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1/20/1507/ 2:00 p.m.

**2014 HIGHLIGHTS OF PROGRESS
and
(2015 IMPLEMENTATION PLAN; under
development)**

for the

***National Action Plan:
Priorities for Managing Freshwater Resources
in a Changing Climate***

XX XX, 2015

**Prepared by the
Water Resources Workgroup**

**Supporting the
Council on Climate Change Preparedness and Resilience**

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Introduction

In October 2011, the Interagency Climate Change Adaptation Task Force published a *National Action Plan: Priorities for Managing Freshwater Resources in a Changing Climate* (http://www.whitehouse.gov/sites/default/files/microsites/ceq/2011_national_action_plan.pdf). Developed by a Workgroup made up of Federal agencies with responsibilities for water management, the *Plan* provides an overview of the challenges that a changing climate presents for the management of the Nation's freshwater resources and describes actions Federal agencies will take to support water resource managers in understanding and reducing the risks of climate change.

The *National Action Plan* (NAP) included six core recommendations for improving water resources management in a changing climate and identified 24 specific "supporting actions" that Federal agencies could take to implement the recommendations (See Table 1). A team of Workgroup members most closely associated with each recommendation manages the recommendation and related supporting actions.

This report highlights progress made in 2014 implementing the *National Action Plan* and describes the specific tasks that Federal agencies are planning to undertake in 2015. This report builds on a previous report published in 2014 which described progress in 2013 and laid out plans for 2014 (available at: http://acwi.gov/climate_wkg/NAP_2014_implementation_plan&2013_highlights_final3-24-14a.pdf). Taken together, the work described in these workplans and progress reports reflect a comprehensive, coordinated, and continuing effort by Federal agencies to respond to the challenges posed by climate change for water resources management.

In a new development, the Water Resources Workgroup was retained under a new structure established to implement the and 2013 President's *Climate Action Plan* and Executive Order 13653, *Preparing the United States for the Impacts of Climate Change*. Under E.O. 13653, the new, expanded interagency group - called the Council on Climate Change Preparedness and Resilience (Council) - replaced the Interagency Climate Change Adaptation Task Force. As part of the Task Force, a Climate Natural Resources Working Group (CNRWG) was created to address the full range of climate change and natural resources issues. In addition, the President's State, Local, and Tribal Leaders Task Force (SLTLTF) was established to secure recommendations from stakeholders on building resilience.

The Water Resources Workgroup continues to inform the CNRWG. Furthermore, the Workgroup is integrating the recommendations made by both the CNRWG and the SLTLTF into current and ongoing work planning. Recommendations adopted – either in whole or in some respect - from the CNRWG and the SLTLTF reports are noted in the 2015 Workplan in italics.

On a final note, this document also describes how the Workgroup considered the recommendations made by the Climate subgroup of the Advisory Committee on Water Information, an authorized FACA.

Some examples of the many 2014 highlights of progress described in this report include:

- ✓ Provided funding and technical assistance to states and localities to build capacity, including:
 - CDC funding for building waterborne disease prevention capacity in fifteen states (Arizona, Florida, Ohio, South Carolina, Washington, New Hampshire, Louisiana, and Maine. Colorado, Maryland, Oklahoma, Oregon, Tennessee, Virginia, and Wisconsin);
 - CDC funding for building waterborne disease surveillance capacity in seven state health departments (Illinois, Michigan, New York, Indiana, Minnesota, Ohio, and Wisconsin).
 - The Army Corps of Engineers funded climate adaptation pilot studies that address aspects of Integrated Water Resource Management in three watersheds: Los Angeles Basin Watershed, Ohio River Basin, and West Maui Watershed (xxx.xxx.xxxx).
 - EPA technical assistance supporting more than 20 comprehensive climate-related risk assessments for drinking water and wastewater utilities using our Climate Resilience Evaluation and Awareness Tool.
 - The Bureau of Reclamation's WaterSMART Grants program cost-share grants for water and energy efficiency including piping of channels to reduce seepage, installation of more advanced water management and irrigation devices, and municipal rebate programs for activities including metering and turf replacement. (<http://www.usbr.gov/WaterSMART>).
 - The Army Corps of Engineers published a review of State Hazard Mitigation Plans and State Floodplain Management (xxx.xxxx.xxxx)
 - EPA launched a Green Infrastructure Collaborative among government agencies, NGOs, and other private sector entities to advance green stormwater infrastructure to build resilience to climate change (http://water.epa.gov/infrastructure/greeninfrastructure/gi_partners.cfm).
- ✓ Developed tools to help users access and use climate information:
 - NOAA Cooperative Institute for Climate and Satellites compendium of uses of downscaled climate information, including water (pending release at <http://xxx.xxxx.xxx>)
 - USGS National Climate Change Viewer that allows users to interact with the downscaled data at various regional, state, and local scales around the country. (http://www.usgs.gov/climate_landuse/clu_rd/apps/nccv_viewer.asp)
 - EPA added a scenario-based map of projected changes to the Climate Resilience Evaluation and Awareness Tool for easy access to scenarios of projected changes for annual total precipitation, annual average temperature, precipitation intensity for the 100-year storm, and sea-level rise (<http://water.epa.gov/infrastructure/watersecurity/climate/creat.cfm>).
 - EPA Stormwater Calculator climate scenarios to evaluate how green

infrastructure can be used to reduce runoff(<http://www2.epa.gov/water-research/epa-science-matters-newsletter-green-infrastructure-adds-epas-national-stormwater>).

- CDC released a new guide, “Assessing Health Vulnerability to Climate Change,” to help public health departments assess local vulnerabilities to health hazards associated with climate change. (<http://www.cdc.gov/climateandhealth/pubs/AssessingHealthVulnerabilitytoClimateChange.pdf>).
- ✓ Collaborated to support resilience of regional water supplies
 - The U.S. Geological Survey (USGS) Water Census released a beta version of a Data Platform that will help integrate datasets needed to help states and localities develop water budgets (<http://water.usgs.gov/watercensus/data-products.html>).
 - The Western States Federal Agency Support Team (WestFAST), and the Western States Water Council created a Water Data Exchange (WaDE) exchange portal that will enable states to share water planning and use data and WSWC is assisting a handful of pilot states to deploy the infrastructure necessary to participate in the exchange (<http://www.westernstateswater.org/wade/>).
- ✓ Provided training for water professionals:
 - The Bureau of Reclamation, working with other Federal agencies, the Western Water Assessment and the University Consortium of Atmospheric Research, added a module (“Water Temperature Impacts Under Climate Change”) to the technical training curriculum for water resources professionals on incorporating climate science into hydrologic assessment studies. Information on the program, “Assessing Natural Systems Impacts under Climate Change” is available at: <http://courses.comet.ucar.edu/course/info.php?id=136>.
 - EPA and the Water Utility Climate Alliance provided a series of six webinars about utility decision-making, planning methods, tools and resources for the water sector. The sessions are archived at: www.epa.gov/climateandwater/utility.
 - The NOAA Sectoral Applications Research Program provided monthly webinars on climate change and water resources issues. Information is available at: <http://cpo.noaa.gov/ClimatePrograms/ClimateandSocietalInteractions/SARPProgram/WebinarsandWorkshops.aspx>
 - The National Park Service developed a Natural Resource Career Field Academy climate change module to help professionals understand climate change issues and explore adaptation and planning options. See www.nps.gov

For 2015, some of the most significant implementation actions described in this report are:

TBD

As a result of three years of implementation effort, Federal agencies have been able to complete or substantially implement several of the 24 specific supporting actions identified in the *National Action Plan*. Specifically, the Workgroup considers the following actions identified below to be substantially complete, although some work to keep the action current may continue:

- ✓ **Supporting Action 1:** Establish a planning process with the capability to identify priority adaptation actions and promote their implementation;
- ✓ **Supporting Action 2:** Establish an organizational framework to promote effective management of water resources in a changing climate;
- ✓ **Supporting Action 7:** Establish interagency effort to expedite implementation of the newly developed wetlands mapping standard;
- ✓ **Supporting Action 9:** Develop an internet portal on water resources and climate change;
- ✓ **Supporting Action 13:** Promote free and open access to authoritative climate change-science and water resources data;
- ✓ **Supporting Action 15:** Make water use efficiency an explicit consideration in the revision of Principles, Requirements and Guidelines for water resources projects;
- ✓ **Supporting Action 18:** Revise Federal water project planning standards to address climate changes;
- ✓ **Supporting Action 19:** Working with States, review flood risk management and drought management planning to identify “best practices” to prepare for hydrologic extremes;
- ✓ **Supporting Action 20:** Develop benchmarks for incorporating adaptive management into water project designs, operational procedures, and planning strategies.

In addition, efforts to advance implementation of the supporting actions in very difficult budget circumstances, (including a shutdown of the government) has resulted in agencies, and the Workgroup as a whole, rethinking the feasibility of some supporting actions and deciding to stop or delay some of the work, including:

- ✓ **Supporting Action 10:** Develop a pilot climate change vulnerability index for a major category of water facilities;
- ✓ **Supporting Action 23:** Engage Water Resources Research Institutes at land grant colleges in climate change adaptation research; and
- ✓ **Supporting Action 24:** Increase graduate fellowships in water management and climate change.

Table 1: Summary of Recommendations and Status of Supporting Actions	
<input type="checkbox"/>	Ongoing Actions;
<input type="checkbox"/>	Action Substantially Complete;
<input type="checkbox"/>	Action Stopped/Delayed
Recommendation 1: Establish a Planning Process	
Action 1:	Establish a planning process
Action 2:	Establish an organizational framework
Recommendation 2: Improve Water Resources and Climate Data	
Action 3:	Strengthen data for understanding climate change impacts on water
Action 4:	Create a program to align “hydroclimatic” statistics
Action 5:	Implement surveillance system for tracking waterborne disease threats
Action 6:	Provide information to identify areas likely to be inundated by sea level rise
Action 7:	Expedite implementation of wetlands mapping standard
Recommendation 3: Strengthen Assessment of Vulnerability	
Action 8:	Publish guidance on use of modeled projections for water resource applications
Action 9:	Develop an internet portal on water resources and climate change
Action 10:	Develop a pilot climate change/freshwater vulnerability index
Action 11:	Develop tools to build capacity for vulnerability assessments
Action 12:	Assess vulnerability of National Forests and Grasslands
Action 13:	Promote free and open access to water resources data
Recommendation 4: Improve Water Use Efficiency	
Action 14:	Develop nationally consistent metrics for water use efficiency
Action 15:	Make water use efficiency an explicit consideration in the revision of Principles and Standards for water resources projects and in new NEPA guidance on climate change
Action 16:	Enhance agency coordination and create a “toolbox” of water efficiency practices
Recommendation 5: Support Integrated Water Resources Management	
Action 17:	Strengthen the role of interstate bodies in climate change adaptation
Action 18:	Revise Federal water project planning standards to address climate change
Action 19:	Working with States, review flood risk management and drought management planning and identify “best practices”
Action 20:	Develop benchmarks for incorporating adaptive management into water project designs, operational procedures, and planning strategies
Recommendation 6: Educate Water Resource Managers and Build Capacity	
Action 21:	Establish a core training program on climate change science
Action 22:	Focus existing youth outreach programs on climate change and water issues
Action 23:	Engage land grant colleges in climate change adaptation research
Action 24:	Increase graduate level fellowships in water management and climate change

Recommendation 1: Establish a Planning Process and Organizational Framework

The *National Action Plan* was an initial step to respond to the challenges to freshwater resource management posed by a changing climate. Its recommendations, however, need to be evaluated and updated over time. In addition, a formal organizational framework is needed to oversee implementation of the *Plan*, ensure ongoing coordination and continuity, and strengthen links between Federal agencies and State, tribal and local governments and other interested parties.

Supporting Action 1: Establish a planning process with the capability to identify priority adaptation actions and promote their implementation **(COMPLETE)**

Supporting Action 2: Establish an organizational framework to promote effective management of water resources in a changing climate **(COMPLETE)**

During 2014, the co-chairs of the Water Resources Workgroup (i.e., USGS, EPA, and CEQ) implement this recommendation in conjunction with the agency members of the Workgroup. The co-chairs believe that the initial tasks of establishing a planning process and organizational framework have been successfully completed. Going forward, the co-chairs will continue to use the organizational framework to implement the planning process and to provide continuity for evolving federal processes.

For example, the organization and planning process described has already evolved with new interagency initiatives related to the 2013 President's Climate Action Plan and the new Climate Change Executive Order (EO 13653). The Climate Change Preparedness and Resilience Council established under EO 13653 created several working groups, including one focused on natural resources (land and water) and the Water Resources Workgroup supports these new groups.

In October 2014, the Council published a *Priority Agenda: Enhancing the Climate Resilience of America's Natural Resources*. This report identifies four key themes related to natural resources and climate change:

- Foster Climate Resilient Lands and Waters;
- Manage and Enhance US Carbon Stocks;
- Enhance Community Preparedness and Resilience by Utilizing and Sustaining Natural Resources; and
- Modernize Federal Programs, Investments, and Delivery of Services.

Each of these four theme areas identifies specific actions to be implemented by Federal agencies. Some of these actions are related to freshwater resources and have been developed in conjunction with the continued implementation of the *National Action Plan*.

Also in response to the Executive Order, the President's State, Local and Tribal Leaders' Task Force published a report in November 2014 providing a range of climate adaptation recommendations, including recommendations related to freshwater resources that are

consistent with the recommended actions in the *National Action Plan*. For example, the Task Force recommended:

- Expanded use of green and natural infrastructure;
- Providing data and tools to guide local-decision-makers; and
- Promoting integrated watershed management and planning.

A major challenge for the Workgroup in 2015 is continue work to complete the implementation of the key actions identified in the National Action Plan while overseeing the integration of new concepts and actions arising from the reports of the President's Task Force and the *Priority Agenda*.

In addition, the Workgroup recognizes that the *National Action Plan* was developed in 2010 and 2011 and that substantial new information and data concerning water resources and climate change is now available from the National Climate Assessment and other sources. Further, a substantial part of the work called for the *National Action Plan* is now complete or will be completed in 2015 and new ideas from the President's Task Force and the *Priority Agenda* need to be integrated into work to implement the *National Action Plan*. New ideas for next steps in adapting management of freshwater resources to a changing climate are also included in a report of the Advisory Committee on Water Information (ACWI) Climate Change Workgroup. To account for the evolution of thinking concerning freshwater resources and climate change, the Workgroup plans to initiate work to update the *National Action Plan* in the spring of 2015 and finalize this work by the spring of 2016.

2014 HIGHLIGHTS OF PROGRESS:

Key accomplishments in 2014 related to recommendation include the following:

- 1. Publish a 2013 Highlights of Progress:** In March 2014, the Workgroup published an annual progress report describing actions to implement the *National Action Plan*; see http://acwi.gov/climate_wkg/NAP_2014_implementation_plan&2013_highlights_final3-24-14a.pdf
- 2. Publish 2014 Workplan:** In March 2014, the Workgroup published a workplan describing actions to be implemented to advance the work described in the *National Action Plan*; see http://acwi.gov/climate_wkg/NAP_2014_implementation_plan&2013_highlights_final3-24-14a.pdf
- 3. Hold Regular Workgroup Meetings:** The Climate Change and Water Resources Workgroup met frequently in 2014. In these meetings, Agencies exchanged information concerning developments related to climate change adaptation, coordinated related projects, and reviewed of progress implementing the *National Action Plan*.

4. Coordinate with Related Climate Change and Water Plans and Projects: Throughout 2014, the Workgroup participated in a range of related programs and projects including:

- Contributed to the President’s *Climate Action Plan* and subsequent development of the Climate Change Preparedness Executive Order, released in November 2013;
- Participated in developing the report of the Council’s Climate and Natural Resources Workgroup;
- Coordinated on the water related elements of the *National Fish, Wildlife and Plants Climate Change Adaptation Strategy*;
- Commented on documents developed by the Climate Change and Water Working Group (CCAWWG) (available at: <http://www.ccawwg.us/>); and
- Reviewed and commented on Agencies’ climate change adaptation strategies to provide input to CEQ as it created guidance to agencies for improving strategies.



5. Cooperate with the National Science and Technology Council (NSTC) Committee on Environment, Natural Resources, and Sustainability’s (CENRS), Subcommittee on Water Availability and Quality (SWAQ): Throughout 2014, the Workgroup co-chairs and members participated in monthly meetings of the Committee on the Environment, Natural Resources, and Sustainability’s SWAQ.

6. Support Operation of External Stakeholder Federal Advisory Workgroup: The Advisory Committee on Water Information (ACWI) is a Federal Advisory Committee that provides advice and guidance to Federal agencies on water issues. The *National Action Plan* includes a recommendation that ACWI serve as a vehicle for engaging stakeholders on climate change and water issues. Membership of the Climate Change Workgroup of ACWI includes some 26 organizations representing States, Tribes, and public interest groups along with 14 Federal agencies. EPA is the Federal agency co-chair of the Workgroup and the Water Environment Federation is the non-Federal co-chair.

In 2014, ACWI’s Climate Change Workgroup met on a monthly basis and provided feedback on the *National Action Plan*, culminating in publication of a report recommending next steps for implementing the *National Action Plan* (see: http://acwi.gov/climate_wkg/Climate_water_recommendations_rpt-april_21_2014_final_draft.pdf). Other materials related to the Workgroup, including a report describing actions in 2014, are posted at: http://acwi.gov/climate_wkg.



2015 WORKPLAN: ESTABLISH A PLANNING PROCESS AND ORGANIZATIONAL FRAMEWORK

Task Number	Task	Projected Completion
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Recommendation 2: Improve Water and Climate Change Information for Decision-Making

Current decision-making tools and policies for water resources management rely on historical water data to estimate future variations in water availability and quality. In a changing climate, however, as the hydrological cycle undergoes changes due to alternations in the climate, water data and models used in decision-making need to be more updated and reevaluated. In addition, new insights from predictive models and vulnerability and assessment tools need to be applied to key decisions.

In 2014, the Advisory Committee on Water Information (ACWI) Water Resources Adaptation to Climate Change Workgroup made three recommendations related to water data and information in support of climate change decision-making. In 2014, the Workgroup initiated several new activities that support the ACWI recommendations. Furthermore, the recommendations provide an opportunity to reframe a number of the supporting actions identified in the National Action Plan.

The ACWI recommendations being considered are:

ACWI Recommendation 1: Ensure continuity and viability of long-term hydro- climate observations and data management systems by establishing a coordinated process in which each Federal agency develops a plan and budget for its key observing system(s) showing how that agency will dedicate resources to evaluate data and information adequacy and then sustain and upgrade its system(s) to meet those needs.

ACWI Recommendation 2: Enhance data access and interoperability of data systems, including encouraging the Subcommittee on Water Availability and Quality (SWAQ) to develop and oversee implementation of a plan for improved water data access and interoperability across agency boundaries. This includes the development of an integrative tool to assist in the access to data and information from multiple sources.

Supporting Action 3: Strengthen data for understanding climate change impacts on water

Supporting Action 4: Create a program to align “hydroclimatic” statistics with today’s climate and anticipate future changes

Supporting Action 5: Implement an active, reliable surveillance system for tracking waterborne disease and public health threats relevant to climate change

Supporting Action 6: Provide coastal states and communities with essential information to identify areas likely to be inundated by sea level rise

Supporting Action 7: Establish interagency effort to expedite implementation of the newly developed wetlands mapping standard
(COMPLETED)

ACWI Recommendation 3: Bolster critical data sets, including those related to groundwater, stream/river flow, health data (waterborne disease), water use, and paleoclimate reconstruction.

The Data and Information Team, led by US EPA, manages the implementation of actions and tasks to support this recommendation in conjunction with the agency members of the Workgroup.

2014 HIGHLIGHTS OF PROGRESS:

Key accomplishments in 2014 related to this recommendation include:

- 1. Downscaled Climate Projections:** In 2013, NASA released downscaled minimum and maximum air temperature and precipitation data for 33 of the CMIP5 models that informed the IPCC and National Assessment activities to an 800-meter grid across the U.S. Available at: xxx.xxx.xxxx.
- 2. Publish the National Climate Assessment (NCA) Water Resources Chapter:** USGS and the US Army Corps of Engineers (USACE) co-led development of a technical input report to the NCA's water resources chapter which summarized current observations of effects of climate change on the water cycle, anticipated effects based on climate modeling, and identified adaptation strategies. This report served as a key input to the water resources Chapter of the National Climate Assessment, released in 2014. The water sector technical report was reviewed in 2013 and published in November 2014 as a USGS Circular (available at: http://www.iwr.usace.army.mil/Portals/70/docs/iwrreports/2013-R-10_Water_Resources_Sector_TIR.pdf).
- 3. Study of Climate Change in 20 Watersheds:** EPA released in September 2013 a final report titled, *Watershed Modeling to Assess the Sensitivity of Streamflow, Nutrient, and Sediment Loads to Potential Climate Change and Urban Development in 20 U.S. Watersheds*. This document characterizes the sensitivity of streamflow, nutrient (nitrogen and phosphorus) and sediment loading in different regions of the nation to a range of plausible mid-21st Century climate change and urban development scenarios. As a first-order conclusion, results indicate that in many locations future conditions are likely to be different from past experience. Results also provide a plausible envelope on the range of streamflow and water quality responses to mid-21st century climate change and urban development in different regions of the nation. In addition, in many study areas the simulations suggest a likely direction of change of streamflow and water quality endpoints. Sensitivity studies evaluating the implications of different methodological choices help to improve the scientific foundation for conducting climate change impacts assessments, thus building the capacity of the water management community to understand and respond to climate change. The final report is available at: <http://cfpub.epa.gov/ncea/global/recorddisplay.cfm?deid=256912>.

- 4. Continue funding for waterborne disease prevention capacity in Arizona, Florida, Ohio, South Carolina, Washington, New Hampshire, Louisiana, and Maine.** CDC continued to support waterborne disease surveillance activities in eight states during 2014 through its Epidemiology and Laboratory Capacity grant program and saw expansion of funding to seven more: Colorado, Maryland, Oklahoma, Oregon, Tennessee, Virginia, and Wisconsin.
- 5. Expand waterborne disease surveillance capacity in the Great Lakes states to focus on waterborne disease surveillance and prevention issues related to ambient water quality.** Great Lakes Restoration Initiative funding was used to hire three new Council of State and Territorial Epidemiology (CSTE) Applied Epidemiology Fellows and match them with Illinois, Michigan, and New York state health departments. They will work on water and health issues in the Great Lakes region, including climate-related issues and harmful algal blooms. Four Fellows were matched in 2013 and continued their placements in Indiana, Minnesota, Ohio, and Wisconsin.
- 6. Collaborate with state and federal partners to integrate surveillance of public health data on harmful algal blooms into the National Outbreak Reporting System (NORS), CDC's largest electronic outbreak reporting system.** A new state and federal working group provided guidance on integration of harmful algal bloom-associated illness and event reporting into NORS, including a NOAA-sponsored workshop that convened in March 2014.
- 7. Enhance Community Access to Future Climate and Hydrology Projections:** Federal agencies (USGS, Bureau of Reclamation, USACE, NASA Ames, DOE Lawrence Livermore National Laboratory (LLNL)) and non-Federal organizations continued to partner in 2014, developing and serving new downscaled climate and hydrologic projections to the water resources adaptation community, translated from CMIP5 global climate projections. The various activities complement each other by offering data resources and web-services that serve different user groups and their tailored information interests in various ways. The activities also represent a range of techniques for climate projections downscaling and hydrologic analysis. Notable CMIP5-based information releases in 2014 were sponsored by (1) USACE, Bureau of Reclamation, USGS, and LLNL at http://gdo-dcp.ucllnl.org/downscaled_cmip_projections/dcpInterface.html, (2) USGS and NASA Ames at <http://regclim.coas.oregonstate.edu/gccv/index.html>, and (3) USGS at <http://cida.usgs.gov/gdp/>.
- 8. Use LiDAR data from before and after Hurricane Sandy to improve NOAA and FEMA surge forecast models:** Prior to Hurricane Sandy, USGS and NOAA conducted LiDAR shoreline mapping from North Carolina to New York (see <http://coastal.er.usgs.gov/hurricanes/sandy/>). Immediately following the landfall, the mapping was repeated in order to document the impact of major storms on shoreline change (see <https://water.usgs.gov/floods/events/2012/sandy/>). In addition, USGS mapped high-water levels resulting from Sandy at more than 1,000 points in the impact zone. These data, along with data from more than 200 Recording Water Level Gages, are being used to document the magnitude and extent of inundation and to improve NOAA and FEMA surge forecast

Comment [KM1]: I assume you meant recording, right?

models. Reports relevant to these activities are available at:

<http://www.usgs.gov/hurricane/sandy/#publications.html>.

- 9. Publish online the final digitized version of the wetlands data layer of the National Spatial Data Infrastructure (NSDI) for the conterminous US, Hawaii, Puerto Rico and the Virgin Islands; continue work to finalize wetland mapping for Alaska:** The U.S. Fish and Wildlife Service provides stewardship for the wetlands data that comprise the Wetlands Layer of the National Spatial Data Infrastructure (NSDI). In partnership with the U.S. Geological Survey, the Service has made these data available via the Internet (<http://www.fws.gov/wetlands/Data/>). All digital wetlands data are provided in a seamless format for the conterminous United States and its territories. This provides resource managers and the general public with digital wetland information that can be used in geographic information systems. As of 2014, the FWS Wetlands Geodatabase contains map data for the entire conterminous 48 States, the windward islands of Hawaii, Puerto Rico, the Virgin Islands, Guam, the major Northern Mariana Islands and 35% of Alaska.
- 10. Climate Data and Tools (CDAT):** USGS and NOAA initiated an effort in 2014 to catalog existing federal water data and tools related to climate. The catalog supports two aspects of the President's Climate Action Plan, including the Climate Data Initiative and the Climate Resilience Toolkit. A water theme was added to the data initiative in December 2014 (see <http://climate.data.gov>). The CDI leverages extensive open Federal data to spur innovation and private-sector entrepreneurship in order to advance awareness of and preparedness for the impacts of climate change. The initial holdings, which include over 125 datasets, maps, tools and featured content, may be found on climate.data.gov/water. In addition, there are a number of private sector commitment leads that have been initiated. The Climate Resilience Toolkit provides a catalog of available tools that can be used to better understand and plan for impacts from climate change. Work began in 2014 to develop the water theme for the Toolkit, which will be available online with other toolkits at <http://toolkit.climate.gov/>. The Water Theme is co-chaired by USGS and NOAA
- 11. Soil Moisture Network:** The President's Climate Action Plan outlined the need for a coordinated National Soil Moisture Network (NSMN). Soil moisture data are critical for accurate drought prediction, flood forecasting, climate modeling, prediction of crop yields and water budgeting. However, soil moisture data are collected by many agencies and organizations in the United States using a variety of instruments and methods for varying applications. These data are often distributed and represented in disparate formats, posing significant challenges for use. In response to this action plan, a team led by the National Integrated Drought Information System (NIDIS) and made up of representatives from numerous Federal, State and university groups has begun to develop a framework for a NSMN and has instituted a proof-of-concept pilot study. This pilot is located in the south-central plains of the U.S., and will serve as a reference architecture for the requisite data systems and inform the design of the national network. The pilot comprises both in-situ and modeled soil moisture datasets (historical and real-time) and will serve the following

use cases: operational drought monitoring, experimental land surface modeling, and operational hydrological modeling.

12. Open Water Data Initiative (OWDI): In 2014, The Subcommittee on Spatial Water Data of ACWI in collaboration with the Federal Geospatial Data Committee (FGDC) initiated an effort to integrate currently fragmented water information into a connected, national water data framework and leverage existing systems, infrastructure and tools to underpin innovation, modeling, data sharing, and solution development. The OWDI will build upon data and tool catalogs that are being compiled as part of the CDAT project described above as well as the **work already completed** as part of the Integrated Water Resources Science and Service (IWRSS) project that will integrate water information between USGS, USACE, and NOAA. This is a multi-year effort, with both short-term, and long-term activities.

Comment [KM2]: Is there a link to this?

13. Modernize Flow Statistics: In 2014, EPA and USGS engaged in a joint project to modernize the calculation of low flow statistics for both gaged and ungaged rivers that are commonly used in water quality programs. This will enable water quality managers to have readily accessible methods to more accurately evaluate flow statistics based on observational data. The project includes an evaluation of the implications of changing flows due to climate impacts.

2015 WORKPLAN: IMPROVE WATER AND CLIMATE CHANGE INFORMATION FOR DECISION-MAKING

TBD

Task Number	Task	Projected Completion

Recommendation 3: Strengthen Assessment of Vulnerability of Water Resources to Climate Change

Extreme weather events, sea level rise, shifting precipitation and runoff patterns, temperature changes, and resulting changes in water quality and availability all have potentially significant implications for the operations of water sector utilities. To adapt to climate change, water resource managers must first determine the degrees of risk and vulnerability in their systems.

Throughout 2014, the Vulnerability Assessment Team, led by NOAA, managed the implementation of actions and tasks to support this recommendation in conjunction with the agency members of the Workgroup.

Each agency has significant work underway. Some of the projects have timeframes that, by necessity, extend beyond the shorter time frame contemplated by the action plan. Given other priorities and resource constraints, deadlines for tasks fluctuate based on agency support. Committing to ongoing coordination and collaboration to keep other agencies aware of these and other efforts will provide significant benefits to stakeholders.

Existing efforts to develop vulnerability tools have focused on categories of infrastructure that may be at risk as a result of climate change or may need to change operations. These infrastructure facilities are often critical to protecting human health, life and property. At the same time, more attention will need to be given in the future to vulnerability assessment tools for ecosystems and the services they provide.

2014 HIGHLIGHTS OF PROGRESS:

Key accomplishments in 2014 related to this recommendation include:

1. **Compendium of Uses of Downscaled Climate Data:** As part of the National Climate Assessment, scientists at the NOAA Cooperative Institute for Climate and Satellites are developing a compendium of uses of downscaled climate information applicable to all

Supporting Action 8: Publish long-term plan for Federal “downscaling” of climate model projections

Supporting Action 9: Develop a Federal internet portal to provide information on water resources and climate change **(COMPLETED)**

Supporting Action 10: Develop a pilot climate change vulnerability index for a major category of water facilities **(POSTPONED)**

Supporting Action 11: Continue development of tools and approaches that build capacity for water institutions to conduct vulnerability assessments and implement responses.

Supporting Action 12: Assess vulnerability of watersheds and aquatic systems on National Forests and Grasslands

Supporting Action 13: Promote free and open access to authoritative climate change-science and water resources data **(COMPLETED)**

climate applications, including water, that have been used in the Assessment and have passed peer review. The first step was accomplished in 2013 in conjunction with the USGS with the development of a detailed dataset of downscaled climate variables to meet user requirements. The compendium is expected to be released in late 2014 or early 2015.

2. **Downscaled Climate Projections:** In 2013, NASA released downscaled minimum and maximum air temperature and precipitation data for 33 of the CMIP5 models that informed the IPCC and National Assessment activities to an 800- meter grid across the U.S.

3. **National Climate Change Viewer:** In May 2014, USGS released a National Climate Change Viewer that allows users to interact with the downscaled data at various regional, state, and local scales around the country. This viewer, available at http://www.usgs.gov/climate_landuse/clu_rd/apps/nccv_viewer.asp, also provides time series information and download capabilities.

4. **Climate Ready Water Utilities Tools:** EPA continues to develop tools to support water resource managers to evaluate potential impacts and build resilience to climate change. Recent products, which are available at: www.epa.gov/climate-ready-utilities, include:



- a. *Scenario Projection Mapping:* a scenario-based map of projected changes to the Climate Resilience Evaluation and Awareness Tool (CREAT). It provides easy access to scenarios of projected changes and an interactive map for annual total precipitation, annual average temperature, precipitation intensity for the 100-year storm, and sea-level rise.
 - b. *Storm Surge Mapping:* EPA, working with NOAA's National Hurricane Center, has created a web-based interactive map of the Atlantic and Gulf coasts that illustrates potential inundation from storm surge. The mapping tool displays NOAA's Sea, Lake, and Overland Surge from Hurricanes model as well as FEMA's 100 and 500 year flood zones. EPA plans to incorporate historical hurricane location strike data into the next version of the tool.
 - c. *Stormwater Calculator:* The CREAT tool is now integrated with a new Stormwater Calculator that enables users to run alternative scenarios to evaluate how they can add green infrastructure into their plans to reduce runoff.
- Water Utility Climate Resilience Support Projects:* EPA is supporting more than 20 comprehensive climate-related risk assessments for drinking water and wastewater utilities using our Climate Resilience Evaluation and Awareness Tool. The Agency will provide technical assessment assistance to the participating utilities, which will help identify adaptation strategies for implementation to bolster climate readiness and resilience.

5. **Workbook for Watershed-Based Climate Change Vulnerability Assessments and Adaptation Plans:** In September 2014, EPA's Climate Ready Estuaries published *Being*

Prepared for Climate Change: A Workbook for Developing Risk-Based Adaptation Plans as a resource for environmental managers and planners. This publication provides much needed guidance for conducting risk-based climate change vulnerability assessments and developing adaptation action plans. The workbook helps users to identify, analyze and prioritize climate change risks. In developing an action plan, it guides users to address their most pressing risks and find appropriate responses. By using the workbook and addressing climate change in their systems, users will be ready to protect environmental resources, public safety, and infrastructure. Learn more about the *Being Prepared for Climate Change* workbook tools at: <http://www2.epa.gov/cre/risk-based-adaptation>.

6. **Federal Support Toolbox for Integrated Water Resources Management (IWRM)/Climate Change:** The Army Corps of Engineers developed a “Toolbox” that provides a comprehensive hub of information and capabilities through a common data portal across Federal agencies. The toolbox provides state, tribes, federal, regional, and local water resources agencies with access to Federal water resources information, planning assistance, and capabilities to optimize the planning and management of water. The Toolbox includes climate change information and takes advantage of current activities in improving hydrostatistics, new information available through the National Climate Assessment, data integration mechanisms such as the Hydrologic Information System (HIS) developed by the Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI), and data visualization techniques such as those developed for “CalAdapt” by the California Energy Commission and the California Natural Resources Agency. The Toolbox provides links to other climate information and collaborative activities such as the NOAA Climate Portal. The Toolbox is available at: <http://watertoolbox.us>.
7. **Report on National Forest Watershed Vulnerability Assessments:** In 2014, the Forest Service continued its vulnerability assessment pilots in National Forests, with the release of the vulnerability assessment for the Minnesota forest ecosystem, bringing the total of forests assessed to 12. The pilot efforts identified key principles important to conducting future vulnerability assessments, and contributes directly to the Forest Service Watershed Condition Framework, a systematic, six-step process for determining watershed condition class that all National Forests and Grasslands can apply consistently (http://www.fs.fed.us/publications/watershed/Watershed_Condition_Framework.pdf)
8. **Drought Impacts on Colorado River:** The interagency National Integrated Drought Information System (NIDIS) and NOAA supported the examination of low flow and drought in the Colorado River Basin on junior water rights holders. NIDIS is now working to integrate these new findings into the Colorado River Basin Drought Early Warning System to give advance warning of potential water shortages during a developing drought. This work is supported by a grant, and is expected to be completed in summer 2014.
9. **Great Dismal Swamp Ecosystem Resilience Pilots.** During 2014, the U.S. Geological Survey (USGS) initiated two pilot projects with the Fish and Wildlife Service in the Great Dismal Swamp National Wildlife Refuge. The first project is to consider the impacts of management

decisions on carbon stocks and fluxes as well as impacts on resilience and ecosystem services, such as water quality, flood risk reduction, wildlife viewing, cultural heritage, and nutrient cycling. The second project is to develop a tool helping resource managers consider the impacts of management decisions on ecosystem resilience and services, such as water quality, flood risk reduction, wildlife viewing, cultural heritage, and nutrient cycling.

2015 WORKPLAN: STRENGTHEN ASSESSMENT OF VULNERABILITY

TBD

Task Number	Task	Projected Completion
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Recommendation 4: Expand Water Use Efficiency

Climate change will further challenge water resources that are already under stress because of growing populations, contamination, and demands to meet diverse human and ecosystem needs. Making more efficient use of water can extend the availability of current supplies, reduce competition among sectors, save energy, and reduce the cost of water system operations.

The Water Use Efficiency team established three supporting actions for this effort (see box). These supporting actions are in various stages of implementation. Progress on some of the specific actions has been slow, largely due to other priority activities on which the different agencies

Supporting Action 14: Develop nationally consistent metrics for water use efficiency in key sectors and report water efficiency information in nationally consistent formats.

Supporting Action 15: Make water use efficiency an explicit consideration in the revision of Principles, Requirements and Guidelines for water resources projects **(COMPLETED)** and in new NEPA guidance on climate change.

Supporting Action 16: Enhance coordination among Federal water efficiency programs and improve program effectiveness.

are focused. However, those other activities are linked to this effort in that they are either directly furthering water use efficiency or laying a foundation for future efforts.

A Water Resources Adaptation to Climate Change Workgroup of the Advisory Committee on Water Information provided recommendations on elements of the NAP in 2014. The subgroup that focused on water use efficiency made three recommendations: (1) Prioritize agriculture for consideration under Supporting Action 14 of the NAP; (2) Update DOE efficiency standards for plumbing products; (3) Promote programs and legislation to develop a national funding program for water efficiency and reuse/reclamation that would mirror, but not replace, existing programs managed in western States by the Bureau of Reclamation.

The team will take the first recommendation under advisement as it carries out activities in 2015. A need for nationally consistent water use metrics has now been recognized by other interagency groups, including the Subcommittee on Water Availability and Quality (SWAQ), which reports to the Committee on Environment and Natural Resources for the National Science and Technology Council in the White House Office of Science and Technology Policy. The other two recommendations are somewhat out of the control of the team, but the group will continue to promote programs that enable local entities to implement water efficiency and reuse/reclamation projects.

2014 HIGHLIGHTS OF PROGRESS:

A summary of 2014 efforts from the Water Use Efficiency Team and an overview of activities being carried out by each agency that support improvements in water efficiency is provided below. As can be seen by reviewing the activities that follow, each agency has significant work underway. Some of the projects, the results of which would be critical in advancing activity on metrics, have timeframes that, by necessity, extend beyond the shorter time frame contemplated by the action plan. However, committing to ongoing coordination and collaboration to keep other agencies aware of these and other efforts will provide significant benefits towards advancing water use efficiency efforts to support our respective stakeholders.

- 1. Improving Water Use Assessment in the Water Census Program:** The U.S. Geological Survey (USGS) is conducting the Water Census under the umbrella of the DOI WaterSMART initiative. The project is wide-ranging and has subprojects that will build a foundation for development of metrics and better assessments of water use in different sectors. The website at <http://water.usgs.gov/watercensus/> provides information about the Water Census and affiliated efforts. Of note, in 2014 the Census released a beta version of a Data Platform that will help integrate datasets needed to help states and localities develop water budgets. Subprojects that are part of the Census include:



- **Water Use in the United States.** The USGS completed the *Estimated Use of Water in the United States in 2010* report, which was released to the public in November 2014.
- **Public Supplies.** WaterSMART is working on a seven-year effort to develop a site-specific water use database for 55,000 public water systems that will be able to link with monthly withdrawal amounts by type of delivery (e.g., domestic, industrial, or cooling uses). After the database is completed, a consumption profile of each facility will be developed. This project is in coordination with EPA and the products should be released to the public in fiscal year 2017.
- **Irrigation.** WaterSMART is working on a large project looking at amount of evapotranspiration (ET) associated with irrigated crop land in order to develop a better sense of the consumptive use associated with irrigation (i.e., how much of a crop can we produce per a given amount of water consumed). An article documenting the work was published in the Journal of the American Water Resources Association in (<http://onlinelibrary.wiley.com/doi/10.1111/jawr.12057/abstract>). The project is being piloted in the Colorado River Basin and the estimated ET from irrigated cropland will be released in 2015. This project is being coordinated with USDA NRCS and the Bureau of Reclamation, which is a large user of this information. The USGS also has a project underway with Utah State University to look at methodologies for evapotranspiration measurements. Many states have their own evapotranspiration methods, and want to incorporate this into the Water Census.

- **Thermoelectric Power.** As part of follow-up to recommendations from a GAO report in 2010, the USGS has continued to work with the Energy Information Administration to improve the collection of water use data from thermoelectric power plants and better estimate the consumptive water use associated with plants, rather than just withdrawals. The first report from this effort was published and distributed in November 2013. The report, entitled *Methods for Estimating Water Consumption for Thermoelectric Power Plants in the United States* (USGS Scientific Investigations Report 2013-5188), presents a model for estimating the consumptive use of water at thermoelectric power plants. The report may be accessed at: <http://pubs.usgs.gov/sir/2013/5188/pdf/sir2013-5188.pdf>. In September 2014, the USGS released a companion report, *Withdrawal and Consumption of Water by Thermoelectric Power Plants in the United States, 2010* (USGS Scientific Investigations Report 2013-5184), which estimated water use for 1,290 water-using plants in the U.S. based on the methodology in the earlier report. The report may be accessed at <http://pubs.usgs.gov/sir/2014/5184/>.

2. **Release of the Principles and Requirements for Water Resource Investments:** CEQ released an update of the Principle, Requirements and Guidelines for Water Resource Investments (formerly, Principles and Standards) in March 2013, making water use efficiency an explicit consideration in Federal water resources investment decisions. The Interagency Guidelines was released in December 2014. More information on the Principles and Requirements can be found at <http://www.whitehouse.gov/administration/eop/ceq/initiatives/PandG>.

3. **Assessing agricultural water use efficiency in the Ogallala Aquifer:** As part of ongoing USDA efforts to evaluate agricultural conservation programs, the Natural Resources Conservation Service (NRCS) began an evaluation on the effectiveness of Federal programs to reduce irrigation water withdrawals from the Ogallala Aquifer. The 2013 assessment phase of the evaluation found large reductions in water withdrawn and energy consumed from program implementation. In 2015, alternative program approaches will be evaluated against program objectives and alternative effectiveness measures, including water use efficiency.

4. **Developing State Water Data Exchange:** The Western States Federal Agency Support Team (WestFAST), in cooperation with the Western States Water Council (WSWC), is engaged in a major project to create an exchange that will enable states to share important water planning and use data, which will in turn support studies that cross state borders (<http://www.westernstateswater.org/wade/>). One goal of the project is to be able to provide more comprehensive water withdrawal and consumptive use data; however, at this time, many states do not collect this information and the methods used vary by state. To assess this variability, the WSWC issued a survey and compiled all of the state water



planning agency responses into a summary report, the “Western State Water Program Capabilities Assessment Survey & Report,” which can be found here: <http://www.westernstateswater.org/western-state-water-program-capabilities-assessment-report/>. The report contains survey results that highlight the similarities and differences between states’ water planning activities, such as data gathering, water use reporting, and data management. It also discusses the challenges regarding a regional water availability and use picture of the West and makes several recommendations to achieve that goal. WSWC is in the process of assisting a handful of pilot states to deploy the infrastructure necessary to participate in the exchange. The Water Data Exchange (WaDE) portal is anticipated to have data flowing from a majority of its western state members by mid-2015. The work will support both the Water Census and DOE studies looking at the availability of water for energy in the West.

5. **National Drought Resilience Partnership:** In November 2013, as part of President Obama’s [Climate Action Plan](#), Federal agencies established the [National Drought Resilience Partnership \(NDRP\)](#) to help communities better prepare for future droughts and reduce the impact of drought events on livelihoods and the economy. Responding to requests from communities, businesses, and farmers and ranchers, the National Drought Resilience Partnership will make it easier to access Federal drought resources, and will help link information such as monitoring, forecasts, outlooks, and early warnings with longer-term drought resilience strategies in critical sectors such as agriculture, municipal water systems, energy, recreation, tourism and manufacturing. Beginning in 2014, the NDRP, in partnership with the State of Montana, is pursuing a “proof of concept,” around long-term drought resilience by demonstrating how improved drought planning and resilience could be achieved through enhanced coordination of federal agency resources in the Upper Missouri River Watershed in Montana.
6. **Impacts of Changes in Water Availability on the Energy Sector:** The Department of Energy (DOE) is continuing to assess the challenges and opportunities of the energy-water nexus and the effects of decreasing water availability and of climate change on energy systems. DOE is developing recommendations and pursuing activities to address knowledge, technology and policy gaps to building a secure and sustainable energy future. In July 2013, DOE’s Office of Energy Policy and Systems Analysis issued the report “U.S. Energy Sector Vulnerabilities to Climate Change and Extreme Weather” that examines current and potential future climate trends on the U.S. energy sector. The report identifies current adaptation responses as well as opportunities for improved technologies, policies, information and stakeholder engagement to respond to the threats of climate change. The report is available at: <http://www.energy.gov/downloads/us-energy-sector-vulnerabilities-climate-change-and-extreme-weather>.

In June 2014, DOE also released a new report, *The Water-Energy Nexus: Challenge and Opportunities*, which took a broad look at several different strategic areas including optimizing the freshwater efficiency of energy production, electricity generation, and end use systems as a means to lay a foundation for coordinating research and development

between DOE and other federal partners. In addition, this report examines opportunities to optimize the energy efficiency of water management, treatment, distribution and end use systems. The report is available at: <http://www.energy.gov/downloads/water-energy-nexus-challenges-and-opportunities>

Sandia National Laboratories, in collaboration with the USGS, several states, and the Western States Water Council, released a paper in May 2014 that reports on their efforts to assess water use and demand in the western U.S. The work supports efforts funded by DOE's Office of Electricity Delivery and Energy Reliability to assess the nexus between energy and water in the western and Texas electricity interconnections to support future decision-making on planning for future energy needs. The paper, *Mapping water availability, projected use and cost in the western United States* is available at <http://iopscience.iop.org/1748-9326/9/6/064009/article>.

7. **Monitoring Studies of Water Use Metrics:** EPA is following two significant projects that are underway by the Water Research Foundation.
 - A project to update and expand the Residential End Uses of Water Study from 1999 is expected to be completed in early 2015.
 - A project to develop and test methodologies to collect standardized data to determine the proportion of commercial, institutional, and industrial end uses of water. There is considerable inconsistency in how water utilities identify these types of facilities in their billing and water use records, which hinders forecasting and benchmarking. A final report is expected in 2015.
8. **Revising Water Efficiency Grants to Include Additional Water Savings Data:** The Bureau of Reclamation continues to review the process used to select water conservation grants they make for water conservation to assess the different measurements of success for water savings that grantees report. In 2012, significant revisions were made to the funding opportunity announcement for WaterSMART Grants to request more detailed support for applicants' water savings estimates so that those estimates can be evaluated as effectively as possible. The Bureau is also conducting before and after visits to project sites for a sample of funded projects to compare project sponsors' estimates of water savings with post-project results. This effort continues, with a preliminary report expected to be released in 2014. The information gathered during this process may be of benefit to the work on metrics.
9. **Army Net Zero Installations:** Following on their pilot program, in 2014, the Army issued a directive that will extend the Net Zero policy to all Army installations (http://www.apd.army.mil/pdffiles/ad2014_02.pdf). For water, the Commands are asked to implement Net Zero to the maximum extent practicable and fiscally prudent by reducing overall water use, regardless of source; increasing use of technology that uses water more efficiently; recycling and reusing water, shifting from the use of potable water

to non-potable sources as much as possible; and minimizing interbasin transfers of any type of water, potable or non-potable, so that a Net Zero water installation recharges as much water back into the aquifer as it withdraws.

10. **Implementing Net Zero Planner Program:** The U.S. Army Corps of Engineers Construction Engineering Research Lab is developing planning-scale tools to integrate Army installation actions that support net zero energy, water, and waste. The Net Zero Planner (NZIP) tool includes multi-scale modeling and analyses of water conservation measures to document potential water and energy savings. During FY 2014 this research project developed models for individual water measures. These models calculate the integrated effect of the measures on water, energy and waste and allow optimized planning. In addition, the models are being captured in the NZIP tool, which will be released by the end of FY 2015. Initial demonstration sites for the NZIP include Fort Leonard Wood, MO; Fort Hood, TX; and RAF Lakenheath, England.
11. **Refinement of a Mobile Tablet Water Equipment Tracker**The Office of the Assistant Secretary of the Army (Installations, Energy and Environment) funded the Army Corps of Engineers Construction Engineering Research Lab to develop a mobile tablet Water Equipment Tracking (WET) application to be used to inventory and track water related equipment in individual facilities. A report describing the tool was published in late 2013 (http://acwc.sdp.sirsi.net/client/en_US/search/asset/1031240). The WET helps eliminate transfer errors in auditing and provides an immediate estimate of building water consumption based on occupancy, use, and existing equipment. In FY 2014 additional funding was made available by the OASA(IE&E) to adjust the existing algorithms that were created to provide building level estimates of water demand. These revised algorithms were compared with meter data at Fort Campbell and Fort Leonard Wood for residential, barracks, dining facilities, and administrative building types. Further refinements of the algorithms are in progress to ensure reasonable estimates can be provided across all Army installations.
12. **Expanding EPA's WaterSense Program:** Efficient use of water is a key strategy for managing water resources as supplies become more unpredictable as a result of climate change. In 2014, the program finalized changes to its program for labeling professional certification programs and continued work towards release of a draft specification for commercial toilets. The program also carried out a focused campaign in 2014 with the hospitality sector to encourage them to use the *WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities* as a means to track and reduce water use.

The WaterSense program is continuing to work with the EPA ENERGYSTAR program to evaluate data collected by Fannie Mae for multifamily housing to determine if the data is sufficient to support water benchmarking. In 2014, based on popular request, ENERGY STAR also added water use back as a recognition category for its National Building Competition. (It had been included in 2012 and excluded in 2013.)



13. Maintaining WaterSMART Grants for Water Efficiency: The Bureau of Reclamation’s WaterSMART Grants program offers cost-shared grants for water and energy efficiency (<http://www.usbr.gov/WaterSMART/weeg/>). The grants cover water management improvements, including piping of channels to reduce seepage, installation of more advanced water management and irrigation devices, and municipal rebate programs for activities including metering and turf replacement. Approximately 162 projects have been funded since FY 2010. Projects funded under WaterSMART Grants and other water conservation programs FY 2010 through FY 2013 enable the capability to conserve 734,000 acre-feet of water, meeting the Department of the Interior’s Priority Goal of 730,000 acre-feet for that period. An accomplishments report, *WaterSMART: A Three-Year Progress Report*, was published in October 2012, and is available at <http://www.usbr.gov/WaterSMART>. **[NOTE: these numbers will be updated when USBR makes their next round of awards in fall 2014.]**

2015 WORKPLAN: WATER USE EFFICIENCY

TBD

Task Number	Task	Projected Completion
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Recommendation 5: Support Integrated Water Resources Management

Management of the risks from a changing climate should not occur in isolation and should be integrated with efforts to address other freshwater resources management challenges. As models and methods for integrated water resources management are developed across the country, challenges posed by a changing climate should be incorporated.

The Integrated Water Resources Management (IWRM) team led by USACE managed the implementation of actions and tasks to support this recommendation in conjunction with the agency members of the Workgroup. Four supporting actions were established for this effort (see box). Several are completed.

2014 HIGHLIGHTS OF PROGRESS:

Key accomplishments in 2014 related to this recommendation include:

- 1. Adaptation Pilot Studies:** The USACE funded several climate change adaptation pilot studies that address certain aspects of IWRM. Additional studies are under consideration for FY15 subject to existing agency priorities and commitments. FY14 highlights of the pilot studies follow:

An IWRM climate adaptation pilot study for the **West Maui Watershed** encompassing the region from the summit of Pu`u Kukui to the outer coral reef was completed and a report released. The central question addressed by the pilot is: How can a risk-informed decision-making (RIDM) framework be incorporated at the beginning of a collaborative planning process for a place-based climate change adaptation strategy, and what are the challenges in implementing an IWRM framework? Partners in the pilot included USACE-Honolulu District, the State of Hawaii Department of Land and Natural Resources (DLNR) and the Department of Health (DOH) with support from NOAA and EPA. As part of the pilot study, a decision framework was developed to guide the West Maui Ridge to Reef (R2R) Initiative. The pilot identified several factors as being important in future similar efforts: a shared lexicon is critical in an interagency planning process, decision making agencies must first

Supporting Action 17: Work with States and interstate bodies (e.g., River Basin Commissions) to incorporate IWRM into planning and programs, paying particular attention to climate change adaptation issue

Supporting Action 18: Revise Federal water project planning standards to address climate changes (**COMPLETED**)

Supporting Action 19: Working with States, review flood risk management and drought management planning to identify “best practices” to prepare for hydrologic extremes (**COMPLETED**)

Supporting Action 20: Develop benchmarks for incorporating adaptive management into water project designs, operational procedures, and planning strategies (**COMPLETED**)

have a clear understanding of the decision framework before engaging the broader stakeholder community, climate change should be incorporated early in the early in the planning process, and interagency initiatives are most effective when they use or develop a framework suited to their particular objectives (i.e., there is no one-size-fits-all framework).

USACE continued to participate in an IWRM climate adaptation pilot for the **Los Angeles Basin Watershed** (Watershed) in collaboration the Los Angeles County Department of Public Works' (LACDPW) and the U.S. Bureau of Reclamation's (BOR) Los Angeles Basin Stormwater Conservation Study (Basin Study). The effort covers the Los Angeles River Watershed and the San Gabriel River Watershed, with the objective to assess and manage future climate change impacts on the freshwater resources in the Watershed. The FY15 scope is under consideration.

A third pilot study involving regional collaboration with the **Ohio River Basin** (ORB) Alliance made good progress in FY14, and a report is expected in FY15. The Alliance includes representatives from Federal agencies, States, non-governmental organizations (NGOs) and universities. The aim of the pilot study is to collaboratively develop mitigation and adaptation strategies with the ORB Alliance to counteract the anticipated water resources, ecological, and infrastructure impacts of climate change. One product of this pilot is the formation of a permanent climate change working group within the ORB Alliance to assist in future IWRM activities.

1. **State Flood and Drought Risk Management:** A contractor completed a review of State Hazard Mitigation Plans in 2012. The report has been written and published. A survey of State Hazard Mitigation Officials (SHMO) and State Floodplain Management Officials has also been completed. In total, 46 SHMOs and 45 NFIP Coordinators responded to the survey. The report on the survey has also been completed.
2. **Integrated Water Resources Science and Services (IWRSS):** USACE, USGS, and NOAA's National Weather Service established IWRSS to enable and demonstrate a broad, integrative national water resources information system to serve as a reliable and authoritative means for adaptive water-related planning. The three agencies continue to implement IWRSS in the areas of improved data interoperability and flood inundation mapping.

2015 WORKPLAN: INTEGRATED WATER RESOURCES MANAGEMENT

TBD

Task Number	Task	Projected Completion
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Recommendation 6: Support Training and Outreach to Build Response Capability

Today, the workforce that manages water resources programs at all levels of government and in the private sector needs information and tools to address the implications of a changing climate or to make complex climate change adaptation decisions related to freshwater resources.

Implementation of actions and tasks in support of this recommendation were taken on by the full Water Resources and Climate Change Workgroup rather than an individual team.

Throughout 2014, the Workgroup co-chairs, in conjunction with the agency members of the Workgroup, managed the implementation of actions and tasks to support this recommendation. Four supporting actions were established for this effort (see box).

Supporting Action 21: Establish a training program that will increase the ability of technical practitioners to incorporate climate change information in the studies they conduct that inform water and water related resource management decisions

Supporting Action 22: Focus existing youth outreach programs on climate change and water issues

Supporting Action 23: Engage Water Resources Research Institutes at land grant colleges in climate change adaptation research **(DEFERRED)**

Supporting Action 24: Increase graduate fellowships in water management and climate change **(DEFERRED)**

2014 HIGHLIGHTS OF PROGRESS:

Key accomplishments in 2014 related to this Recommendation include:

- 1. Developing Climate Change Training Capacity:** The Bureau of Reclamation worked with other Federal agencies, including USACE and EPA, and with the Western Water Assessment and the University Consortium of Atmospheric Research, to design and develop a technical training curriculum that instructs water resources professionals how to incorporate climate science and its associated uncertainties into hydrologic assessment studies. This professional development series is titled: Assessing Natural Systems Impacts under Climate Change. More information is available at: <http://courses.comet.ucar.edu/course/info.php?id=136>.



In August, 2014, the program conducted the first course addressing Water Temperature Impacts Under Climate Change (WTIUCC). In this three day, instructor-led, in-classroom course, participants explored methods to scope, conduct, and document an assessment of impacts (with uncertainty) from a changing climate on water temperature.

Other courses in the series include:

- Introduction to Climate Models (currently available, about 1.5 hours of material);
- Preparing Hydro-climate Inputs for Climate Change in Water Resource Planning (currently available, about 5 hours of material); and
- Basics of Water Temperature: Watershed Flyover (will become available in early summer 2014, about 40 minutes of material)

2. Carrying-Out Climate Ready Water Utilities Webinars: In 2014, EPA, in coordination with the Water Utility Climate Alliance, provided a series of six (6) webinars. More than 400 participants learned about utility decision-making and planning methods as well as relevant tools and resources for the water sector. Through these 60-minute webinars, participants developed a greater understanding of how to plan for and adapt to challenges, including climate change and extreme events. Webinar topics included threshold analysis, financing adaptation and communicating climate risk. The webinars featured case studies from utilities that have used these decision-support methods to become more climate ready, including two utilities in Florida. The sessions are archived on EPA's website at www.epa.gov/climatereadyutilities.

3. Webinars: Climate Information for Managing Risks in Water Resources: The NOAA Sectoral Applications Research Program (SARP) is working with partners to provide a monthly series of webinars on climate change and water resources issues. Partners include the US National Integrated Drought Information System (NIDIS), Water Research Foundation, Water Environment Federation (WEF), Water Environment Research Foundation (WERF), and American Water Works Association (AWWA). Webinars conducted in 2014 are described below. More information is available at: <http://cpo.noaa.gov/ClimatePrograms/ClimateandSocietalInteractions/SARPProgram/WebinarsandWorkshops.aspx>. Topics covered in 2014 included:

- **Decision Making into Local/Regional Planning (1/15/14)**
 1. *Latham Stack (Syntectic International) and Michael Simpson (Antioch University – New England), et al. - Stakeholder –Driven Decision– Making for Adaptation: Design and Implementation of a Water Infrastructure Adaptation Plan*
 2. *Vikram Mehta (Center for Research on the Changing Earth System)- Interannual to Decadal Climate Variability Information for Risk Assessment, Urban Water Policy, and Decision Support: Case Studies of Kansas City, Lincoln, and Great Falls Urban Areas within the Missouri River Basin*
- **Working with Communities (2/21/14)**
 1. *Dr. Heather Lazrus (National Center for Atmospheric Research) - "Water Decisions for Sustainability of the Arbuckle-Simpson Aquifer"*

2. Dr. Ken Potter (U of Wisconsin) - "Demonstration Storms for Identifying Climate Vulnerability."

- **The California Drought (3/24/14)**

Jeanine Jones - The California Drought and Related Climate Science Needs

- **Stakeholder Communications (4/17/14)**

1. Daniel Ferguson (University of Arizona) and Jennifer Rice (University of Georgia) - "Linking Environmental Research and Practice: Lessons from the Integration of Climate Science and Water Management in the Western United States"

2. Karen Raucher (Stratus Consulting) - "Five Americas for Community Water and Climate Change: A Nationally Representative Segmentation Analysis"

- **Stakeholder Communications (5/22/14)**

Paul Fleming (Seattle Public Utilities) and Aris Georgakakos (Georgia Institute of Technology) - "Findings from the 3rd National Climate Assessment: Implications for Water Utility Management, Planning and Decision Making"

- **Stakeholder Communications (12/3/14)**

Mark Deutschman (Houston Engineering, Inc.) - "The Role of Climate and Water Resources Data in Societal Decisions"

4. Climate Change Module for National Park Service Field Academy: In 2014, the National Park Service completed development of a Natural Resource Career Field Academy online climate change module to help resource professionals understand key climate change related issues and explore adaptation and planning options. See www.xxxxx

5. ThinkWater Education Summit: ThinkWater is a national project sponsored by the USDA and designed by educators, scientists and activists in partnership with the University of Wisconsin Extension to add thinking skills and awareness into existing water education lessons. The modified lessons and their delivery will create Water Thinkers – people who care about and deeply understand water and the issues surrounding it.

In November, 2014, ThinkWater hosted a national water education summit in Madison Wisconsin. Participants from around the country gathered to diagnose and prescribe how to increase the impact of existing water education curriculum. Attendees include national, regional and local experts in water education, youth development, STEM, policy and program directors, educators, cognitive scientists and thought leaders, exploring the challenges and solutions surrounding water education. Videos and other resources available at www.waterthinkers.org.

2015 WORKPLAN: SUPPORT TRAINING AND OUTREACH TO BUILD RESPONSE CAPABILITY

TBD

Task Number	Task	Projected Completion
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Appendix: 1

2014 Membership

**Water Resources Workgroup of the
Climate Change Preparedness and Resilience Council**

Co-chairs:

Council on Environmental Quality
Chitra Kumar
Ellen Tarquinio

Environmental Protection Agency
Michael Shapiro

U.S. Geological Survey
Jared Bales

Members:

Army Corps of Engineers
Janet Cushing
Rachel GrandPre
Rolf Olsen

Environmental Protection Agency
Veronica Blette
Karen Metchis
Jeff Peterson

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**Prepared by the
Water Resources Workgroup**

**Supporting the
Council on Climate Change Preparedness and Resilience**

DECEMBER 2014

