

**2013
IMPLEMENTATION PLAN**

for the

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

**Prepared by the
Climate Change and Water Resources Workgroup
Supporting the
Interagency Climate Change Adaptation Task Force**

March 2013

**NATIONAL ACTION PLAN:
PRIORITIES FOR MANAGING FRESHWATER RESOURCES IN A CHANGING CLIMATE**

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Introduction

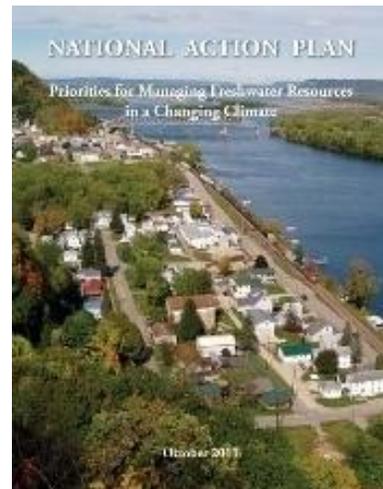
In October 2011, the Interagency Climate Change Adaptation Task Force published a *National Action Plan* providing an overview of the challenges that a changing climate presents for the management of the Nation's freshwater resources and recommending actions for Federal agencies to support water resource managers in understanding and reducing the risks of climate change. This *Implementation Plan* describes the specific tasks that Federal agencies will take to implement the *National Action Plan* between January 2012 and January 2013.

The *National Action Plan* was developed in response to a recommendation in the October 2010 *Progress Report* of the Interagency Climate Change and Adaptation Task Force (available at: http://www.whitehouse.gov/sites/default/files/microsites/ceq/2011_national_action_plan.pdf). It was developed for the Task Force by an interagency Water Resources and Climate Change Adaptation Workgroup made up of representatives from Federal agencies involved in water resources management. The Workgroup, which is co-chaired by the Department of Interior (DOI), the Environmental Protection Agency (EPA), and the Council on Environmental Quality (CEQ), prepared this *Implementation Plan* for 2012 and will oversee implementation actions.

Six recommendations to improve water resources management in a changing climate were presented in the original *National Action Plan*. For each of these recommendations, Federal agencies are implementing supporting actions, which are summarized in Table I below. Overall, Federal agencies have made significant progress in implementing the 24 supporting actions in the National Action Plan. In 2012, the Workgroup determined that one supporting actions is completed, 19 are on track and 4 are delayed.

This *Implementation Plan* describes the more specific tasks that Federal agencies will undertake to implement these actions. Tasks supporting each recommendation are managed by a Team of Workgroup members most closely associated with the recommendation and the agencies on each team are identified in this *Plan* along with led agency for the task and the estimated schedule for completion.

The Task Force recognizes that managing the risks to freshwater resources posed by a changing climate is a complex and multi-faceted undertaking for which many recommendations and actions might be appropriate. This *National Action Plan* presents the recommendations and actions that are judged to be both a high priority today and achievable in the context of existing and foreseeable agency capacity.



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Action 1: Establish a planning process
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Action 3: Strengthen data for understanding climate change impacts on water
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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 resources applications
Action 9: Develop an internet portal on water resources and climate change
Action 10: Develop a pilot climate change/freshwater vulnerability index
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Action 15: Make water use efficiency an explicit consideration in the revision of Principles and Standards for water resources projects and in the new NEPA guidance on climate change
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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
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Recommendation 1:

Continue Planning Process and Improve Organizational Framework:

The *National Action Plan* was an initial step to respond to the challenges to freshwater resources posed by a changing climate. Its recommendations, however, will need to be evaluated and updated over time. The formal organizational framework along with the ACWI subcommittee on Climate Change is needed to oversee implementation of the Plan and strengthen links to Federal agencies with State, tribal and local governments and other interested parties.

The Water Resources and Climate Change Workgroup (WG) co-chairs (i.e., USGS, EPA, CEQ) will manage the implementation of actions and tasks to support this recommendation in conjunction with the agency members of the Workgroup.

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

Task Number	Task	Projected Completion
1	Workgroup participates in review of Water Sector chapter of National Climate Assessment: <ul style="list-style-type: none"> ○ Work with water stakeholders to encourage comment on draft water chapter for public review 	February
2	Outreach to Agency officials developing agency climate change adaptation plans to address key action in <i>National Action Plan</i> : <ul style="list-style-type: none"> ○ Input to CEQ guidance to agencies ○ Provide Workgroup comments on draft Agency Strategies 	Ongoing
3	Develop program and outcome measures for evaluating progress on water resources climate adaptation: <ul style="list-style-type: none"> ○ Draft measures for comment ○ Final measures 	Spring Fall
4	Provide comments on products of the CCAWWG	Ongoing

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

The Water Resources and Climate Change Workgroup (WG) co-chairs (i.e., USGS, EPA, CEQ) will manage the implementation of actions and tasks to support this recommendation in conjunction with the agency members of the Workgroup.

Task Number	Task	Projected Completion
1	Continue Water Resources and Climate Change Adaptation Workgroup meetings	Monthly
2	Oversee implementation of Freshwater <i>National Action Plan</i> , including: <ul style="list-style-type: none"> ○ Develop implementation plan - yearly ○ Support Implementation Teams (see below) ○ Publish Annual Workgroup Progress Report-yearly 	January/Feb Ongoing October
3	Participate in meetings of the SWAQ and provide comments on climate related reports	Monthly
4	Participate in meetings of the CCAWWG and provide comments on reports and products	Ongoing
5	Work with the Water Science and Technology Board (WSTB) of the National Research Council and others to revise the charter of Subcommittee on Hydrology. The revised charter would utilize the Subcommittee to provide a forum for coordination among climate modelers and water observational data managers. <ul style="list-style-type: none"> ○ With WSTB, organize initial planning meeting to review organizational options and consult with interested parties ○ Finalize any needed charter changes ○ Establish revised Subcommittee on Hydrology 	March & Ongoing
6	Continue to work with and support the Freshwater Climate Change subcommittee of ACWI to identify options for expanded attention to climate change.	Ongoing
7	Participate in development of regional collaborations on climate change science and services	Ongoing

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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, water data used in decision-making tools needs to be more complete and current. In addition, new insights from predictive models and vulnerability and assessment tools need to be applied to key decisions.

Implementation of actions and tasks in support of this recommendation will be managed by a team of Workgroup members led by the USGS within the Department of Interior.

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

Task Number	Task	Projected Completion
1	Provide a report to the Secretary of the Interior on approaches and options that might be implemented by USGS and Interior leadership in order to sustain and enhance water monitoring and related science	Summer 2013
2	Complete review and publish National Climate Assessment Water Resources chapter	Fall
3	Produce a summary report on Section 9506 agency activities	Winter 2013

Task Details:

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

Number	Task	Projected Completion
1	Update precipitation intensity-duration-frequency (IDF) statistics to improve water resource management	Ongoing
2	Explore options to further research on how climate change will affect flooding in communities across the country	Ongoing

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Task Details:

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

Task Number	Task	Projected Completion
1	Continue waterborne disease capacity grant funding in Arizona, Florida, Ohio, South Carolina, Washington, New Hampshire, Louisiana, and Maine	Ongoing
2	Further work in the Great Lakes states building waterborne disease detection capacity by supporting Council of State and Territorial Epidemiologists fellows in each state	Ongoing

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

Task Number	Task	Projected Completion
1	Plan additional steps to better share LiDAR mapping information	Ongoing
2	Use LiDAR data from before and after Hurricane Sandy to improve NOAA and FEMA surge forecast models. Reports forthcoming.	

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

Task Number	Task	Projected Completion
1	Continue progress in digitizing maps showing locations of wetlands	Ongoing

Task Details:

Additional resources are needed to provide wetland coverage for the continental United States and Puerto Rico as well as convert existing hard copy maps in Alaska to digital data that can be used in GIS analysis. The cost of this remaining work is about \$12 million dollars. This doesn't include any new mapping in Alaska.

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. In order to maintain consistency with other approved Federal guidelines and documents, the Workgroup adopted the Intergovernmental Panel on Climate Change (IPCC) definition of vulnerability from its fourth assessment:

Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, the sensitivity and adaptive capacity of that system.

Risk can simply be defined as: *Exposure to the chance of injury or loss; a hazard or dangerous choice.* Risk assessment can be defined as:

Risk assessment characterizes the nature and magnitude of risks to a physical system from stressors that may be present in the environment. It represents the determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat (also called hazard). Risk managers use this information to help them decide how to protect a system from stressors.

Risk assessments can generally be conducted two different ways – utilizing a top-down approach or utilizing a bottom-up approach. A top-down risk assessment utilizes global circulation models and other globally and nationally derived data and scenarios and applies them to regions by downscaling. A bottom-up risk assessment utilizes regional and local knowledge, data, and information to determine the risk of an area to identified hazards.

Federal agencies have made substantial investments in the development of climate change assessment tools related to water resources. Some examples include:

- Environmental Protection Agency (EPA) work to modify existing risk assessment methodologies (e.g.; natural disaster and terrorism) for drinking water and wastewater utility owners and operators to consider climate change impacts, including the Climate Resilience Evaluation and Awareness Tool (CREAT) (see Appendix J);
- The July 30, 2010 Memorandum of Understanding between the Department of Commerce and the Department of Interior to establish a framework to enable better decisions and policies relating to understanding climate change, assessing vulnerability, and improving science, data, and technical assistance;

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- National Oceanic and Atmospheric Administration’s (NOAA) work to expand regional drought early warning information system pilot projects under the National Integrated Drought Information System (NIDIS);
- NOAA Vulnerability Assessment Techniques and Applications (VATA) for coastal communities and the joint training on vulnerability assessment of fish and wildlife and other natural resources for managers (see Appendix J); and
- US Army Corps of Engineers’ (USACE) Dam Safety Action Classification tool (see Appendix J).

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, the more attention will need to be given in the future to vulnerability assessment tools for ecosystems and the services they provide.

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

Task Number	Task	Projected Completion
1	Publish guidance related to appropriate or best use of particular downscaling approaches for climate information based on user requirements	Fall

Task Details:

A barrier to expanded use of climate change vulnerability assessment tools is the limitations of modeled projections of long-term changes in water resource conditions expected as a result of warmer temperatures. Although these projections are available at large scales, there is a need to “downscale” the model outputs so that they are more relevant to the facilities for which assessments are being conducted. Many Federal agencies develop “downscaled” modeled outputs. Likewise, many decision-makers are not aware of these activities or are unsure of which output to use. As part of the National Climate Assessment, a compendium of peer-reviewed uses of downscaled climate information will be developed and published.

Supporting Action 9: Develop a Federal internet portal to provide information on water resources and climate change.

Task Number	Task	Projected Completion
1	Federal internet portal will be developed by the USACE through their Federal Toolbox for Integrated Water Resources Management (IWRM)	March 2013
2	Agencies should provide information to the portal using data standards	On-going

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	and mechanisms that have been agreed upon nationally and internationally	
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Task Details:

The National Integrated Drought Information System (NIDIS) has demonstrated the value of a single Federal government portal. This Federal internet portal will be developed by the USACE through their Federal Toolbox for Integrated Water Resources Management (IWRM). The “Toolbox” provides a comprehensive hub of information and capabilities through a common data portal across Federal agencies for the nation. It provides State, Tribes, Federal, regional, and local water resources agencies with a system to readily access Federal water resources information, planning assistance, and capabilities to optimize the planning and management of water resources through an IWRM approach. The toolbox can take 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 working with collaborators such as UC Berkeley and UC Santa Clara, the Pacific Institute, Scripps Institute, USGS, and Google. The Toolbox should also take advantage of other climate information collaboration activities such as the NOAA Climate Portal. Agencies should provide information to the portal using data standards and mechanisms that have been agreed upon nationally and internationally. An example is leveraging GEO standards for data interchange and interoperability. This includes archiving climate-related information in netCDF format and using OGC-compliant web services for delivery of the information.

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

Task Number	Task	Projected Completion
1	Conduct an index assessment on junior water rights holders on the Colorado River when a compact call is made to upstream entities to demand water downstream.	Ongoing
2	Utilize results of this index assessment to set priorities for implementation of climate adaptation responses	Ongoing

Task Details:

An index of vulnerability should be developed for a major category of water facilities or water managers. Through NIDIS, current efforts are underway to determine the impact on junior water rights holders on the Colorado River when a compact call is made to upstream entities to

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demand water downstream. These junior rights holders represent a wide range of industry and agriculture and are vulnerable to reduced water availability, especially during a “call”. The results of this index assessment can be used to set priorities for implementation of climate adaptation responses. This pilot index should serve as a proof of concept for developing vulnerability indices to support assessments by a range of other water facilities and sectors. This work should be conducted in coordination with complementary vulnerability assessment activities, such as those identified in the MOU between DOI and DOC/NOAA, and EPA's Climate Ready Water Utilities efforts to support the water sector. Over the long term, this could support development of a database of vulnerable infrastructure to support prioritization for infrastructure investments.

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

Task Number	Task	Projected Completion
1	Actions under the Climate Ready Utilities (CRWU) initiative for drinking water and wastewater utilities will include: <ul style="list-style-type: none"> ○ Promote version 2.0 of the Climate Resilience Evaluation and Awareness Tool (CREAT) with training module(s) ○ Conduct additional work with Climate Ready Estuaries program ○ Expand resources in the CRWU Toolbox 	Fall Ongoing Spring/Fall
2	Support Climate Ready Estuaries in National Estuary Program estuaries including: <ul style="list-style-type: none"> ○ Provide an annual progress report of CRE activities and National Estuary Program adaptation projects ○ Finalize a CRE workbook for conducting vulnerability assessments in coastal watersheds and utilize ○ Initiate CRE climate change adaptation projects with new National Estuary Program partners 	Summer Summer/Fall Summer
3	Develop list of programs that are candidates for application of the “Climate Ready” designation	Ongoing

Task Details:

There are several important efforts now underway to support vulnerability assessments, For example, EPA has successfully developed the Climate Ready Estuaries Program and is in the process of developing a Climate Ready Water Utilities program. Both programs provide climate

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assessment tools tailored to the needs of a particular water institution or program and have the potential to promote effective climate impact assessments and to establish public recognition of climate adaptation efforts. The Climate Ready Estuaries Program continues to develop a climate change Adaptation Planning Workbook what will provide a methodology for preparing vulnerability assessments and action plans. In addition, the USBR report addressing climate change issues in western Reclamation basins provide useful information for assessing climate vulnerability, including downscaled impacts information. Existing programs of this type should be expanded and similar approaches should be adapted by other Federal agencies where appropriate and be applied to irrigation districts, power plants, ports, and dams and reservoirs. Vulnerability assessments can also be used to identify those aquatic species and habitats most likely to be in need of conservation actions as a result of climate change.

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

Task Number	Task	Projected Completion
1	Watershed vulnerability assessments will be integrated with assessments of the vulnerability of terrestrial resources, social, and economic attributes and used to guide adaptation strategies in forest planning	Summer

Task Details:

The U.S. Department of Agriculture’s (USDA) Forest Service is implementing assessments of the condition of forested watersheds in each of the agency regions. These condition assessments will be expanded into assessments of the vulnerability of watersheds and aquatic systems to climate and non-climate stresses in multiple future scenarios. The watershed vulnerability assessments will be integrated with assessments of the vulnerability of terrestrial resources, social, and economic attributes and used to guide adaptation strategies in forest planning.

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

Task Number	Task	Projected Completion
1	Recommend actions to promote access to climate change and water data	Summer

Task Details:

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Data and information should be available to decision-makers, researchers, and the public freely and openly and in formats that readily fit the needs of users. In 2012, NOAA’s National Climatic Data Center began moving toward providing free access to all climate data obtained online via the internet. In 2013, this activity should be completed as additional datasets become available via the internet and as existing customers are transitioned into the new model. Cost recovery, is still in place for data requiring manual intervention and for official or certified data.

Recommendation 4: Expand Water Use Efficiency (WUE)

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.

Implementation of actions and tasks in support of this recommendation will be managed by a team of Workgroup members led by the Office of Water within the EPA. Team members will include staff from EPA, USDA/NRCS, USGS, USBR, USACE, Army, DOE, NIDIS, and other agencies as they are identified. Tasks under Actions 14 and 16 are aimed at developing ongoing relationships and processes to support a long-term effort on improving federal coordination and information sharing on water use efficiency.

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

Task Number	Task	Projected Completion
1	For a major water use sector (e.g., agriculture, energy, municipal), identify policy gaps (e.g., science, policy, technology) and other barriers that hinder the ability to collect data that would facilitate assessment of water use, efficiency, and development of metrics.	Summer
2	Develop an initial strategy that, while recognizing gaps, would help to describe how to identify consistent metrics in a major water use sector. This initial strategy could be used as a template to address other sectors.	Summer
3	Develop report describing findings and recommended actions for further efforts.	Late fall

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Task Details:

The identification of robust, consistent metrics is hindered by gaps in science, policy, and technology. These gaps vary according to sector or sub-sector and strategies to address them will likewise vary. The team will focus efforts in 2013 on identifying information that is available and the gaps that need to be filled to support identification of metrics for one or more sectors. The workgroup members will coordinate as appropriate with other related efforts and will also seek to reach out to interested stakeholders and appropriate forums in which to discuss metrics.

Supporting Action 15: Develop Principles and Guidelines and NEPA Guidance (CEQ is responsible for this Action)

Task Number	Task	Projected Completion
1	Publish Principles and Requirements making water use efficiency an explicit consideration	Spring
2	Release draft implementation guidance	Spring
3	NEPA Greenhouse Gas Guidance Draft and Final	TBD

Task Details:

Draft implementation guidance will support agency efforts to develop agency specific implementation.

Supporting Action 16: Enhance coordination among Federal water efficiency programs and improve program effectiveness, including creating a “toolbox” of key practices

Task Number	Task	Projected Completion
1	Build interagency team working on water use efficiency.	Ongoing
2	Update inventory of key Federal programs that advance water efficiency.	Spring
3	Initiate effort to develop inventory of Federal R&D projects that advance water efficiency and identify gaps, and future research needs.	Summer
4	Create process to regularly update the WaterSMART Clearinghouse and Federal Support Toolbox.	Fall
5	Team develops a. recommendations on how to strengthen coordination and adoption of “key practices” b. a proposed process to maintain information about WUE programs/ projects	Late fall

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Task Details:

An interagency technical team formed during development of the NAP will continue to be supplemented by representatives from other agencies. Initial efforts will focus on building relationships and understanding activities being carried out across agencies. The team will update earlier efforts to inventory WUE activities and add a component that focuses more specifically on R&D efforts. To avoid duplication of resources, the team will work to integrate its findings into the existing WaterSMART Clearinghouse managed by Reclamation and the pending Federal Support Toolbox being developed by USACE.

**Recommendation 5:
Support Integrated Water Resources Management (IWRM)**

Management of the risks from a changing climate should not occur in isolation and needs to 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 need to be incorporated.

Implementation of actions and tasks in support of this recommendation will be managed by a team of Workgroup members led by the Army Corps of Engineers within the Department of Defense.

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 issues

Task Number	Task	Projected Completion
1	Draft definition and description of IWRM	Completed 2012
3	Outreach to States, river basin commissions, etc.	In progress
4	Draft white paper on IWRM and climate change	March
5	Review and revision of white paper	September

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6	Draft practices on including IWRM and climate change in Interstate and State planning programs	September
7	Selection of three IWRM and climate change pilot studies	In progress

Task Details:

“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 issues.” We are using the definition of IWRM from the report *Building Strong Collaborative Relationships for a Sustainable Water Resources Future National Report Responding to National Water Resources Challenges* (U.S. Army Corps of Engineers, 2010). The report defines IWRM as:

- Sustainable outcomes—the practice of making decisions and taking coordinated actions for outcomes and benefits that use or affect current economic, environmental and quality of life resources conditions in ways that preserve these resources for future generations.
- Collaborative planning—a process that avails collaboration to secure the input of all stakeholders about their interests and needs.
- A systems perspective—a systems approach that arrays interests and needs as input variables, modeling a system of interdependent variables with multiple outputs.
- A geographic context—a geographic perspective that examines who is doing what where at a broad geographic scale, e.g., a river basin, watershed or coastal zone.
- Balanced aims—a process that seeks to balance multiple objectives as diverse desired outputs producing multiple benefits.

The implementation goals for Action 17 for 2013 are 1) Completion of the report on governance issues and review of Federal and State laws and authorities affecting water resources management and climate change adaptation, 2) Summary of lessons learned from the IWRM pilot studies, and 3) A summary report on IWRM practices and climate change adaptation. Future work: The reports could provide a basis for further outreach to States, Tribes, river basin commissions, and interstate bodies to better incorporate IWRM into water resources planning and climate change adaptation.

Supporting Action 18: Revise Federal water project planning standards to address climate change (CEQ is responsible for this Action)

Task Number	Task	Projected Completion
1	Publish Principles and Requirements that more explicitly consider climate change	Fall
2	Release draft implementation guidance	Fall

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Task Details:

Draft implementation guidance will support agency efforts to develop agency specific implementation.

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

Task Number	Task	Projected Completion
1	Review of State Hazard Mitigation Plans	Completed 2012
2	Report from contractors on SHMPs	Completed 2012
3	Literature review on flood risk and drought risk management best practices	July
4	Discussion with experts on possible best practices	September
5	Survey of State officials , Report from contractors on survey	March, April
6	Team develops inventory of “best practices” for flood/drought management planning	August
7	Team develops recommendations for actions to strengthen coordination and adopt “best practices”	August

Task Details:

“Working with States, review flood risk management planning and drought management planning to identify ‘best practices’ to prepare for hydrologic extremes in a changing climate.”

Action 19 in the NAP stated, “As a first step in strengthening coordination among Federal, State, Tribal, and local agencies on drought and flood issues, Federal agencies should work closely with States to review flood and drought planning activities.” A goal of action 19 is to identify “best practices” that can be shared with others, including: (1) the degree of coordination between flood and drought management; (2) cooperative efforts with Federal agencies (e.g., Silver Jackets); (3) the extent to which new information concerning hydrologic variations is reflected in state hazard mitigation plans; and (4) identification of innovative or especially useful planning or coordination mechanisms.”

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The survey of State Hazard Mitigation Officials (SHMO) and State Floodplain Management Officials should be completed by March 2013. The contractors will present the results of the survey in a draft report that should be completed by late April 2013. It is likely that New Jersey and New York, two states that were badly affected by Sandy, may be missing from the survey due to the increased workload for State flood officials. If funding and time permit, these states will be contacted later in the year for their input.

After the survey, a team from FEMA and USACE will summarize the report on the SHMPs and the survey of State officials and present the report to the Water Resources and Climate Change Adaptation Work Group. The current intent is to publish this report as a joint USACE-FEMA report. We intend to share the report with the Federal Interagency Floodplain Management Task Force (FIFTF).

Future work: The report can be used to facilitate further collaboration among Federal agencies and States on flood risk management with a changing climate.

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

Task Number	Task	Projected Completion
1	Technical team develops inventory of existing “adaptive management” practices and policies	Completed 2012
2	Technical team develops draft recommendations for wider application of adaptive management strategies to IWRM team	Completed 2012
3	Revise report based on agency review and publish as an interagency document	May

Task Details:

“Develop benchmarks for incorporating adaptive management into water project designs, operational procedures, and planning strategies.”

An Interagency Technical Team has written two reports Action 20. Agencies that participate on this team include USACE, DOI (USGS representing DOI), USDA (NRCS and Forest Service), EPA, and NOAA. Team members are listed in the above table.

The two reports are

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"Benchmarks for Incorporating Adaptive Management into Water Project Designs, Operational Procedures, and Planning Strategies"

Report I: "Federal Agency Inventory of Adaptive Management Practices and Policies"

Report II: "Recommendations for Federal Agency Implementation of Adaptive Management for Climate Change Adaptation."

Report 1 has completed a first round of agency review. The review period for Report 2 will be extended to allow additional comments. The goals for 2013 will be to 1) complete each participating agency's review process, 2) revise the papers based on agency review comments, and 3) publish the reports as an interagency document with logos from each participating agency.

Future work: The reports could be used to promote adaptive management policies by Federal agencies.

**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 recognize 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 will be managed by a team of Workgroup members led by individual agencies as identified in the tables below.

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 (Interagency project lead)

Task Number	Task	Projected Completion
1	Offer pilot residence course, "Hydrologic Impacts under Climate Change" (HIUCC) January 15-17, 2013	FY13Q2
2	Offer pilot residence course, "Crop Irrigation Requirements under Climate Change" March 5-7, 2013	FY13Q2

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3	Develop curricula plan for two additional impact areas, sedimentation/river hydraulics and ecosystems	FY13Q3
4	Implement curriculum plan for one of the two subject areas of Task 1	FY13Q1
5	Pilot the conversion of the HIUCC residence course into a virtual course to expand course delivery capacity	FY13Q1
6	Develop post-pilot sustainability planning including business model development, course maintenance, and development of new resources.	FY13Q1

Task Details:

The CCAWWG report *“Addressing Climate Change in Long-Term Water Resources Planning and Management – User Needs for Improving Tools and Information”* is being used to help comprehensively frame the range of relevant training topics related to the response of water and other natural systems to a changing climate(e.g. watershed hydrology, ecosystems, land cover, water quality, crop water demands, sedimentation and river hydraulics) (<http://www.ccaawwg.us/index.php/activities/addressing-climate-change-in-long-term-water-resources-planning-and-management>, pages 46-56)

In 2013, the team will provide the pilot training courses to a broad audience of practicing professionals from the federal/non-federal water and water related natural resources community of practice. During this efforts, the participation of the US Fish and Wildlife Service and other natural resource organizations will be key to forming collaborative efforts and leveraging capabilities with the natural resources community of practice.

Results and feedback from the pilot course offerings will be used to:

- gauge the success of the training
- identify what works well and refine what needs to be improved.
- better understand the scope of training needs and interests of the broader water and water related natural resources community of practice.

Year 2013 activities will inform a proposed a long-term, sustainable training program capable of providing professional development for the topics identified above. The long-term plan will include:

- Proposed scope
- Level of effort
- Identify collaborators
- Identify collaborator contributed/leveraged capability

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- A strategy to add new modules and to update training materials and to provide a continuing education process to keep practitioners informed of most current understanding and application approaches.
- Annual costs and business model options that ensure annual program costs are funded.

Development of this proposal will include engagement with interested organizations who would facilitate long-term implementation of the training platform.

Supporting Action 22: Focus existing youth outreach programs on climate change and water issues (USDA is leading this action)

Task Number	Task	Projected Completion
1	Review the results of the Mapping the Future Project and use findings to improve water-related youth programming	Summer
2	Advance the ThinkWater Movement	Ongoing
3	Incorporate climate issues into water-related youth education programs	Spring

Task Details:

The Mapping the Future Project provided a summary and analysis of past and current youth-water programming, including an evaluation of strengths and weaknesses and articulation of the dominant approach and goals. The findings will be reviewed and incorporated into future youth programming efforts.

The ThinkWater Movement will continue to enhance engagement around water issues. Campaign components will include a website, a full feature film, and PSAs to spark interest and the ThinkWater movement. The education components will include a teacher/leader tutorial to illustrate how the ThinkWater curriculum can add value to an existing Science Technology Engineering Mathematics (STEM), social studies, language arts, or visual arts lesson plan.

These and other existing youth outreach programs such as USDA 4H and Project WET (Water Education for Teachers) should be expanded to include climate impacts on water resources.

Supporting Action 23: Engage Water Resources Research Institutes at land grant colleges in climate change adaptation research (USGS is leading this action)

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Task Number	Task	Projected Completion
1	Clarify grant guidance to more clearly address climate change issues.	Ongoing
2	Determine what options are available given current funding uncertainty.	Ongoing

Task Details:

The Institutes are developing a summary of their climate change-related research to assist with Task 1.

Once clarity has been provided on what funds will be available to this program, work will continue.

Supporting Action 24: Increase graduate fellowships in water management and climate change (CEQ/NOAA are leading this action)

Task Number	Task	Projected Completion
1	Encourage participation from appropriate candidates in the UCAR Advanced Study Program in Atmospheric, Earth System, Environmental, and Social Sciences	Ongoing
2	Encourage participation from appropriate candidates in the UCAR postdocs Applying Climate Expertise Fellowship Program	Ongoing

Task Details:

Support fellowships for graduate students with an interest in climate change and water research or management issues that include an avenue to Federal employment. Federal agencies could look to trained graduate students as a recruitment mechanism to meet long term staffing needs related to water resources research and management. Two mechanisms currently addressing this recommendation are the University Center for Atmospheric Research’s (UCAR) Advanced Study Program in Atmospheric, Earth System, Environmental, and Social Sciences and their postdoctoral Applying Climate Expertise Fellowship Program.