offices.

In addition to the major accomplishments highlighted in each of these vision areas and for each EPA Region, other important projects and activities were accomplished in 2013. A detailed compendium of 2013 activities and accomplishments related to climate change and water programs underway in EPA national water program offices and Regional offices is provided in Appendix A.

In addition to reporting on highlights of progress for 2013, the National Water Program is continuing past work to assess progress in the overall implementation of the *2012 Strategy* in the context of the stage or phase of development of climate response programs. This assessment effort is described in Part III of this report. The assessment effort tracks program implementation progress through seven developmental phases:

- initiation;
- assessment;
- response development;
- initial implementation;
- robust implementation;
- mainstreaming; and
- monitor outcomes and adaptive management.

Each of these phases is described in greater detail in the *2012 Strategy* and in this report.

In addition, Part III includes an assessment of the status of progress toward each of the 19 goals described in the *2012 Strategy* with respect to the developmental phases. This assessment builds on the first, baseline assessment of the developmental status of climate change adaptation programs and projects across the National Water Program that was provided in the *2012 Highlight of Progress* report. The numerical score representing the 1-7 progress under each of the 19 goals in the *2012 Strategy* for 2013 is 51 of a possible score of 133. This is an increase of 9 points above the 2012 score of 42 and indicates that some progress in strengthening implementation of the program has been made but that more work is needed.



OVERVIEW OF 2013 HIGHLIGHTS

National Water Programs/Research Products

Vision Area 1: Water Infrastructure

1. Address Climate Change in Clean Water State Revolving Fund
2. Expand Climate Ready Water Utilities Program Outreach
3. Publish Reports of Water Utility Extreme Weather Case Studies
4. Expand WaterSense to Commercial Kitchen Products
5. Expand WaterSense Partners

Vision Area 2: Watersheds and Wetlands

6. Build State and Local Capacity to Protect Healthy Watersheds and Enhance Climate Resiliency
7. Sign Joint Memorandum of Understanding to Promote Healthy Watershed Protection
8. Assess Climate Change in 20 Watersheds (*Research Product*)

Vision Area 3: Coastal and Ocean Waters

9. Publish for peer review *Being Prepared for Climate Change Workbook*
10. Hold Climate Change Vulnerability Workshop
11. Publish Study of Climate Change Impacts on Salmon Populations (*Research Product*)
12. Publish Research on Sea Surface Temperatures in Pacific Northwest (*Research Product*)

Vision Area 4: Water Quality

13. Develop Climate Change Extension for the Stormwater Calculator
14. Develop Improved Monitoring of Water Temperature and Flow (*Research Product*)
15. Publish Study of Climate Impacts on Nitrogen in Water (*Research Product*)

Vision Area 5: Working with Tribes

16. Support EPA's Tribal-Focused Environmental Risk/Sustainability Tool (*Research Product*)

Vision Area 6: Cross-cutting Program Support

17. Develop Office of Water Draft *Climate Change Adaptation Implementation Plan*
18. Co-Chair Climate Change Adaptation and Water Stakeholder Group
19. Contribute to Federal Interagency Climate Adaptation Projects

OVERVIEW OF 2013 HIGHLIGHTS

EPA Regional Programs

Region 1: Organize New England **Climate Change Leaders Summit** that identified six key themes to help local communities be more resilient to climate change impacts *(Supports Vision Area 6: Crosscutting Program Support)*

Region 2: Provide grants of \$340 million to the State of New York and \$229 million to the State of New Jersey for **improvements to wastewater and drinking water treatment facilities impacted by Hurricane Sandy** *(Supports Vision Area 3: Coastal and Ocean Waters)*

Region 3: Hold an **extreme weather events workshop** titled ***Adapt, Mitigate, and Survive*** with eleven drinking water and/or wastewater utilities representing a population served of 3.95 million people *(Supports Vision Area 1: Water Infrastructure)*

Region 4: **Expand outreach to States and Tribes to address impacts from all types of hydrologic alteration under which there is Clean Water Act (CWA) authority** *(Supports Vision Area 4: Water Quality)*

Region 5: Support projects in the **Great Lakes region related to climate change** including addition of climate change elements to State grant agreements, Federal interagency agreements, and agreements with Canada *(Supports Vision Area 4: Water Quality)*

Region 6: Hold a climate change workshop in Albuquerque, NM for **Tribal and environmental justice communities vulnerable to climate change impacts** *(Supports Vision Area 5: Working with Tribes)*

Region 7: Work with states to **incorporate climate change considerations into Intended Use Plans (IUPs)** for State Revolving Loan Funds *(Supports Vision Area 1: Water Infrastructure)*

Region 8: Celebrate the **first WaterSense labeled affordable home in the Nation** and promote water efficiency benefits with key stakeholders *(Supports Vision Area 1: Water Infrastructure)*

Region 9: Release a final ***Coral Reef Strategy*** for Hawaii and the U.S. Pacific Territories that seeks to better focus authorities, technical assistance, and funds for protection of coral reefs and to provide leadership on the links between coral reef protection and climate change *(Supports Vision Area 3: Coastal and Ocean Waters)*

Region 10: Organize a **workshop series focusing on energy efficiency for water and wastewater utilities in western Washington** *(Supports Vision Area 1: Water Infrastructure)*

PART I

NATIONAL PROGRAM HIGHLIGHTS



Vision Area 1: Water Infrastructure

***Vision:** 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.*

- 1. Address Climate Change in Clean Water State Revolving Fund:** In 2013, the Clean Water State Revolving Fund (CWSRF) program developed a comprehensive list of CWSRF-eligible projects to increase climate/weather-related resilience at water utilities to implement the Disaster Relief Appropriations Act of 2013. Climate/weather-related eligibilities were also discussed at the fall Council for Infrastructure Financing Authorities conference, where the CWSRF program delivered a presentation to State and Regional counterparts regarding the CWSRF's ability to promote climate/weather-related resilience in the water sector.

The CWSRF program also revised its Annual Review Checklist to incorporate several questions on resilience to climate change and extreme weather and participated with the DWSRF in the development of a draft guide for small utilities that want to become more resilient to flooding.

- 2. Expand Climate Ready Water Utilities Program Outreach:** Through the Climate Ready Water Utilities (CRWU) initiative, EPA has provided 15 workshops and webinars and reached over 2000 people. Key 2013 activities included:



- convening a working group to develop version 3.0 of the Climate Resilience Evaluation and Awareness Tool (CREAT) including utilities, academia, associations and other Federal partners;
- holding two-day emergency response workshops with demonstrations of tools and resources to aid utilities, review climate impacts, and discuss planning options with different sector stakeholders, such as local governments, first responders, and community leaders; and

- hosting webinars with the Water Utility Climate Alliance to help utilities plan for climate change and other threats.

Ten webinars were held in 2013 and there are plans for at least four more over 2014. Each webinar is recorded and archived on EPA’s website at www.epa.gov/climatereadyutilities.

3. Publish Reports of Water Utility Extreme Weather Case Studies: EPA worked with partners to organize workshops in six communities with a focus on areas that have already experienced extreme events, including drought, flooding, wildfires, sea level rises, and heat waves. The communities where workshops were held included:

- Georgia: Upper Apalachicola- Chattahoochee-Flint River Basin;
- California: Russian River Watershed;
- Virginia: Tidewater Area;
- Washington DC: National Capital Area;
- Kansas/Missouri: Lower Missouri River Basin; and
- Texas: Central Region.

Fact sheets and reports on the lessons learned from these case studies were published throughout 2013. Fact sheets are available at: <http://cpo.noaa.gov/ClimatePrograms/ClimateandSocietalInteractions/SARPPProgram/ExtremeEventsCaseStudies.aspx>. Partners included the National Oceanic and Atmospheric Administration, Water Environment Research Foundation, Water Research Foundation, Concurrent Technologies Corporation, and Noblis.

4. Expand WaterSense to Commercial Kitchen Products:

In September 2013, EPA finalized the first WaterSense specification for a commercial kitchen product. Pre-rinse spray valves—which remove excess food waste from dishes prior to dishwashing—are now eligible to earn the WaterSense label and help food service establishments save water, energy, and money. Pre-rinse spray valves can account for nearly one-third of the water used in a typical commercial kitchen. If every U.S. commercial food service establishment installed and used a WaterSense labeled pre-rinse spray valve, we could save more than 10 billion gallons of water, and more than \$225 million in water and energy costs annually across the country. Because kitchens use hot water to rinse dishes, installing a WaterSense labeled pre-rinse spray valve can also reduce a commercial kitchen’s annual natural gas use by more than 6,400 cubic feet per year.



5. Expand WaterSense Partners: In 2013, the number of WaterSense partners across the country continued to grow, increasing by close to 120 to a total of 1,474 partners, which includes water utilities, state and local governments, manufacturers, retailers, and builders.

Vision Area 2: Watersheds and Wetlands



***Vision:** 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.*

6. Build State and Local Capacity to Protect Healthy Watersheds and Enhance Climate Change Resiliency:

EPA's Healthy Watersheds Program (HWP) is working to build state and local capacity to identify and protect healthy watersheds using a systems



approach that recognizes watersheds as dynamic, interconnected ecosystems. Natural, intact watersheds are better equipped to withstand, recover from, and adapt to natural and man-made disturbances, including climate change. Implementing strategies to maintain and protect healthy watersheds is key toward enhancing climate change resiliency. In 2013, HWP worked to build state and local capacity to identify and protect healthy watersheds at a variety of scales and locations:

- Identification and Protection of Kansas's Healthy Watersheds;
- California Integrated Assessment of Watershed Health;
- Aquatic Ecosystem Protection in Minnesota's Snake River Watershed;
- Establishing Temperature Regime Characteristics of High Quality Streams in Connecticut;
- Sustaining West Virginia's Natural Capital: A Framework for Green Infrastructure; and
- Green Infrastructure Practitioners Guide and Ulster County New York Case Study.

For more information on the Healthy Watershed Program see:

www.epa.gov/healthywatersheds.

- ### 7. Sign Joint Memorandum of Understanding to Promote Healthy Watershed Protection:
- On February 22, 2013, EPA, The Nature Conservancy (TNC), and the Association of Clean Water Administrators (ACWA) jointly signed the Memorandum of Understanding (MOU) to promote EPA's Healthy Watersheds Program (HWP: www.epa.gov/healthywatersheds).



The Nature Conservancy



This MOU formalizes a mutual collaboration between these groups as they strive to develop and implement healthy watersheds programs in states and with regional aquatic ecosystem programs. These programs include working with states and other partners to identify healthy watersheds state-wide and to implement healthy watershed protection plans, to integrate such protection into EPA programs and to increase awareness and understanding of the importance of protecting our remaining healthy watersheds. TNC, EPA, and ACWA recognize that healthy, intact watersheds can offset the potential impacts of climate change in a variety of ways including maintenance of baseflow during periods of drought, native vegetation that provides cooling during heat waves, carbon storage in native vegetation and soils, and enhanced stormwater infiltration capacity that mitigates downstream flooding.

The partners will promote data gathering/data sharing and evaluation of conservation and environmental outcomes resulting from the implementation of state and regional healthy watershed programs. See: <http://water.epa.gov/polwaste/nps/watershed/hwi-mou.cfm>.

8. **Assess Climate Change in 20 Watersheds:** The EPA Office of Research and Development released in 2013 a report that evaluated streamflow, nitrogen, phosphorus, and sediment in 20 different watersheds across the U.S. for the periods 1970-2000 and 2041-2070 to examine the effects of six different scenarios of climate change and urban/residential development. Additional scenarios were evaluated for five of the watersheds to examine implications of using different methodological choices for this and similar studies. The results indicate that different conditions by mid-21st century are possible for many watersheds, with larger differences likely where development is concentrated. The results also showed sensitivity to the methodological choices, such as use of different watershed models and approaches to downscaling results from global-scale models. (See EPA/600/R-12/058F). (<http://www.epa.gov/ncea>).

**Office of Research and
Development:
2013 Product**

Vision Area 3: Coastal and Ocean Waters



Vision: 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.

9. Publish for Peer Review *Being Prepared for Climate Change* workbook:

A public draft of the Climate Ready Estuaries (CRE) Program workbook titled *Being Prepared for Climate Change* was sent out for peer review in September and posted on the CRE website in October 2013 for public comment. The workbook applies a risk management methodology for climate change adaptation and helps organizations prepare vulnerability assessments and action plans. The vulnerability assessment methodology of the *Being Prepared for Climate Change* workbook was shared with staff from NEPs, EPA Regions, EPA headquarters, and other federal partners. For more information see <http://water.epa.gov/type/oceb/cre/news.cfm>.



10. Hold Climate Change Vulnerability Workshop:

On February 25, 2013, EPA held a climate change vulnerability assessment workshop with two main goals:

- to share the vulnerability assessment methodology of the *Being Prepared for Climate Change* workbook; and
- to hear from NEP staff (a main audience for the workbook) about what they want to know in order to prepare high-level, risk-based vulnerability assessments.

The workshop provided a step-by-step walk through of the vulnerability assessment steps in the CRE workbook. The San Juan Bay Estuary Program (SJBEP) also shared some of its experience working on a climate change vulnerability assessment. SJBEP was part of a 2012 Climate Ready Estuaries pilot project to use an early version of the workbook for their assessment.

11. Publish Study of Climate Change Impacts on Salmon

Populations: EPA's Office of Research and Development used empirically based simulation modeling of 48 sockeye salmon populations to examine how reliably alternative monitoring designs and fish stock assessment methods can estimate the relative contribution of climate compared to non-climatic factors. The study covered a range of

Office of Research and
Development:
2013 Product

scenarios for ocean conditions, salmon productivity, and human-induced changes and found that distinguishing climate-related effects on salmon productivity from non-climate sources will be difficult, especially if climatic changes occur rapidly and concurrently with major anthropogenic disturbances. Better understanding of the mechanisms underlying the relationship between climate and salmon productivity may be essential to avoid undesirable management outcomes. *Fisheries Research* **147**:10-23.

12. Publish Research on Sea Surface Temperatures in Pacific

Northwest: A remotely-sensed dataset was used to focus on the nearshore environment of the North Pacific to identify and describe broad-scale sea surface temperature (SST) patterns.

Satellite remotely-sensed mean, monthly SST data were used to create a 29-year nearshore (< 20 km offshore) time series of SST along the North Pacific coastline. The scalable nature of the methodology is useful to both broader-scale and more focused analyses, and puts an environmental factor of primary importance (SST) into the hands of researchers studying nearshore environments by providing web-based access to it. Reference: Payne, M. C., Reusser, D., Brown, C. A., and Lee II, H. (2012) "Ecoregional analysis of nearshore sea-surface temperature in the North Pacific." *PLoS ONE*, **7**(1):12 pages.

**Office of Research and
Development:
2013 Product**

**Vision Area 4:
Water
Quality**



***Vision:** The 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.*

13. Develop Climate Change Extension for the Stormwater Calculator: The Stormwater Calculator (SWC) is a desktop tool intended to help users at individual sites manage stormwater by reducing runoff through infiltration and retention (i.e., green infrastructure). The SWC was launched in 2013 and uses EPA’s Stormwater Management Model (SWMM) as its computational engine. A climate change extension to the SWC was developed in 2013 and released in final form early in 2014. This extension allows users to apply different future climate change scenarios that modify the historical precipitation events and evaporation rates normally used by the calculator. This climate change extension will help site owners, developers, and planners design more robust stormwater management solutions in the face of uncertain future climatic conditions.

14. Develop Improved Monitoring of Water Temperature and Flow: EPA’s Office of Research and Development released an external review draft report of technical "best practices" describing sensor deployment for and data collection of continuous temperature and flow at ungaged sites in wadeable streams. The draft report addresses questions related to equipment needs; configuration, placement, and installation of equipment; and data retrieval and processing. (See EPA/600/R-13/170). (<http://cfpub.epa.gov/ncea/global/recordisplay.cfm?deid=261911>).

**Office of Research and
Development:
2013 Product**

15. Publish Study of Climate Impacts on Nitrogen in Water: EPA’s Office of Research and Development investigated the effects of projected changes in land cover and climate (precipitation, temperature and atmospheric CO₂ concentrations) on simulated NO₃ and organic nitrogen discharge for two watersheds within the Neuse River Basin, NC for years 2010 to 2070. Results showed nitrogen discharges were most sensitive to changes in precipitation and temperature, with sensitivities to CO₂ and land cover only one-tenth as much. With nitrogen discharge showing high sensitivity to P+T change, this study suggests more emphasis should be placed on investigating impacts of climate change on nutrient transport compared to land cover change in the Neuse River Basin. (See “Relative Sensitivity of Simulated Nitrogen Discharge to Projected Changes in Climate and Land Cover for Two Watersheds in North Carolina, USA,” presented at AGU Fall Meeting 2013, San Francisco, CA, December 09 - 13).

**Office of Research and
Development:
2013 Product**

Vision Area 5: Working with Tribes



***Vision:** 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.*

16. Support EPA's Tribal-Focused Environmental Risk and Sustainability Tool (Tribal-FERST).

The EPA Office of Water is working with the Office of Research and Development to develop and implement Tribal-FERST, which is a web-based geospatial decision support tool designed to serve as a research framework to provide tribes with easy access to the best available human health and ecological science.

**Office of Research and
Development:
2013 Product**

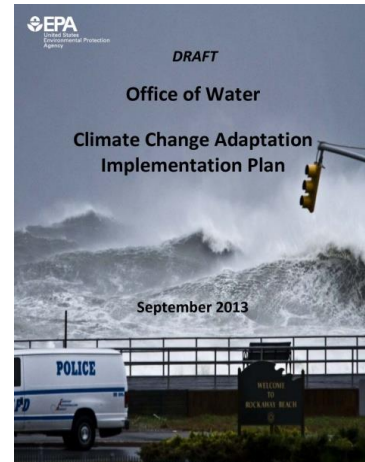
Tribes and partners throughout the United States are providing input on the design and content of Tribal-FERST. The United South and Eastern Tribes (USET) is partnering with EPA to develop the Tribal-FERST guidance document and connect its water quality exchange database and data transfer network with Tribal-FERST. The Pleasant Point Passamaquoddy Tribe of Maine is currently piloting Tribal-FERST as part of its sustainable and healthy community effort.

In addition, water programs in EPA's regional offices are working with Tribes to assist them in responding to a range of climate change related issues. These activities, described in greater detail in the next Part of this report, include:

- Region 2 is maintaining a dialog with the Tribal nations regarding **climate change adaptation and Traditional Ecological Knowledge (TEK)**. A **climate change grant** to the Nations was extended through September 2013 to support vulnerability assessment of nation lands and planning climate adaptation strategies.
- Region 4 initiated collaboration with United South and Eastern Tribes, Inc., (USET), which serves 26 Tribes from Texas to Maine and is located in Nashville, TN. Region 4 is working with USET to **build their capacity to provide energy management assistance to Tribal water utilities**.
- Region 6 held a **climate change workshop in Albuquerque, NM for Tribal and Environmental Justice Communities vulnerable to climate change impacts**.
- Region 7 tribes are incorporating climate change science into their CWA 106 programs addressing **water quality monitoring**.

Vision Area 6: Cross-cutting Program Support

17. Develop Office of Water Draft *Climate Change Adaptation Implementation Plan*: The Office of Water worked with EPA Regional Water Division staff to draft a *Climate Change Adaptation Implementation Plan*. The draft *Plan* was organized on the template adopted by EPA and is comparable to each of the 16 other national program office and Regional office climate change adaptation implementation plans. The Office of Water draft *Plan* was released for public comment in September 2013. A final *Plan* will be published in the fall of 2014. More information is available at: <http://www.epa.gov/water/climatechange>.



18. Co-Chair Climate Change Adaptation and Water Stakeholder Group: In 2013, the Office of Water staff served as co-chair of a newly established Climate Change Workgroup of the Advisory Committee on Water Information (ACWI). The Workgroup includes 40 representatives from federal agencies and stakeholder organizations and provides advice and comment to federal agencies on a range of climate change and water resources issues, including the progress in implementing the *National Action Plan: Priorities for Managing Freshwater Resources in a Changing Climate*. More information is available at www.acwi.org.



19. Contribute to Federal Interagency Climate Adaptation Projects: National Water Program staff also participated in a range of workgroups within EPA and among other federal agencies working to adapt to a changing climate including the:

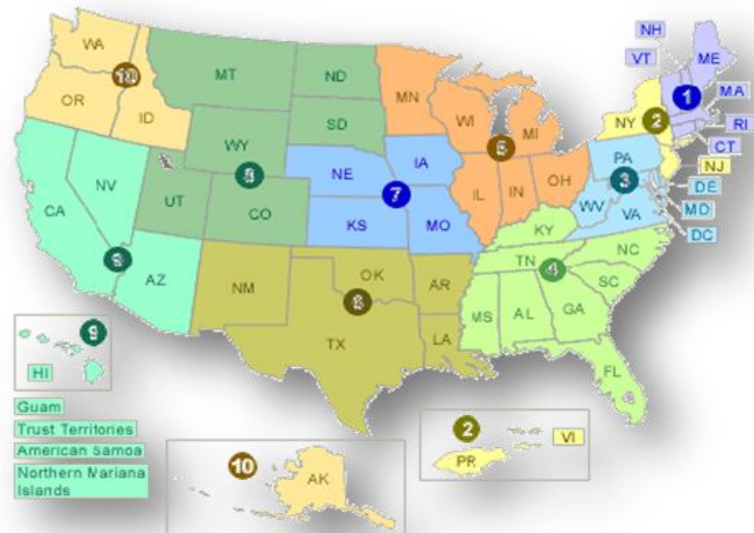
- EPA Cross-Agency Climate Change Adaptation Workgroup;
- Interagency Council on Climate Resilience and Preparedness;
- Water Resources Workgroup of the Interagency Council on Climate Change Resilience and Preparedness;
- Interagency Joint Working Group implementing the final *Fish Wildlife and Plants Climate Adaptation Strategy*;
- *National Ocean Policy* Implementation Plan workgroup on climate change;
- Interagency Ocean Acidification Working Group; and
- Coral Reef Task Force.

The Office of Water also has an interagency agreement with NOAA in which climate adaptation is a joint focus.

PART II

HIGHLIGHTS FROM EPA REGIONAL PROGRAMS

A major highlight of work in each of the ten EPA Regional offices (see map of EPA Regions) to implement the *2012 Strategy* is described below. Additional accomplishments by EPA Regions are described in the Compendium in Appendix A.



Region 1

On November 8, 2013, EPA Region 1 convened an invitational “**New England Climate Change Leaders Summit**” in Providence, Rhode Island. A group of 140 leaders from federal, tribal, state, and local government, non-governmental organizations, academic institutions, and businesses came together to discuss what they could do to help local communities be more resilient to climate change impacts. The summit also was used to promote the President’s Climate Action Plan and Executive Order, “Preparing the United States for the Impacts of Climate Change.” The summit culminated with commitments by participants to address six themes developed over the day – pilot vulnerability assessments; state roundtables with federal partners to coordinate assessment resources; integrating climate planning into all municipal planning; developing a common data platform in New England; a communication initiative to make climate impacts and solutions local and personal; and scoping out smarter spending on resilient infrastructure.

Region 2

On May 2, 2013, EPA announced that it would provide **grants of \$340 million to the State of New York and \$229 million to the State of New Jersey for improvements to wastewater and drinking water treatment facilities impacted by Hurricane Sandy**. The funding will help storm-damaged communities in both states as they continue to recover from the damage caused by the storm. Projects must be for resiliency purposes and “reduce flood damage risks and vulnerability or enhance resiliency to rapid hydrologic change or a natural disaster at water or wastewater facilities. Examples of eligible projects include the hardening of facilities, correction of infiltration and inflow, separation of combined sewers, green infrastructure, and backup power.

Region 3

In May, 2013 Region 3 held an extreme weather events workshop titled ***Adapt, Mitigate, and Survive***. Eleven drinking water and/or wastewater utilities participated, representing a population served of 3.95 million people. State agencies, academia, and several EPA offices attended. A key focus of the workshop was seven case studies presented by impacted utilities who shared lessons learned on preparedness and recovery. Many have taken advantage of their experiences with extreme weather events to upgrade facilities with resiliency, efficiency and energy savings in mind. These case studies can be found at:

http://www.epa.gov/reg3wapd/pdf/pdf_drinking/Region3_%20Climate%20Change%20Mitigation%20and%20Adaptation%20Fact%20Sheets_Draft_082213.pdf.

Region 4

EPA Region 4 Water Protection Division's (WPD) Flow Work Group (FWG), created in 2010, is charged with understanding and working with states to address **impacts from all types of hydrologic alteration under which there is Clean Water Act (CWA) authority**. During 2013, the FWG continued to:

- Work with States and Tribes to raise understanding of the need to ensure that water resource management decisions are consistent with EPA-approved water quality standards and, where possible, ensure that water resource planning (both ground water and surface water) does not result in new water quality impairments and removal of uses;
- Encourage states and tribes to develop and adopt explicit water quality standards for the flows needed to maintain the designated and existing uses and protect downstream uses;
- Provide tools for conservation and efficiency consideration in water resource planning through the use of the Water Efficiency Guidelines (which will be updated in 2014) as implemented through the Section 404, Section 401 and NEPA programs,
- Conduct a baseline evaluation of how waters are currently being assessed for hydrologic/flow alterations and work with state monitoring and assessment staff to ensure that waters impaired by hydrologic alteration are adequately captured in the state's listing of impaired waters under the CWA;
- Evaluate, where possible, the potential for restoration of hydrologically altered waters; and
- Improve our understanding of the economic benefits of protecting the ecologic integrity of intact aquatic ecosystems.

Region 5

In 2013, EPA Region 5 supported several **projects in the Great Lakes region related to climate change**:

- **Great Lakes Restoration Initiative (GLRI) 2013 Interagency Agreements:** Approved climate change information activities under several interagency agreements with federal partners in implementing the GLRI and encouraged all federal partners to incorporate sensitivity to climate change impacts into their GLRI interagency agreements.
- **GLRI Capacity Grants to States and Tribes:** Included climate change planning and adaptation work in some GLRI capacity grants to Great Lakes States and Tribes.
- **U.S. – Canada Great Lakes Water Quality Agreement (GLWQA) of 2012:** In 2013, established a binational subcommittee to the Great Lakes Executive Committee to coordinate the implementation of the climate change commitments under Annex 9 the GLWQA.

Region 6

On June 20, 2013, Region 6 held a **climate change workshop in Albuquerque, NM for Tribal and environmental justice communities vulnerable to climate change impacts**. Some potential climate change impacts for the Region include increasing air temperature and related urban heat island effects, water scarcity, sea level rise and coastal land loss, increased storm intensity and related degradation in water quality, and increased frequency and intensity of wildfires. Climate adaptation measures as well as potential funding sources were discussed with community members. Earlier in March, Region 6 held a separate climate adaptation workshop for tribes at a Regional Tribal Operations Committee meeting, discussing the same topics noted above to a different group of tribal representatives.

Region 7

Region 7 reviewed its states' **Intended Use Plans IUPs for State Revolving Loan Funds** and the states incorporated the following climate change considerations into their plans:

- **Kansas** assigned additional priority points to projects which implement an asset management program and provided asset management training for public water systems.
- **Iowa** adopted a goal to “Promote and identify sustainable practices in projects proposed for funding”. One project example in Osage, Iowa satisfies with the usage of wind turbines that supply electricity to the city’s wastewater treatment facility.
- **Missouri** adopted a goal to identifying ways to utilize the SRF program to encourage sustainable infrastructure and capacity development concepts with borrowers in its 2013 IUP.

- **Nebraska's** 2013 IUP long-term goals list exploration with stakeholders to find ways the SRF Program can be used to encourage **sustainable** infrastructure, capacity development, and opportunities to use distributed wastewater treatment options, and encourage the incorporation of green infrastructure concepts and energy recovery, production, and conservation in funded projects.

Region 8

In 2013, EPA Region 8 celebrated the **first WaterSense labeled affordable home in the nation**. The home, in Colorado, was built by Habitat for Humanity of Metro Denver to the specifications of EPA's three labeled home programs - ENERGY STAR, Indoor airPLUS and WaterSense. WaterSense program staff have been involved in numerous speaking engagements to promote the WaterSense label for new homes, and to educate consumers about the Program. A webinar was given by ENERGY STAR, Indoor airPlus and WaterSense to various state chapters of the U.S. Green Building Council that showcased how our programs are a component of LEED.

Region 9

In 2013, EPA Region 9's Sustainable Infrastructure Program completed another one-year program of monthly energy management webinars with eight water/wastewater utilities. The **2011 effort resulted in ten projects expected to reduce nearly 3,244 MWh/year of electricity**, GHG emissions of nearly 2,300 MTCO₂e/year, plus nearly \$600,000 in annual reduced operating costs by implementing projects using the Environmental Management Systems approach. To date, EPA Region 9 has funded or coordinated 38 energy and 4 water audits that have identified savings of 80,000 MWh, \$14 million, and over 10 billion gallons of water per year. The Region will continue its relationship with DOE's Industrial Assessment Centers to conduct 9-10 free wastewater treatment facility audits per year. The Region is also working with state SRF programs to provide regular annual funding to conduct energy and water audits and to develop Sustainable Infrastructure projects and will continue to coordinate with state agencies and energy utilities to facilitate the funding of water efficiency projects with energy efficiency funding.

Region 9 focused on the development and beneficial **use of biogas at wastewater treatment facilities**. Primary areas of emphasis in 2013 included working to expand the Region 9 Biogas Mapping Tool, researching the environmental and economic performance of varying biogas management strategies, and working with California agencies and other interested entities to navigate technical and regulatory barriers that currently discourage the use of biogas.

With American Recovery and Reinvestment Act of 2009 (ARRA) funds, EPA Region 9 and the Hawaii Department of Health targeted workshops on each of the main Hawaiian Islands for **field energy audits at four major wastewater treatment plants in Kauai, Honolulu, Maui, and Hawaii counties**. In 2013, work was initiated in Honolulu County from a Clean Water State Revolving Fund loan from the Hawaii Department of Health to support implementation of audit recommendations at the Kailua Wastewater Treatment Plant. This project has resulted in

substantial energy efficiency improvements and the installation of a solar array that will save millions of dollars over the life of the project.

In coordination with EPA Region 9, the DOE Industrial Assessment Centers at San Diego State University and San Francisco State University completed 18 energy audits in 2012 and 2013. These audits have resulted in the implementation of a diverse array of energy improvement projects at numerous facilities. For example, the Victor Valley Wastewater Reclamation Authority (CA) was one of the 9 facilities that received an audit in 2012. During 2013, the energy audit recommendations began to be implemented. Through an innovative public private partnership, Victor Valley will save over \$2 million through the life of their project.

Region 10

With seed money from the EPA Region 10 and additional support from other sponsors, Washington State University Extension Energy Program led a **workshop series focusing on energy efficiency for water and wastewater utilities** in western Washington. Four workshops and three webinars were conducted during 2012 and 2013 with twelve utilities participating. Partners include Bonneville Power Administration, Puget Sound Energy, Zero Waste Alliance and the EPA. The utilities participating in this series learned approaches and techniques leading to reduced energy consumption.

Part III

Assessment of Progress: 2013 Assessment

The *2012 Highlights of Progress* report included the initial step in tracking progress in implementing climate change response programs based on assessing the stage or phase of development of efforts to implement the 19 Goals and each of the 54 specific “Supporting Actions” identified in the *2012 Strategy*.

The seven developmental phases for climate change related work identified in the 2012 report are:

- **Initiation**; conduct a screening assessment of potential implications of climate change to mission, programs, and operations;
- **Assessment**; conduct a broader review to understand how climate change affects the resources in question;
- **Response Development**; identify changes necessary to continue to reach program mission and goals and develop initial action plan;
- **Initial Implementation**; initiate actions in selected priority programs or projects
- **Robust Implementation**; programs are underway and lessons learned are being applied to additional programs and projects;
- **Mainstreaming**; climate is an embedded, component of the program; and
- **Monitor Outcomes and Adaptive Management**; continue to monitor and integrate performance, new information, and lessons learned into programs and plans.

More detailed descriptions of each of these phases of assessment are included in Table I.

Recognizing the long-term nature of work to address climate change, the National Water Program has identified the current (i.e. December 2012) status of work on each of the Goals in Table II below. The 2012 baseline assessment has a total numeric value of 42 out of a total possible score of 133 (i.e., 19 Goals times a score of 7 for each goal equates to a score of 133). This combined score indicates that many actions are in the early stages of implementation.

This *2013 Highlights of Progress* report includes a 2013 update of the initial 2012 assessment. The 2013 scores are provided in Table II after the 2012 scores. Collectively, the total score increases from 42 to 51 between 2012 and 2013. This indicates that some progress in strengthening implementation of the program has been made but that more work is needed.

Table I - Description of Implementation Phases

Program Implementation Phases	Explanation	Examples of Evidence of Achievement
1. Initiation	Conduct a screening assessment of potential implications of climate change to mission, programs, and operations	<ul style="list-style-type: none"> ○ Preliminary information is developed to evaluate relevance of climate change to the mission or program; a decision is made as to whether to prepare a response to climate change; further exploration of climate change implications has been authorized ○ Responsibilities are assigned at appropriate levels within the organization and resources are available to develop more in-depth assessments
2. Assessment	<p>Conduct a broader review to understand how climate change affects the resources in question</p> <p>Work with stakeholders to develop an understanding of the implications of climate change to the mission, programs, and operations</p>	<ul style="list-style-type: none"> ○ Review science literature and assessments to understand how climate change affects the resources being protected (threat to mission); ○ Engage internal staff and external stakeholders in evaluation ○ Identify climate change issues and concerns and communicate with internal and external stakeholders and partners. ○ Identify which specific programs are threatened and what specific information or tools need to be developed ○ Communicate findings to partners and stakeholders and engage them in dialogue on building adaptive capacity
3. Response development	<p>Identify changes necessary to continue to reach program mission and goals</p> <p>Develop initial action plan</p> <p>Identify and seek the research, information and tools needed to support actions</p> <p>Begin to build the body of tools, information and partnerships needed to build capacity internally and externally</p>	<ul style="list-style-type: none"> ○ Develop initial program vision and goals for responding to climate change. ○ Identify needed response actions or changes that will allow the organization to begin to address climate impacts on its mission ○ Initiate strategies and actions in a few key areas to begin to build organizational ability to use climate information in decision processes ○ Identify program partners’ needs for building adaptive capacity ○ Begin working with an external ‘community of practice’ to engage in tool and program development ○ Rudimentary methods are put in place to track progress and options for more formal measures are identified and evaluated ○ Develop a strategy and partnerships to obtain additional needed research

4. Initial Implementation	Initiate actions in selected priority programs or projects	<ul style="list-style-type: none"> ○ Make it clear within the organization that incorporating climate change into programs is critical ○ Initiate actions and plans identified in Step 3 ○ Initiate projects with partners ○ Develop needed information and tools ○ Initial implementation of measures capable of documenting the extent of implementation of needed actions by partners/stakeholders ○ Some program partners have begun to implement response actions
5. Robust Implementation	Programs are underway and lessons learned are being applied to additional programs and projects	<ul style="list-style-type: none"> ○ Lessons learned are evaluated and strategies are refined ○ Efforts are initiated to consider climate change in additional program elements ○ Continue to institute institutional changes to include climate change in core programs, including refinement of measures ○ External communities of practice are in place to support ongoing capacity development
6. Mainstreaming	Climate is an embedded, component of the program	<ul style="list-style-type: none"> ○ The organization's culture and policies are aligned with responding to climate change ○ All staff have a basic understanding of climate change causes and impacts ○ All relevant programs, activities, and decisions processes intrinsically incorporate climate change ○ Measures for documenting progress among partners/stakeholders are well established and support program evaluation
7. Monitor Outcomes and Adaptive Management	Continue to monitor and integrate performance, new information, and lessons learned into programs and plans	<ul style="list-style-type: none"> ○ Progress is evaluated and needed changes are implemented ○ As impacts of climate change unfold, climate change impacts and organizational responses are reassessed

TABLE II - Climate Goals with 2012 Baseline Assessment Scores and 2014 Assessment Scores

<i>Visions and Goals</i>	<i>Strategic Actions</i>	<i>Assessment</i>
<p>Infrastructure: 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.</p>		
<p>Goal 1: Build the body of information and tools needed to incorporate climate change into planning and decision making.</p>	<p>SA1: Improve access to vetted climate and hydrological science, modeling, and assessment tools through the Climate Ready Water Utilities program.</p> <p>SA2: 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.</p> <p>SA3: 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.</p> <p>SA4: Promote sustainable design approaches to provide for the long-term sustainability of infrastructure and operations.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 3</p> <p>2014 Assessment: 3</p>
<p>Goal 2: Support IWRM to sustainably manage water resources.</p>	<p>SA5: Understand and promote through technical assistance the use of water supply management strategies.</p> <p>SA6: Evaluate and provide technical assistance on the use of water demand management strategies.</p> <p>SA7: Increase cross-sector knowledge of water supply climate challenges and develop watershed specific information to inform decision making.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 2</p> <p>2014 Assessment: 2</p>

<i>Visions and Goals</i>	<i>Strategic Actions</i>	<i>Assessment</i>
Watersheds & Wetlands: 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.		
<p>Goal 3: Identify, protect, and maintain a network of healthy watersheds and supportive habitat corridor networks.</p>	<p>SA8: Develop a national framework and support efforts to protect remaining healthy watersheds and aquatic ecosystems.</p> <p>SA9: Collaborate with partners on terrestrial ecosystems and hydrology so that effects on water quality and aquatic ecosystems are considered.</p> <p>SA10: Integrate protection of healthy watersheds throughout the NWP core programs.</p> <p>SA11: Increase public awareness of the role and importance of healthy watersheds in reducing the impacts of climate change.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 3</p> <p>2014 Assessment: 3</p>
<p>Goal 4: Incorporate climate resilience into watershed restoration and floodplain management.</p>	<p>SA12: Consider a means of accounting for climate change in EPA funded and other watershed restoration projects.</p> <p>SA13: 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.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 3</p> <p>2014 Assessment: 3</p>
<p>Goal 5: Watershed protection practices incorporate Source Water Protection to protect drinking water supplies.</p>	<p>SA14: Encourage states to update their source water delineations, assessments or protection plans to address anticipated climate change impacts.</p> <p>SA15: 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.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 2</p> <p>2014 Assessment: 2</p>

Visions and Goals	Strategic Actions	Assessment
<p>Goal 6: Incorporate climate change considerations into the CWA 404 regulatory program as they relate to permit reviews and compensatory mitigation.</p>	<p>SA16: Consider the effects of climate change, as appropriate, when making significant degradation determinations in the CWA Section 404 wetlands permitting and enforcement program.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 1</p> <p>2014 Assessment: 1</p>
	<p>SA17: 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.</p>	
<p>Goal 7: Improve baseline information on wetland extent, condition and performance to inform effective adaptation to climate change.</p>	<p>SA18: Expand wetland mapping by supporting wetland mapping coalitions and training on use of the new federal Wetland Mapping Standard.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 1</p> <p>2014 Assessment: 2</p>
	<p>SA19: Produce a statistically valid, ecological condition assessment of the nation’s wetlands.</p>	
	<p>SA20: Work with partners and stakeholders to develop information and tools to support long term planning and priority setting for wetland restoration projects.</p>	
<p>Coastal and Ocean Waters: 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.</p>		
<p>Goal 8: Collaborate to ensure information and methodologies for ocean and coastal areas are collected, produced, analyzed, and easily available.</p>	<p>SA21: 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.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 3</p> <p>2014 Assessment: 3</p>
	<p>SA22: 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.</p>	

<i>Visions and Goals</i>	<i>Strategic Actions</i>	<i>Assessment</i>
<p>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.</p>	<p>SA23: Work with the NWP’s larger geographic programs to incorporate climate change considerations, focusing on both the natural and built environments.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 2</p> <p>2014 Assessment: 2</p>
	<p>SA24: Address climate change adaptation and build stakeholder capacity when implementing NEP Comprehensive Conservation and Management Plans and through the Climate Ready Estuaries Program.</p>	
	<p>SA25: 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.</p>	
<p>Goal 10: Address climate driven environmental changes in coastal areas and ensure that mitigation and adaptation are conducted in an environmentally responsible manner.</p>	<p>SA26: Support coastal wastewater, stormwater, and drinking water infrastructure owners and operators in reducing climate risks and encourage adaptation in coastal areas.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 2</p> <p>2014 Assessment: 3</p>
	<p>SA27: Support climate readiness of coastal communities, including hazard mitigation, pre-disaster planning, preparedness, and recovery efforts.</p>	
	<p>SA28: Support preparation and response planning for diverse impacts to coastal aquatic environments.</p>	

<i>Visions and Goals</i>	<i>Strategic Actions</i>	<i>Assessment</i>
<p>Goal 11: Ocean environments are protected by EPA programs that incorporate shifting environmental conditions, and other emerging threats.</p>	<p>SA29: Consider climate change impacts on marine water quality in NWP ocean management authorities, policies, and programs.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 2</p> <p>2014 Assessment: 3</p>
	<p>SA30: 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.</p>	
	<p>SA31: Support the evaluation of sub-seabed sequestration of CO₂ and any proposals for ocean fertilization.</p>	
	<p>SA32: Participate in interagency development and implementation of federal strategies through the NOC and the NOC Strategic Action Plans.</p>	
<p>Water Quality: 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.</p>		
<p>Goal 12: Protect waters of the United States and promote management of sustainable surface water resources.</p>	<p>SA33: Encourage states and communities to incorporate climate change considerations into their water quality planning.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 2</p> <p>2014 Assessment: 3</p>
	<p>SA34: Encourage green infrastructure and low-impact development to protect water quality and make watersheds more resilient.</p>	
	<p>SA35: Promote consideration of climate change impacts by National Pollutant Discharge Elimination System permitting authorities.</p> <p>SA36: Encourage water quality authorities to consider climate change impacts when developing wasteload and load allocations in TMDLs where appropriate.</p>	
	<p>SA37: Identify and protect designated uses that are at risk from climate change impacts.</p>	

<i>Visions and Goals</i>	<i>Strategic Actions</i>	<i>Assessment</i>
<p>Goal 13: As the nation makes decisions to reduce its greenhouse gas emissions and develop alternative sources of energy and fuel, the NWP will work to protect water resources from unintended adverse consequences.</p>	SA38: 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.	<p>Phase Response Assessment:</p> <p>2012 Baseline: 1</p> <p>2014 Assessment: 2</p>
	SA39: Continue to provide perspective on the water resource implications of new energy technologies.	
	SA40: Provide assistance to states and permittees to assure that geologic sequestration of CO ₂ is responsibly managed.	
	SA41: 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.	
	SA42: Provide informational materials for stakeholders to encourage the consideration of alternative sources of energy and fuels that are water efficient and maintain water quality.	
	SA43: 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.	
<p>Goal 14: Collaborate to make hydrological and climate data and projections available.</p>	SA44: Monitor climate change impacts to surface waters and ground water.	<p>Phase Response Assessment:</p> <p>2012 Baseline: 3</p> <p>2014 Assessment: 3</p>
	SA45: 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.	

<i>Visions and Goals</i>	<i>Strategic Actions</i>	<i>Assessment</i>
<u>Working With Tribes:</u> 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.		
<p>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.</p>	<p>SA47: Through formal consultation and other mechanisms, incorporate climate change as a key consideration in the revised NWP Tribal Strategy and subsequent implementation of CWA, SDWA, and other core programs.</p> <hr/> <p>SA48: Incorporate adaptation into tribal funding mechanisms, and collaborate with other EPA and federal funding programs to support sustainability and adaptation in tribal communities.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 3</p> <p>2014 Assessment: 3</p>
<p>Goal 16: Tribes have access to information on climate change for decision making.</p>	<p>SA49: Collaborate to explore and develop climate change science, information, and tools for tribes, and incorporate local knowledge.</p> <hr/> <p>SA50: Collaborate to develop communication materials relevant for tribal uses and tribal audiences.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 2</p> <p>2014 Assessment: 3</p>
<u>Cross-Cutting Program Support</u>		
<p>Goal 17: Communication, Collaboration, and Training</p>	<p>SA51: Continue building the communication, collaboration, and training mechanisms needed to effectively increase adaptive capacity at the federal, tribal, state, and local levels.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 3</p> <p>2014 Assessment: 4</p>

<i>Visions and Goals</i>	<i>Strategic Actions</i>	<i>Assessment</i>
<p>Goal 18: Tracking Progress And Measuring Outcomes</p>	<p>SA52: Adopt a phased approach to track programmatic progress towards Strategic Actions; achieve commitments reflected in the Agency Strategic Plan; work with the EPA Work Group to develop outcome measures.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 3</p> <p>2014 Assessment: 4</p>
<p>Goal 19: Climate Change and Water Research Needs</p>	<p>SA53: 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 to provide the decision support tools needed by water resource managers.</p>	<p>Phase Response Assessment:</p> <p>2012 Baseline: 2</p> <p>2014 Assessment: 3</p>

TOTAL Implementation Phase Assessment Score -- 2012 = 42
TOTAL Implementation Phase Assessment Score -- 2013 = 51
Total Possible = 133

Appendix A:

Compendium of Additional 2013 Accomplishments for Climate Change Adaptation

In addition to the accomplishments highlighted for each of the vision areas and EPA regions, other important projects are in development and a number of supporting activities are being implemented. A complete summary of activities related to climate change and water programs is provided below.

I) National Water Program Climate Change Adaptation Accomplishments

Office of Wetlands, Oceans and Watersheds

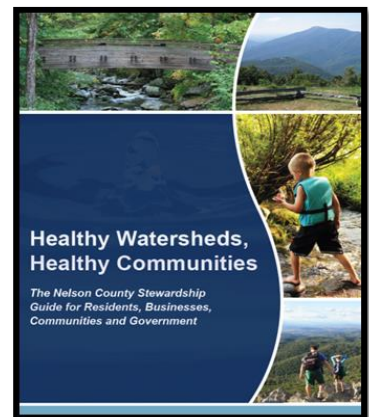
- **Climate Ready Estuaries (CRE) Program** published its second lessons-learned document; this one focused on the experience of National Estuary Programs in New England. CRE also published the "Adaptation to Attain Clean Water Goals and Sustainable Coasts" pamphlet. **CRE worked with the communications' teams in OW and OWOW to raise public awareness about sea level rise through king tide photography.** Activities included:
 - Greenversation blogs by EPA officials;
 - a series of posts on EPA's State of the Environment Photography Project;
 - a NPR radio interview with a senior EPA official; and
 - multiple tweets and Facebook posts that helped spread the word about king tides and how they can help communities understand the effects of sea level rise.
- In 2013, EPA continued to support **climate ready projects within the National Estuary Program funded in prior years.** Some 37 projects have been supported with 23 National Estuary Programs (NEPs). The Climate Ready Estuaries Program website was also updated to better serve the coastal management community.
- The NARS team **researched the potential for a parameter that could be used as an indicator of climate change in the next National Coastal Condition Assessment.** They concluded that there is insufficient information available to incorporate an indicator of climate change as a core parameter in the NCCA. However the team will continue to work with EPA scientists to determine if a research indicator could be added for the 2015 sampling period.
- EPA's Healthy Watersheds Program (HWP: www.epa.gov/healthywatersheds) works with states to build the capacity to identify and protect our nation's remaining healthy watersheds. **In November 2013, HWP released the *California Integrated Assessment of Watershed Health*, a statewide report on the status and vulnerability of watershed health**

(<http://water.epa.gov/polwaste/nps/watershed/ca.cfm>). The assessment is framed around the recognition that the biological, chemical, and physical health of water bodies are fundamentally connected to one another and to the maintenance of natural watershed processes. The California assessment **incorporates projections of future climate to characterize watershed vulnerability to altered precipitation, temperature, and hydrologic regimes**. Assessment results are intended to help inform state clean water and natural resource programs in their efforts to protect healthy watersheds so that the public can continue to enjoy the many benefits and services they provide.

- The Office of Water supported a **national conference focused on the linkages between healthy forests and healthy waters**, including topics related to climate-induced impacts, sustainability, and economic-based incentives fostering protection and restoration of natural resources including those in floodplains which protect water quality and provide resilience in the face of climate change. The conference was held June 27 and 28th in Hartford Connecticut under the sponsorship of the American Water Resources Association U.S. Forest Service, The Nature Conservancy, and Pinchot Institute and EPA among others. The audience consisted of foresters, water resource managers, aquatic ecologists/biologists, land use planners, economists, engineers, water supply purveyors, companies who are major water users, and land managers from the governmental, private, environmental and academic communities.
- EPA's **Healthy Watersheds Program supported the Green Infrastructure Center** (gicinc.org) in two county-level landscape green infrastructure planning and implementation projects:

- Nelson County, Virginia: The Nelson County green infrastructure planning guide provided the county with the information needed to best manage local land resources and to maintain, protect, and restore local water quality and healthy watersheds. More information on the Nelson County green infrastructure planning project can be found here: <http://gicinc.org/projectsnelson.htm>.

- Ulster County, New York: EPA's Healthy Watersheds Program supported a pilot project in Ulster County, New York, to develop a methodology that can be used to inventory green assets and connections, identify opportunities for protection and/or restoration, and plan a coordinated strategy to direct development and redevelopment to the most appropriate locations. The study serves as a template that local governments can use to protect the natural resources upon which they rely to support healthy watersheds, economies, and communities. More information on the Ulster County green infrastructure planning case study can be found here: <http://gicinc.org/PDFs/GIC%20NY-Practitioners%20Guide-Chapter%205-reduced.pdf>.



- In 2013, EPA continued work to develop the first **National Assessment of Wetland condition (NCAA)**. The NWCA will provide an assessment of the overall ecological integrity of the resource and the relative status of wetland processes, such as the ability of a wetland to absorb nutrients and floodwaters. The NWCA will also identify the stressors most associated with degraded wetlands, providing insights into the causes of declining wetland quality. Baseline information on the location, extent, and quality of wetlands and aquatic resources will help to assess changes associated with climate change and other stressors. The NWCA will be repeated at the national scale every five years and will incorporate those indicators, among others, that EPA identifies as most meaningful for detecting and predicting the impacts of climate change on the condition of the nation's wetlands. **Ongoing monitoring will inform the development of predictive models and management strategies, including climate change adaptation.** A report detailing the results of the survey will be released for public comment in 2014.
- The U.S. Fish and Wildlife Service maintains the National Wetlands Inventory. In 2009, EPA co-led a stakeholder working group (Federal Geographic Data Committee (FGDC) Wetlands subcommittee) to **develop a new standard to support digital mapping of wetlands** for incorporation into the National Wetlands Inventory and the National Hydrography Dataset (NHD). Accurate mapping of wetlands is essential to understanding how climate change may result in changes in wetlands over time. EPA has supported the long-term objective of the FGDC Wetlands subcommittee to complete digital mapping for the country. Specifically, a number of 2013 **RFP Wetland Program Development Grants have supported National Wetlands Inventory mapping**, including:

 - Vermont Agency of Natural Resources: *Vermont Wetland Program Planning, Monitoring and Assessment and Enhancing Wetland Protection*;
 - Massachusetts Coastal Zone Management's grant *Wetland Monitoring and Assessment Demonstration: Identifying at-Risk Coastal Wetland Resources and Supporting Climate Change Responses*;
 - Adirondack Park Agency's *Detecting Climate Change in Wetlands in the Adirondack Park*;
 - New Mexico Environment Department's *FY2013/14 New Mexico Wetland Program Development Grants*;
 - Cow Creek Umpqua Tribe grant to further development of Wetland Program Plan, focused on monitoring and assessment core element, including: 1) develop protocol for monitoring and assessing wetland habitats of cultural importance, 2) establishing baseline survey, 3) map wetlands, prioritize future restoration.; and
 - Idaho's Department of Fish and Game's grant to *Building "Idaho's Wetlands" website for delivering maps, data, analyses, and tools for mitigation and restoration planning*.
- The Office of Water, in cooperation with Army Corps of Engineers, completed the Section 404 Program Assessment. Part of the Program Assessment included looking for positive, proactive areas of work that EPA and the Corps could start that would be of value to both

agencies. Report-out on the Assessment was conducted in September, 2013 and will feed into the upcoming year's analysis phase (with an aspiration to **evaluate whether it makes sense to propose one or more of our climate change strategy action items as an area of joint work**).

- National Water Program staff within the Office of Wetlands, Oceans and Watersheds **participated in a range of workgroups** within EPA and among other federal agencies working to adapt to a changing climate including the:
 - the Climate Change and Ocean Acidification (CC&OA) Subcommittee of the National Ocean Council;
 - the Coral Reef Task Force; and
 - the Interagency Ocean Acidification Working Group.
- As a co-leader of the **U.S. Coral Reef Task Force's Climate Change Working Group**, EPA actively participates in efforts to address and adapt to climate change through the development of best practices, improved planning, and implementation of projects that promote resiliency of coral reefs and local communities. In 2013, **EPA and the Climate Change Working Group designed a case study in West Maui, HI to test local adaptation strategies and coral bleaching response implementation plans**. The final result of this study will be released in 2014.
- Through the **Interagency Ocean Acidification Working Group**, EPA continues to coordinate ocean acidification activities with other federal agencies and is working on developing a "Strategic Plan for Federal Research and Monitoring on Ocean Acidification." In 2013, EPA and NOAA held an information exchange to promote better understanding of local, non-atmospheric sources leading to **coastal acidification**. This meeting provided a forum for the two agencies to examine the role that the Clean Water Act (CWA) and existing voluntary programs could play in addressing acidification-related pollution in U.S. coastal waters. Equally important was **to see how lessons learned from efforts to address ocean acidification might be transferable amongst regions of the United States encountering ocean and coastal acidification**. EPA and NOAA have an ongoing collaborative research program to examine coastal acidification in Narragansett Bay that will enable scientists to better understand the role of land-based pollution sources in contributing to coastal acidification and the impact of coastal acidification on the health of economically important shellfish species.
- EPA serves on the U.S. government delegation to meetings of the London Convention and London Protocol (international treaties on ocean dumping) and has supported several actions related to climate change, including development of guidance for the disposal of carbon dioxide streams into sub-seabed geological formations. In November 2013, the Parties to the London Convention and London Protocol **adopted international guidance related to the export of Carbon Dioxide Streams for Disposal into Sub-Seabed Geological Formations**. (Note: In 2009, Contracting Parties to the London Protocol adopted an

amendment to allow for the export for carbon dioxide streams for sub-seabed sequestration; this amendment is not yet in force).

Office of Ground Water and Drinking Water

- The **Adaptation Strategies Guide** serves as an introduction for water sector utilities to explore climate change impacts and relevant adaptation options. The information presented can help jump-start utility discussions, and provide examples of how real utilities are managing threats and planning for the future. Users can browse information based on their location or utility type. In 2013, the *Guide* was updated to include sustainability briefs, and it is currently being updated to include information on water conservation.
- Integrating Source Water Protection into state implementation of CWA programs: OGWDW and the other Office of Water (OW) program offices engaged with the Association of Clean Water Agencies (ACWA), the Association of State Drinking Water Administrators (ASDWA), the Ground Water Protection Council (GWPC) and several of their member states throughout 2013 to **draft a framework for integrating source water protection (SWP) into state implementation of the Clean Water Act (CWA) programs.**
- To ensure protection of underground sources of drinking water (USDWs), OGWDW worked with co-regulators, industry, and other stakeholders to **develop draft technical guidance clarifying Underground Injection Control Class II permitting requirements for hydraulic fracturing with diesel fuels (DFHF).** The draft guidance explains the Agency’s interpretation of the SDWA term “diesel fuels” for permitting purposes and provides guidance recommendations for EPA’s permit writers to consider when establishing permitting requirements for DFHF activities. **NOTE:** EPA released the draft guidance on February 12, 2014.
- OGWDW published, and is continuing to publish, draft technical guidance documents for public comment (e.g., March, April and December, 2013) **and final technical guidance documents (e.g., March and May, 2013) to support Class VI geologic sequestration regulatory implementation.**
- OGWDW **advanced Class VI geologic sequestration permitting** by working closely with current permit applicants and permittees and potential future permit applicants to:
 - Provide clarity regarding the Class VI requirements and develop permit conditions
 - Work through project-specific issues to ensure regulatory compliance and protection of underground sources of drinking water (USDWs)
 - Develop a tool to receive Class VI permit application, reporting and other required information electronically

- OGWDW also worked with states interested in Class VI Primary Enforcement Responsibility (Primacy) including but not limited to North Dakota, Tennessee, Delaware and Kansas.

Office of Science and Technology

- The Office of Water continued work in 2013 to draft a **flow white paper** addressing measures and policies to protect aquatic life. The paper will provide technical non-prescriptive approaches for considering hydrologic flow to support aquatic life designated uses, which will contribute to increasing aquatic ecosystem resilience to climate change impacts. The paper will also include information to incorporate climate change risk considerations into the framework for improved risk management. Completion of the white paper is expected in FY 2014.
- The Office of Water is coordinating technical discussions with NOAA, EPA Program Offices, States, Regions, and external research organizations focused on **advancing the knowledge of aquatic life impacts from effects of ocean acidification in nearshore ecosystems**.
- The Office of Water released a **fact sheet on Harmful Algal Blooms** in 2013 to provide information regarding how climate change impacts on rainfall, temperature, sea level rise, coastal upwelling, atmospheric CO₂, and salinity can impact the growth and occurrence of harmful algal blooms, or HABs. More information is available at: <http://www2.epa.gov/sites/production/files/documents/climatehabs.pdf>.
- The Office of Water continues to present a **climate change module during the Water Quality Standards Academy** during the spring and the winter sessions. This module presents climate change vulnerability considerations in a water quality context. In 2013, over 40 WQS Academy students participated from various sectors including: state, tribal, industry, non-profit, private consultant, and federal.
- Work continues in partnership with the U.S. Geological Society (USGS) to develop **estimates of the plausible future hydrologic response of our nation's rivers and streams to climate change**. Presentations describing this work were given by USGS colleagues at the November 2012 Annual Meeting of the American Water Resources Association in Jacksonville, Florida. Work currently focuses on adapting the USGS gridded Water Balance Model to the NHDPlus waterbody network and calibrating the Water Balance Model. Interim products for are expected to be ready for peer review in FY 2013, pending budgetary decisions.

Office of Wastewater Management

- The Office of Wastewater Management completed an **Energy Management Progress Report** documenting national and Regional efforts to assist utilities in developing energy management plans based on EPA's *Energy Management Guidebook*. Three webinars on energy management for utilities were conducted.

- The Office of Water **hosted a workshop with leading utilities and states to discuss challenges and opportunities to collaborate on actions to help water sector utilities move toward sustainability**. As a result of the workshop, the Office of Wastewater Management (OWM) developed in FY13 *Moving Toward Sustainability: Effective Practices for Creating a Water Utility Roadmap*. This document provides utilities of various sizes a range of practices to ensure that their operations and infrastructure are sustainable over time. More information can be found at: <http://water.epa.gov/infrastructure/sustain>.
- In 2013, the Office of Wastewater Management and the EPA Office of Policy **completed a handbook and hosted a national webinar to help water sector utilities use “Lean Management” techniques** to achieve outcomes associated with the *Attributes of Effectively Managed Utilities*. The Guide, called *Effective Utility Management and Lean: A Handbook for Water Sector Utilities*, describes a number of various Lean Management techniques, how they relate to the *Attributes*, and provides case examples on ways in which utilities have used Lean tools in their operations. The national webinar attracted over 300 participants from around the country. The *Guide* can be found at: <http://water.epa.gov/infrastructure/sustain/upload/EUM-and-Lean-Resource-Guide.pdf>
- The Office of Water posted the **Green Infrastructure Permitting and Enforcement fact sheets** on the green infrastructure website, discussing how municipalities can incorporate green infrastructure into sanitary sewer overflow (SSO), combined sewer overflow (CSO), and MS4 permitting and enforcement. The facts sheets are available at: http://water.epa.gov/infrastructure/greeninfrastructure/gi_regulatory.cfm#permittingseries.
- In July 2012, the Office of Water began a series of **green infrastructure technical assistance projects with 17 communities** in 16 states. The projects include code reviews to eliminate barriers to green infrastructure in local codes and ordinances, design guidance for particular sites/contexts, and cost - benefit analyses of the multiple benefits of green infrastructure. These projects are ongoing and were completed by December 2013. In 2013 the Office of Water began working with an additional 5 communities to provide **green infrastructure technical assistance** to a total of 23 communities. The projects include design guidance for particular sites/contexts, strategies for setting green infrastructure targets, and strategies for conducting outreach/education. These projects will be completed by December 2014.
- In 2013 the Office of Water continued the **Campus RainWorks Challenge** for college and university students - a design competition to engage students in green infrastructure design. Some 84 teams are participating from 29 states. The competition closes at the end of the fall semester and winners will be announced in March or April 2014.
- EPA worked with Syracuse, NY to host a **national green infrastructure summit** in October 2013 in which approximately 100 representatives from communities seeking to integrate green infrastructure into their operations gathered to discuss opportunities and barriers.

II) Climate Change Adaptation Accomplishments Related to Water in EPA Regions

Region 10

- EPA Region 10 is working with the Washington Department of Ecology, the Lummi Nation, and the Nooksack Tribe to identify the best way to **integrate available climate change data into Ecology's TMDL for temperature stress on salmon** in the South Fork Nooksack River, Washington. This will provide a case study of both process and climate change science as a basis to support future decisions. Examining the way temperature can be improved in the Nooksack watershed in order to support salmon restoration is a high priority for the Nooksack and Lummi Tribes. A technical report and assessment of implementation prioritization under future climate scenarios will be completed in the spring of 2014. The TMDL will be completed at the end of FY2014
- Consistent with the **Puget Sound Action** Agenda, EPA Region 10 funded:
 - Low impact development demonstration projects to improve the ability to mitigate and manage stormwater;
 - Restoration of floodplain connectivity to improve watershed habitat resiliency; and
 - Development of riparian buffer standards that could help maintain cool water refuge for salmon and other endangered species.
- EPA Region 10 increased its **WaterSense** presence, sharing information with a regional medical provider, other Federal agencies, businesses and non-profits. Puget Sound Energy, a regional energy provider, joined as a WaterSense partner.
- Region 10 launched ***In the Loop on Climate and Sustainability***, a **newsletter** that will provide Region 10 staff and managers information on the latest developments, events and resources in climate change and sustainability. The goal is to incorporate climate change and sustainability in the day-to-day work and decisions of the Regional Office.

Region 9

- EPA Region 9 released its final ***Coral Reef Strategy*** for Hawaii and the U.S. Pacific Territories of Guam, Commonwealth of the Northern Mariana Islands, and American Samoa in 2013. Corals in these regions are threatened by climate changes including warming air and water, increased storm intensity, rising sea levels, and acidification. Other key threats include water pollution and overfishing. NOAA evaluated 83 species of coral for risk of extinction and has proposed listing 59 coral species in the Pacific Ocean as threatened or endangered under the Endangered Species Act. Region 9's ***Coral Reef Strategy*** seeks to better focus authorities, technical assistance, and funds for protection of coral reefs in the Pacific Islands, and to provide leadership on the links between coral reef protection and climate change. The ***Strategy*** identifies a range of EPA actions needed to protect coral reefs

including reducing sources of land based pollution and increasing the resilience of coral reefs to climate change stressors.

Region 8

- EPA Region 8's National Environmental Policy Act (NEPA) and Section 404 programs have been working with other federal agencies to **have climate change analyses included in water supply project Environmental Impact Statements (EISs)**. Although EPA has not yet developed generalized watershed information in the region for use in climate change analyses, comments and requests for such analysis from other federal agencies may be influential. Key partners include the U.S. Bureau of Reclamation, U.S. Army Corps of Engineers, States, and local water providers.
- Region 8 Nonpoint Source Program, Colorado has set aside \$400,000 of FY 13 funding for Nonpoint Source-eligible activities related to **recovery from the Waldo Canyon and High Park fires**. The money will be competed jointly with the Colorado Water Conservation Board, which is providing match. The grant is awarded but the sub-award to the Colorado Water Conservation Board is not yet final. Region 8 expects a final sub-award workplan (aka Project Implementation Plan) and competition for local projects this fall or winter.
- Over the past several years, ten Region 8 water/wastewater utilities participated in the effort to improve sustainability, **implementing various energy savings upgrades and best practices**. These resulted in 16,975,161 kWh of annual operational energy savings, equal to 11,977 MTCO_{2e}. This work will be phased out in FY14.

Region 7

- Three Region 7 States held **WARN Tabletop exercises during FY 2013**. Participation included a mix of water/wastewater operators, law enforcement, firefighters, power generators, industry representatives and emergency response workers at local, county and state levels. The exercise emphasized the roles, responsibilities, and relationships with WARN member utilities and governments during a response to drinking water and wastewater-related disasters. The training identified challenges and potential solutions for climate-ready resilient utilities to employ in assisting the industry in meeting health based drinking and wastewater standards.
- Region 7 provided outreach materials to encourage new **WaterSense partnerships**. In FY 2013, Region 7 gained five new partners to WaterSense: - 3 promotional and 2 irrigation partners. To access a full list of all partners, visit: www.epa.gov/watersense.
- Beginning in 2011, Region 7 invited 10 Kansas communities to participate in an **Energy Management Initiative for Water and Wastewater Utilities** led by the Kansas Water and Energy Efficiency Partners (KANWE). Five communities chose to participate in the pilot

program which included a series of workshops where participants developed an Energy Management Plan for their water utilities. Case studies for the 5 communities were completed in 2013. Collectively, the cities improved efficiency by 15% and saved over \$50,000 annually. By saving energy, these communities are reducing green house gas emissions by lowering demand from coal fired electric utilities.

- Region 7 **included climate change impacts in the review of draft EIS documents** when applicable. As an example, climate change impacts were included in the review of the St. Johns Bayou/New Madrid Floodway draft EIS which is a nationally significant project.
- Region 7 tribes are **incorporating climate change science into their CWA 106 programs**. Two tribes have "emergency monitoring QAPPs" in place, intended to cover monitoring situations during extreme weather events (e.g. drought or flood, both of which are more frequent/common) and water-related emergency response situations. Two additional tribes are in the process of developing a similar QAPP. As it is more fully implemented, these QAPPs will give R7 tribes an opportunity to monitor when they otherwise would miss monitoring dates (due to weather/stream conditions), and ultimately allow them to more fully assess the impacts of climate change on the water quality of their tribal waters under various weather conditions.
- Region 7 coordinated with FEMA on incorporating green infrastructure approaches into rebuilding efforts following natural disasters such as the May 2011 tornado in Joplin, Missouri. EPA and FEMA combined funding to develop a **Complete Green Street design for the 20th St. corridor that was destroyed by the tornado**.

Region 6

- Working through the Clean Energy and Climate Change workgroup, **Region 6 developed its first Draft Climate Adaptation Implementation Plan**. The Plan addresses projected climate change impacts that may affect the Region, vulnerabilities to these impacts, response actions, measuring and evaluating performance, and working with tribes and other sensitive populations. The workgroup received the EPA Region 6 2013 Cross Divisional Award for multi-media and program collaboration on a topic impacting the entire region. Plans are underway to address public comments and produce a final plan in 2014.
- In March 2013, EPA's Office of Water, EPA Region 6, and NOAA in conjunction with the Environmental Research Foundation and Water Research Foundation **convened a workshop on Adaptation Strategies and Information Needs in Response to Extreme Events in Austin, TX**. This workshop focused on extreme weather and climate events in the Central Texas region. Meeting attendees discussed lessons learned by communities facing extreme events such as drought, heat waves, and wildfires related to climate change and explored ways government agencies and national organizations can help local communities with adaptation and preparedness planning. This workshop was one in a series of six held across

the country with a focus on communities that have already experienced extreme events, including drought, flooding, wildfires, sea level rises, and heat waves. Fact sheets are available at:

<http://cpo.noaa.gov/ClimatePrograms/ClimateandSocietalInteractions/SARPPProgram/ExtremeEventsCaseStudies.aspx>.

- To improve energy efficiency of water and wastewater plants along the U.S.-Mexico Border, EPA Region 6 has been leading an outreach effort by partnering with the El Paso Water Utilities and others aimed at educating utility management and staff on reducing energy use. Region 6 co-facilitated an **Energy Management Workshop with the Border Environment Cooperation Commission (BECC) in El Paso, Texas, on December 3rd and 4th**. Managers from water and wastewater utilities near El Paso, TX, and Las Cruces, NM, and their consulting firms, were invited to the workshop. Presentations included topics such as: adopting an energy management system, implementing an energy program, benchmarking energy use and energy costs, and performance contracting with an energy service company. Staff from the El Paso Electric company discussed electric rates and peak demand charges. Staff from the Texas Water Development Board and the New Mexico Finance Authority discussed how the Green Reserve Fund from the Drinking Water and Wastewater State Revolving Fund can fund energy related projects and how to apply for funding.
- The Galveston Bay Estuary Program, the Barataria-Terrebonne National Estuary Program, and the Coastal Bend Bays and Estuaries Program worked with numerous partners contributing to the **protection, enhancement, or restoration of over 1,566 acres of coastal habitat in 2013, thereby reducing vulnerability to the effects of sea level rise and increasing coastal sustainability.**
- The Coastal Bend Bays and Estuaries Program played a pivotal role in a project designed to **characterize various sea level rise and storm surge scenarios and the associated impacts on coastal habitats in the vicinity of Corpus Christi Bay, Texas.** This work will support the development of adaptation strategies for managing the impacts of sea level rise and storm surge.
- On March 23, 2013, Texas A&M AgriLife Research and Extension Center – Dallas, in partnership with the EPA Region 6, and the City of Dallas Water Utilities hosted the grand opening of the **first WaterSense labeled home in the Dallas/Ft Worth area.** This renovated home serves as a working model that demonstrates to visitors just how easy water conservation can be. It provides hands-on learning opportunities in areas such as hot water on-demand systems, WaterSense labeled fixtures, water-efficient landscaping, rainwater harvesting, and rain garden design. The home also includes upgrades to renewable and energy efficient products for the flooring, counter tops, lighting, and appliances. A WaterSense labeled home can save a family of four 50,000 gallons of water a year or more.
- In 2013 the Region’s Multimedia Planning and Permitting Division rolled out **a customized pilot program to encourage voluntary greenhouse gas emissions reductions among**

various sources and source-types. Many such reduction efforts reduce other air pollutants, conserve energy, and reduce water use, and thus may be very cost-effective. The 2013 pilot will identify the best opportunities among sources for “win-wins” and bring technical expertise to bear to identify and help participating entities make improvements. It consists of two major projects: seeking voluntary GHG reductions from stationary/area sources and encouraging green power purchases/onsite renewables.

Region 5

- In 2013, Region 5 continued to engage with the Midwest Natural Resources Group of **federal agency senior managers to promote cooperation on climate change adaptation** through the adoption and implementation of the *“Guiding Principles for Adapting to Climate Change for the Midwest Natural Resources Group.”*
- Under the 319 program, Region 5 staff is reviewing all in-process watershed plans being developed by the states. This will provide the Region the opportunity to give thoughtful **review and comments to promote climate change resiliency at a point where the scope and direction of the watershed plan can still be impacted.** The review concentrates on the plan’s ability to fulfill programmatic requirements as well as the potential to address cross-programmatic issues such as green infrastructure and climate change.
- Region 5 worked with states to adopt and implement EPA’s Nutrient Management Framework. During FY13, OH and WI finalized nutrient reduction strategies to implement the Hypoxia Action Plan and/or the Nutrient Management Framework memo. Minnesota and Indiana have developed draft strategies. As appropriate, strategies incorporate and **promote agricultural drainage management in their state nutrient management plans to accomplish both water quality and climate resiliency benefits.**
- Region 5 worked with WIDNR on reissuance of the NPDES permit for Milwaukee Metropolitan Sewer District and with Michigan DEQ on the reissuance of the NPDES permit for the Detroit Water and Sewerage District. The permits include **requirements for green infrastructure planning and implementation.**
- Region 5 worked with Region 6 to recruit panelists and develop discussion points for a 90-minute WEFTEC 2013 session, **“Creating Meaningful Dialogue to Support Green Infrastructure.”** The diverse panel was comprised of representatives from a water utility, non-profit advocacy group, city government, and consulting engineer.
- Region 5 added 9 new **WaterSense Partners** in FY 2013.

Region 4

- EPA Region 4 previously developed and implemented an **Energy Management Initiative (EMI) with the collaboration of the Tennessee Department of Environment and Conservation (TDEC)** to work with a group of seven water and wastewater public utilities in Tennessee to save energy and reduce their carbon footprint. The documented energy savings of 5 million kWh/year is projected to increase to 7 million kWh/year – over 7,100 tons/year carbon dioxide equivalent reduction. 2013 actions expanded the EMI to a second round led by TDEC that focused on a new group of utilities. The site visits to those utilities are underway and will be followed by a series of energy management workshops. The second round EMI is projected to produce an additional 4 to 8 million kWh/year savings with an additional 3800 to 7600 tons/year CO₂ equivalent reduction.
- The Alabama Department of Environmental Management partnered with Region 4 in 2013 to conduct an **Energy Management Initiative with selected utilities in Alabama**. The utility selection process is underway and site visits and workshops are planned. Region 4 has developed an Energy Assessment Tool (R4 EAT) that helps both the utilities and the EMI team in assessing the present energy utilization and identification of the processes/equipment with the largest energy usage. The R4 EAT is being used in Alabama and will be made available for other states and utilities to help identify energy saving opportunities.
- Region 4 initiated collaboration with United South and Eastern Tribes, Inc., (USET), who provides assistance to Tribal governments to enhance their capability to meet the needs of Indian people. USET serves 26 Tribes from Texas to Maine and is located in Nashville, TN. Region 4 is working with USET to **build their capacity to provide energy management assistance to Tribal utilities**, and Region 4 will serve as a resource to provide onsite Tribal assistance with USET as needed.
- EPA Region 4 worked with the Mobile Bay National Estuary Program **to incorporate sea level rise in the development of the Three Mile Creek Watershed Management Plan**. The National Estuary Program funded two analyses for the Plan that simulated the impacts of sea level rise on the watershed's existing habitat types and land uses. The assessment will help facilitate the determination of best management practices that address habitat loss or changes while also improving Creek water quality.
- The Tampa Bay Estuary Program prepared and published a **“Gulf Coast Community Handbook” which contains case studies from Gulf of Mexico communities for incorporating climate change resiliency into habitat planning and protection**. This document illustrates how climate change aspects can be incorporated into habitat projects in order to enhance their long-term resiliency and the benefits they provide.
- Region 4 continues to monitor and receive updates from the Alabama Department of Environmental Management UIC Program on the **Class V Carbon Dioxide UIC experimental**

well being operated by Denbury Offshore. Region 4 continues to complete review of the monitoring reports associated with the two Class V UIC CO₂ experimental wells issued by EPA Region 4 in Kentucky.

- The Region provided technical assistance to two North Carolina communities—New Bern and Wilmington—that were selected in 2012 as pilot locations to implement a Memorandum of Agreement between EPA and FEMA. The assistance consisted of two-day workshops held onsite to **evaluate and propose approaches to deal with local sea level rise issues that will increase with climate change.**

The New Bern project focused on challenges related to storm surge from the Neuse River that occur during hurricanes and other significant storms, in particular in a low-wealth downtown neighborhood. The Wilmington project was designed to address the threat of storm surge to grey infrastructure that will increase due to sea level rise projected to occur more frequently in the future.

- Researchers from the **Coral Reef Evaluation and Monitoring Program (CREMP)** of the Florida Keys National Marine Sanctuary Water Quality Protection Program published an article in the August 2013, *Marine Ecology Progress Series*, “*Temporal changes in benthic assemblages on Florida Keys reefs 11 years after the 1997/1998 El Nino,*” documenting and describing the transition of the benthic community from stony coral species to octocorals as the predominate benthic taxa in the Florida Keys since 1999. Although the transition may have started earlier, octocorals apparent resilience to present-day stressors will likely allow this shift to continue into the foreseeable future.

Region 3

- Through funding from the Climate Ready Estuaries Program, the Partnership for the Delaware Estuary (located in Regions 2 and 3) developed “**Weathering Change**” in which the Partnership works with the community to help them understand the weather-related changes that are beginning to happen in their community and adapt to those changes.

In 2013 the Partnership for the Delaware Estuary hosted two **Climate Outreach Roundtable meetings to discuss managing climate change impacts and barriers to sustainable ordinances in municipalities** as well as information/assistance that would be useful and meaningful to municipalities within the Delaware Estuary. These meetings were held in January 2013 and October 2013. The next meeting is planned for March 2014. The group is comprised of state agencies, environmental groups, municipalities, EPA and interstate agencies.

- The Delaware Inland Bays National Estuary Program continues to work with state and local partners on **sea level rise education and outreach.** In partnership with the state, the Partnership for the Delaware Estuary, other federal agencies, and local organizations, a

living shoreline committee was formed to explore the science and implementation of living shorelines (which can help with adaptation to sea level rise).

- The Region 3 had a very **active Energy Team**. Some of their activities related to climate change and water are:
 - Partnered with PADEP’s Wastewater Operator Outreach staff and conducted continuing education credit courses throughout the State titled, “e2 - Energy Efficiency for Water and Wastewater Operators and Managers;”
 - An article on energy audits for water utilities was published in 2 local water association journals and one national journal (Water Efficiency);
 - Encouraging State Capacity Development coordinators to incorporate energy efficiency in their Capacity Development Program; and
 - Crafted wastewater energy efficiency case studies for posting to the regional internet page.
- Region 3’s **Chesapeake Bay Program** is:
 - researching implications of climate change for bioassessment programs;
 - considering monitoring approaches to account for climate change;
 - designing sentinel reference site network in headwater streams to monitor for climate change and acidification effects.

Efforts to date include a project kickoff webinar, two webinars on data infrastructure, and one webinar on classification results with states and other partners.

Region 2

- In response to **Hurricane Sandy** that hit New York and New Jersey on October 29, 2012, EPA has been supporting FEMA and working closely with federal agencies and the states of New Jersey and New York to protect public health and the environment through multiple activities. EPA worked to **assess damage and respond to environmental concerns**. EPA Region 2 participated in **National Disaster Recovery Framework (NDRF)** activities in New York and New Jersey following the Hurricane Sandy response.
- EPA initiated **water infrastructure planning** with an Interagency Funding Coordination Meeting with FEMA, HUD and other Federal and state partners in March, 2013. EPA led discussions on how to most effectively use EPA and partner funding to **develop more resilient drinking water and wastewater facilities**.
- In the aftermath of Super Storm Sandy, with HQ support, Region 2 sponsored water-specific **Incident Command System (ICS) courses** in NY, NJ and PR. Region 2 staff attended all

courses. Region 2 has also **developed Standard Operating Procedures (SOPs) and assessment forms for emergency response to wastewater and drinking water incidents.**

- EPA HQ held **Water and Energy Nexus in Disasters Workshops** in New Jersey and New York in November, 2013. The workshops included presentations from water utilities, electric utilities, state agencies, and federal agencies as well as facilitated discussions. The workshops' aim was to increase coordination and communication between water utilities and electric utilities and provide information on the various options available to secure back-up power and/or increase water utilities' resiliency to power outages.
- EPA Region 2 has been conducting **water quality monitoring in the aftermath of Hurricane Sandy**; Congress allocated \$570,000 for this purpose in February 2013. This is a two year effort to determine the longer-term effects of Sandy on levels of contaminants in sediments and receiving waters of specific coastal waters of New Jersey and New York. The focus is on areas impacted by combined sewer overflows, sanitary sewer overflows, bypassing of wastewater treatment plants, and runoff or discharge from hazardous waste sites. Information will be compared to pre-Sandy monitoring results or monitoring from immediately after Sandy to determine whether additional action or monitoring may be needed. Other federal agencies, such as USGS, NOAA and ACOE, also received funding.
- Region 2, through the New York-New Jersey Harbor & Estuary Program, has been working with FEMA, NYC Office of Emergency Management, Department of Interior, Army Corps, and others to address **abandoned boats and other marine debris**, much of which resulted from Sandy. EPA has undertaken 3 surveys of the Shellbank Creek area in Jamaica Bay, New York to assess and document debris as part of a pilot removal project.
- Region 2 staff is participating in the US Army Corps of Engineers **North Atlantic Coast Comprehensive Study**, which includes attending technical and policy workshops, providing documentation for their study, and reviewing drafts of their report starting around March 2014. Of particular interest is the use of what is being termed **Natural and Nature-Based Features (NNBF) that could be used in conjunction with traditional shoreline protection strategies** and could include wetlands, coastal forests, reefs and other features that would enhance resiliency and risk reduction for coastal communities.
- EPA HQ through the Healthy Watersheds Program, in coordination with Region 2, provided funding to release a New York edition of a **green infrastructure planning guide** that will help communities protect and restore vital green infrastructure from the Green Infrastructure Center Inc. (GIC) and NYSDEC. The guide shows communities how to map their most significant natural resources and make plans to conserve or restore them. A presentation on the project is at:
http://water.epa.gov/learn/training/wacademy/upload/ny-green-01142014_v5.pdf.

- Region 2 worked on **including green infrastructure in the permitting process**. This involved ensuring that New Jersey’s draft CSO permits contain a requirement to include green infrastructure as part of Long-term Control Plan (LTCP) alternative analyses and providing technical assistance to New York on the draft New York City MS4 permit by sharing examples from other states where green infrastructure was included in MS4 permits.
- With EPA Region 2’s support, the New York State Environmental Facilities Corporation (NYSEFC) **Green Innovation Grant Program (GIGP)** has focused on funding Green Infrastructure projects since 2010. Through the New York State Clean Water State Revolving Fund’s Green Innovation Grant Program, Region 2’s SRF program has supported 121 green infrastructure projects valued at over \$50 million since 2009.
- **EPA Region 2 finalized a Coral Reef Protection Plan** for implementing activities to reduce pollution impacts to coral reefs. Creating this plan involved interdivisional collaboration to identify specific activities and identify and track critical milestones and project leads. The keystone of this plan is increased communications with local communities to identify emerging threats and priorities.
- Region 2 initiated the **Caribbean Coral Reef Protection Group (CCRPG)**. This is a partnership of 14 federal and local agencies in Puerto Rico and the U.S. Virgin Islands with authority and jurisdiction to respond to identified local threats to coral reef ecosystems. The CCRPG is a leadership forum to foster collaboration in implementing solutions to coral reef threats.
- The **Long Island Sound Study Sentinel Monitoring Work Group** selected a contractor for a second round of funding related to climate change monitoring. This supports a pilot monitoring program designed to detect and quantify early signals of climate change in the Long Island Sound Ecosystem (located in Regions 1 and 2) and supports a Boston University proposal entitled “Sentinels of Change – Are Salt Marshes in LIS Keeping Pace with Sea Level Rise?”
- The Long Island Sound Research Grant Program (located in Regions 1 and 2) funded jointly through the Connecticut and New York Sea Grant programs, supported **researchers who are developing a computer model to analyze historical trends back to the 1970s to project the environmental conditions of Long Island Sound into the future**. The Stevens Institute of Technology will synthesize physical data collected for LIS and global climate change indices. The computer model will then look forward to simulate the effects of climate on Long Island Sound’s physical environment and living marine resources up to the year 2100.
- EPA Region 2 provided non-point source grant funding to NJDEP **to design shoreline restoration in Camden, NJ**, with incorporation of freshwater mussel beds, and to evaluate water quality contributions of freshwater mussels in the system. This includes an outreach component for coordination with local participation.

- Ocean County College and the Barnegat Bay Partnership in New Jersey received a grant **to examine the relationship between shoreline and marsh conditions**. With this additional information, these organizations will identify wetland protection and restoration efforts to adapt to rising sea levels and the potential influences of climate change.
- The Meadowlands Commission received an EPA grant **to examine several wetland areas within the Meadowlands identified for restoration**. The Commission and its research arm, the Meadowlands Environmental Research Institute, will examine wetland heights, tidal flows and plant communities in these areas. It will use this information to develop criteria needed for successful long-term wetland restoration and to prioritize its current and future restoration efforts in the Meadowlands.

Region 1

- The Region hosted the **New England Hurricane Summit** in June 2013 for 100 representatives of water utilities, water associations, and state and federal agencies. The summit focused on key issues and lessons learned from Tropical Storm Irene and Hurricane Sandy, and included discussions about forming an interstate WARN for New England. EPA Deputy Regional Administrator and FEMA Regional Administrator gave opening remarks.
- The Regional State Revolving Fund (SRF) Program has added general discussion points to its **annual SRF reviews to encourage the states to consider resiliency projects** in their SRF funding decisions each year.
- Over 35 municipal water/wastewater facilities participated in roundtable discussions and were **trained on energy management plans** in 2013. Three wastewater facilities are near Zero Net Energy and at least six others are working on plans to reach Zero Net Energy. Completion dates for proposed Zero Net Energy facilities are mostly unknown, while others have completion dates of 2018 and 2026.
- **Four roundtables were conducted in FY13** with 16 wastewater and drinking water utility operators to help them **reduce energy use in** Massachusetts (October, February, June and September). Three roundtables were conducted in Vermont with approximately 20 wastewater utilities.
- The Office of Ground Water and Drinking Water, initiated the **Berwick (Maine) Water System Resilience Pilot Project** to assess the water system's flooding vulnerability, identify adaptation measures, and produce outreach materials.
- Region 1 provided **ten (10) water emergency response preparedness trainings**, including resilience training, for Connecticut communities. Associated tool development included Irene/Sandy Lessons Learned Report; GIS maps of water assets at risk (e.g. MA, RI, CT, ME); and a "Climate Change-Water Impacts" power point presentation.

- EPA Region 1 and ORD developed quantitative methods for projecting the pollutant (phosphorus and sediment) loading consequences of climate change on **Lake Champlain**. Subsequently, the Region completed several modeling reports as part of the **Lake Champlain TMDL revision process**, including an analysis of potential effects of climate change on phosphorous loads to the lake.
- The Region helped initiate development of an **Integrated Sentinel Monitoring for Climate Change in Northeastern Marine and Estuarine Ecosystems** “science and implementation plan” by co-chairing the steering committee that was formed in February 2013 and providing staff for the estuarine working group. This is a joint effort by the Ocean and Coastal Ecosystem Health Committees of the Northeast Regional Ocean Council and Northeastern Regional Association of Coastal and Ocean Observing Systems.
- **Three of sixteen grants funded by the Region 1 Wetlands Program in 2013 were to address climate change impacts to wetlands, and adaptation.** Details can be found at: <http://www.epa.gov/region1/topics/ecosystems/wpdg.html>.
- The **Narragansett Bay Estuary Program** completed a **Climate Ready Estuaries project** in April 2013 that involved working with local stakeholders in the Lower Pawtuxet River watershed to identify and prioritize habitat restoration and other projects that will reduce the vulnerability and increase resiliency of the watershed to future climate change impacts.
- The **Casco Bay Estuary Partnership, the Piscataqua Region Estuaries Partnership and the University of New Hampshire** worked with the New England Environmental Finance Center, based at University of Southern Maine, to use its **COAST model in evaluating the economic vulnerability of communities in their watersheds to sea-level rise and coastal flooding**, focusing on Portland, Maine and Hampton/Seabrook, New Hampshire. The project concluded in 2013 with the release and distribution of the final report, “Coast in Action: 2012 Projects from New Hampshire and Maine.” Details can be found at: http://www.cascobay.usm.maine.edu/pdfs/cre_coast_final_report.pdf.
- Region 1 conducted a **nonpoint source training workshop for New England Tribes** in April 2013 to improve Tribal program capacity and better prepare the Tribes to protect against NPS erosion and resultant deteriorating water quality that are expected to increase as a result of increases in storm intensity resulting from climate change.
- EPA Region 1 continued to be an active member of the **New England Federal Partners, including co-chairing the climate change committee** to coordinate and share information about cross-agency climate change concerns and actions.

- Region 1 continued to work with R2, R3 and NOAA, to develop and populate the NEClimateUS.org website-- a **website where regional climate change related documents, tools, reports and identified regional needs** will be made available to the public.
- Region 1 established an **internal climate adaptation mapping workgroup** in 2013 to support implementation of the Region's climate strategies, and to discuss mapping needs, data sources, and methodologies that will inform decisions in EPAs programs. GIS staff continued to provide technical assistance to program staff, states, and communities.



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