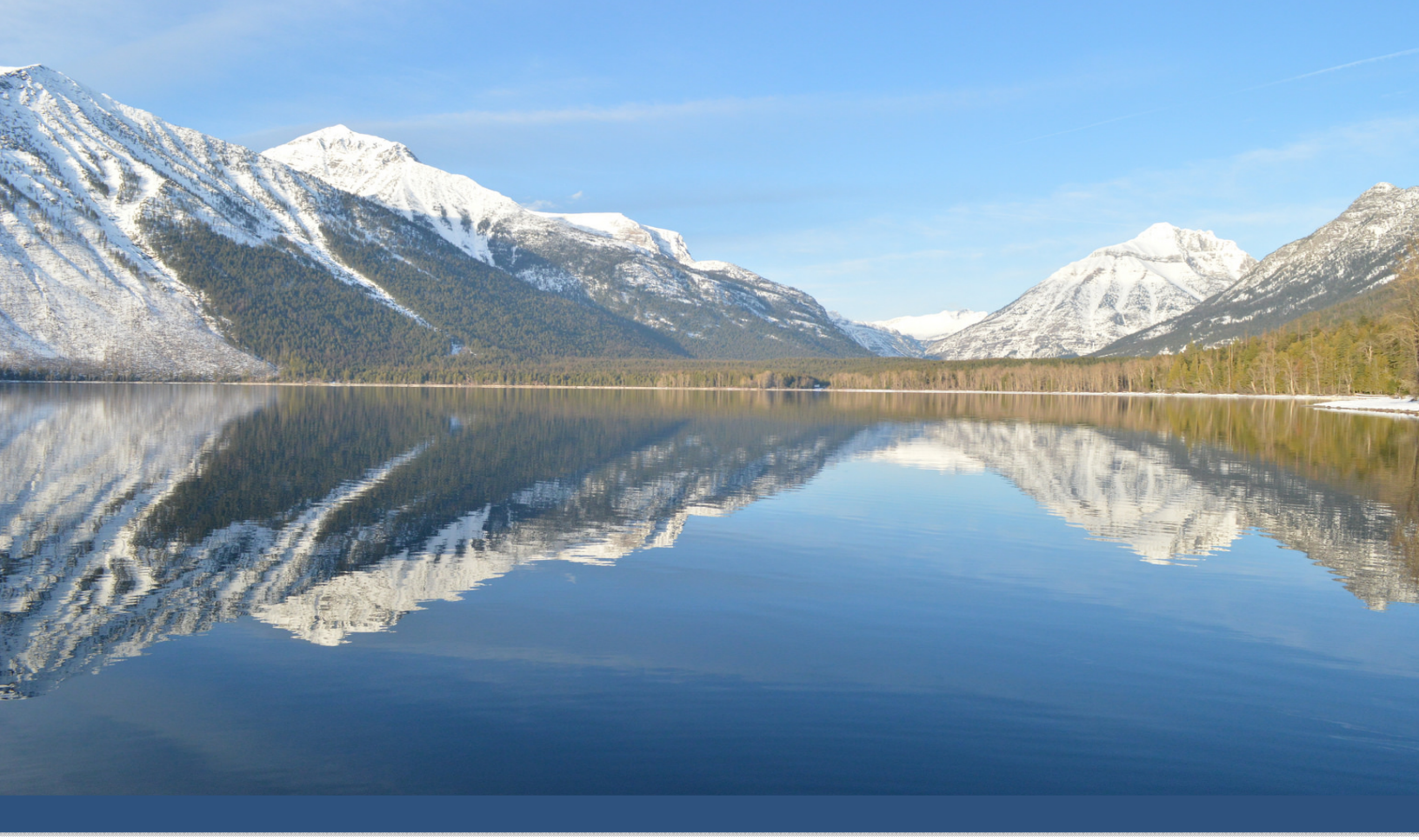

# Department of the Interior
# Climate Change Adaptation Plan

# 2014

Cover photo: Lake McDonald, Glacier National Park, January 2014

# Department of the Interior Climate Change Adaptation Plan

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## I. Overview

In 1850, Glacier National Park had more than 150 glaciers. Today, the park has only 25 glaciers – an 83 percent reduction in 164 years. Studies show that western Montana, where the park is located, is experiencing warmer summers and reduced winter snowpack. In addition, ancient patches of unglaciated snow and ice in the park are melting and receding at unprecedented rates. Since 1900, the average temperature for the Park region has increased by about 2.4°F. Experts predict that all of the park's glaciers could be gone by as early as 2030.

Climate change will continue to have significant consequences for the ecology of Glacier National Park, including impacts to high-elevation habitats such as the alpine meadows, likely impacts to wildlife such as bull trout, and a likely increase in invasive species. Reduced water storage in the snowpack will likely impact regional water supplies, agriculture and wildland fire management. Wildland fires may be larger and occur more frequently due to reduced moisture and hotter days. Climate change also threatens the ice patches that protect ancient cultural materials of the Blackfeet, Salish, Pend d'Oreille, and Kootenai Native American Tribes.[1]

The climate change impacts at Glacier National Park are not unique. Throughout the country, climate change is affecting the balance of natural conditions that supports our communities and ecosystems. As noted in the third National Climate Assessment, climate change is expected to continue even with significant greenhouse gas emissions reductions.[2] At the Department of the Interior (Department, DOI), given the fundamental risk and ongoing impacts to many of the public lands, facilities, and resources for which we have responsibility, we are similarly situated to many communities affected by climate change. Accordingly, we recognize the importance of our mission in preparing the Nation for the impacts of climate change. This Climate Change Adaptation Plan (Plan) demonstrates our commitment to action and highlights ways that we will address these challenges.

Adaptation is the adjustments that society or ecosystems make to limit negative effects of climate change.[3] The Department's approach to adaptation focuses on increasing the *resilience* of the Department's assets, program activities, and mission responsibilities in response to climate vulnerabilities. Resilience is the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions. [4]

While the Department's 2013 Climate Change Adaptation Plan focused on assessing the Department's climate change related vulnerabilities, the 2014 Plan focuses more on the Department's work to address climate change through implementation of Executive Order 13653 and the Department's Climate Change Adaptation Policy (523 DM 1). Section II of this plan explains the Department's official Climate Change Adaptation Policy and provides additional guiding principles. Section III summarizes the Department's efforts to address climate related risks. Section IV demonstrates the Department's efforts to modernize programs to support climate resilience investment.

***The Department of the Interior's Response to Climate Change***

The Department's areas of responsibility are critical to the Nation's economic and social well-being. The Department manages 20 percent of the Nation's lands; supplies water and hydropower in 17 western states; conserves plants, wildlife and historic and cultural resources; provides geological, hydrological, and biological science; fulfills trust responsibilities to American Indians and Alaska Natives; provides financial and technical assistance for tribes as well as insular areas such as Guam and the U.S. Virgin Islands; and conducts leasing for renewable and non-renewable energy development on public lands and the Outer Continental Shelf. This broad spectrum of activities is managed by the Department's nearly 70,500 employees and more than 300,000 volunteers located in approximately 2,400 locations spanning 12 time zones.

In FY 2013, The Department's lands hosted over 400 million recreation visits, which is associated with $25 billion in estimated value-added, supporting about 355,000 jobs. Total FY 2013 production and activities on the Department's lands were associated with nearly $200 billion in estimated value added, supporting an estimated 2 million jobs. Given the Department's vast responsibilities, effectively responding to the impacts of climate change is fundamentally important to the interests of the American people.

As this Plan demonstrates, the Department is taking numerous actions to respond to climate change and prepare for future impacts. Climate change is predicted to have widespread impacts on the nation's natural resources, including sea level rise, significant wildlife habitat changes, increased risk of wildland fire and alterations to fresh water availability – all of which will have serious implications for the Department's operations and management responsibilities. A dedicated focus on increasing the resilience of resources and operations will help the Department better withstand these impacts in the pursuit of its mission.

It should also be clear that the Department's approach on climate change adaptation is evolving. Science is, and will continue to be, our North Star in the ongoing process of assessing impacts and developing strategies. The individual bureaus within the Department will maintain their principle role of identifying risks to missions and programs while the Department will continue to work closely with the bureaus in supporting efforts to develop cross-cutting priorities to effectively respond. These priorities include:

- Investing in research and supplying critical data and information;
- Working with communities that rely on the Department's lands, facilities, and resources to prepare for climate change impacts and develop measures to reduce future risks; and
- Implementing actions that highlight the benefits of new technologies, innovative resource management, and infrastructure improvements that will improve the resiliency of our communities and landscapes.

The Plan that follows highlights the challenges posed by climate change and provides and an important update to the Department's efforts to identify priorities that are necessary to construct a comprehensive framework that meets this challenge head-on. The Department looks forward to working with all interested parties in this critical and ongoing effort.

### *Policy and Guidance*

The Department's Climate Change Adaptation Policy (523 DM 1) was issued in December 2012 in response to the need to prepare for the impacts of climate change.[5] The Policy articulates and formalizes the Departmental approach to climate change adaptation and provides guidance to bureaus and offices for addressing climate change impacts on the Department's mission, programs, operations, and personnel. The new policy also establishes clear Departmental leadership responsibilities for climate change adaptation implementation.

In November 2013, President Obama signed Executive Order 13653,[6] which directs federal agencies to prepare for the impacts of climate change. Climate preparedness is one of three core elements of the President's Climate Action Plan. The Department will work with the White House and federal agency partners throughout 2014 and beyond to implement Executive Order 13653. The Department is also committed to several important interagency plans, including the *National Action Plan: Priorities for Managing Freshwater Resources in a Changing Climate*,[7] released October 28, 2011; the *National Fish, Wildlife and Plants Climate Adaptation Strategy*,[8] released March 26, 2013; and the *National Ocean Policy Implementation Plan*,[9] released April 16, 2013. The Department also led the development of an interagency approach, called Integrated Arctic Management, for coping with the rapid and devastating changes taking place in the U.S. Arctic.[10]

Several of the Department's bureaus have developed or are developing bureau climate change adaptation policies and strategies. Examples of existing bureau policies and strategies include the Bureau of Indian Affairs Climate Change Adaptation Plan (2013), the National Park Service Climate Change Response Strategy (2010), and the U.S. Fish and Wildlife Service Climate Change Strategic Plan (2010).

### *Identification and Assessment of Climate Change Related Impacts*

As highlighted in the third National Climate Assessment, climate change is happening now. Moreover, it is not occurring in isolation but is superimposed on a number of other stresses that are combining to create new challenges as described below. The Department's bureaus continue to actively assess climate related risks to their missions, programs, and activities. The Department will continue to work with partners to use the best available climate science, including the third National Climate Assessment, to develop, apply, and learn from more comprehensive and detailed vulnerability assessments. Vulnerability assessments are being used in conjunction with analyses of non-climate stressors to assess the overall vulnerability of resources and plan for needed management activities.

Vulnerabilities to climate change impacts vary widely across the Department's mission areas. Bureaus' climate change adaptation priorities are based on the particular vulnerabilities of their mission and assets. The following is a summary of the Department's climate change

vulnerabilities that threaten the ability of the Department to accomplish its mission, operations and programs.

*Natural and Cultural Resources*

The Department's key mission areas under this category are protecting natural, cultural, and heritage resources; improving land and water health; sustaining fish, wildlife, and plant species; providing critical water supplies and renewable hydropower; providing recreation and visitor experiences; and managing the impacts of wildland fire. At a general level, some major potential impacts (risks and opportunities) to these resources associated with climate change include:

- Increased temperature and evaporation may lead to increased numbers of large wildland fires due to decreased fuel moisture and increased lightning activity; longer wildland fire seasons; earlier spring melt of snowpack; loss of glaciers, melting of permafrost, and earlier melt to loss of Arctic sea ice; changing range for invasive species; and increased air and water temperatures that may stress, extirpate, and otherwise affect some species and cultural practices, and damage or destroy cultural and heritage resources. Increased temperature and evaporation will also reduce seasonal snow storage for water resources management, and will cause increased evaporation and transpiration that may affect public water supply and demand, lakes, streams, and cold water fisheries, and may stress timber and forage species. Rising ocean temperatures will also impact ocean ecosystems, including more frequent mass bleaching and infectious disease outbreaks on coral reefs.

- Changes in precipitation patterns may lead to dramatic changes in moisture and stream flow that impact species, ecosystems, and infrastructure, as well as lead to more severe wildland fire seasons that may alter ecosystems and threaten species and cultural resources. Changes in precipitation patterns may cause impacts to:

  - Water resources and water quality (e.g., flooding in some areas, water scarcity due to prolonged droughts);
  - Channels and stream banks, which may change erosion rates and raise stream beds which in turn changes floodplains;
  - Stream flow that affects water supply and hydropower production (e.g., via changes in reservoir levels, low summer flow levels, and dewatering in some areas);
  - Water infrastructure (e.g., droughts may reduce water levels, severe weather events may damage infrastructure);

**Davis Dam, Nevada and Arizona**

- Spawning and recruitment of native fish;
- Livestock forage, wood products, tree and forage species distributions;
- Restoration of areas used for production of energy and minerals;
- Archaeological sites and sacred burial grounds; and
- Access to DOI lands for economic use and public enjoyment.

- Sea level rise and higher storm surge may lead to inundation of, and damage to, coastal ecosystems and cultural and heritage resources.

Bureau examples

**U.S. Fish and Wildlife Service**: Climate impacts have been linked to observed changes in certain fish and wildlife populations related to habitat loss, range shifting, population declines, changes in timing of life history events, new migration patterns, and insect and disease outbreaks. It is clear that the lands and the species managed by the Service are vulnerable to these ecological changes.

Climate is one of the prime determinants of the distribution and abundance of species, and range shifting is of particular concern to the agency. As climatic changes are now occurring more rapidly than in the past, and confounding factors such as habitat fragmentation and the spread of invasive species are further hindering species' ability to adapt through range shifts, genetic changes, or other means, biologists are expecting profound impacts on the distribution and abundance of many species by the end of this century, heightening the risk of extinction for some. These shifts will likely affect the species present on national wildlife refuges, and will present challenges for the Service in continuing to maintain its trust species for the continuing benefit of people.

**Bureau of Land Management**: Ecological changes will have a significant impact on the productivity and diversity of the public lands, on public land users and on communities dependent on public lands. There will be changes in the composition of native plant communities, more uncertainty in sustainable forage production, and less water for fish, wildlife, domestic livestock, wild horses and burros. Furthermore, there will be less water available for energy production and increased competition for domestic water supplies. Extreme weather events and, in Alaska, permafrost thawing may adversely affect the infrastructure for energy and minerals production and transport and impact the traditional way of life for the Alaska natives. Additionally, it will likely become more difficult to reclaim land disturbed by energy and mineral extraction and other human activities as climate change impacts alter underlying natural conditions.

**Bureau of Reclamation**: Temperature increases have resulted in decreased snowpack, differences in the timing and volume of spring runoff, and an increase in peak flows for some western U.S. basins. The impacts to snowpack and runoff affect the timing and availability of water supplies. Warming is also expected to increase agricultural water demands and affect the seasonal demand for hydropower electricity. Longer-term and more frequent droughts and larger and more numerous floods are also projected. More extreme variations in climate make it more difficult to meet competing demands for water, increasing the

potential for conflicts. Many areas of the country are already facing severe water shortages that are projected to worsen with climate change. In the Colorado River Basin, for example, the years 2000 to 2013 represent the worst multi-year drought in approximately 100 years of our measured record, which dates back to 1906.

**National Park Service**: Climate change is now affecting, and will increasingly affect the ability of the NPS to conserve park resources in an "unimpaired" condition. In some cases, climate change will fundamentally alter iconic features or resources of parks (e.g., potential loss of glaciers from Glacier National Park, and Joshua trees from Joshua Tree National Park). In other locations, effects of climate change may ultimately threaten particular parks as a whole (e.g., inundation of low-lying coastal parks due to sea level rise, resulting in the loss of significant historical and cultural features, as well as outstanding natural resource values, habitat for threatened and endangered species, and recreation areas for park visitors.

**Hurricane Sandy Impacts on Liberty Island**

**U.S. Geological Survey:** Many of the climate change impacts mentioned above are the subject of completed or ongoing vulnerability assessments intended to inform climate change adaptation planning. To date, there is no available inventory of vulnerability assessments conducted in specific regions or on specific resources; this lack increases the likelihood that new assessments may be launched without knowledge of relevant ongoing or completed assessments. The U.S. Geological Survey is leading the development of an online, public Interagency Climate Change Vulnerability Assessment Registry so that existing vulnerability assessments may more readily be used to inform work across organizations, thereby increasing the value of each assessment. Partners in this effort include a large group of Federal and non-Federal (tribal, state, and NGO) organizations. The online registry is expected to launch early in FY 2015.

*People and Communities*

With responsibility for about 70,500 employees and more than 300,000 volunteers, service to 1.7 million American Indians and Alaska Natives, as host to about 400 million visitors each year, and as a source of electricity, water and other natural resources to significant sectors of the American economy and to communities adjacent to DOI-managed lands, the Department must understand and address the impacts of climate change on people. Much of the human activity of concern to the Department occurs outdoors, in places where climate change impacts will be felt

most acutely. The Department is also responsible for advancing government-to-government trust relationships with American Indians and Alaska Natives and honoring commitments to insular areas.[11] With respect to these responsibilities, vulnerabilities include:

- Changes in temperature and precipitation patterns may result in changes in the geographic range and incidence of diseases and health conditions affecting humans;

- Changes in frequency and intensity of weather-related events, such as heat-waves, precipitation events, and floods exacerbated by climate change may put lives, livelihoods, and homes and businesses at risk; and

- These impacts, as well as others such as sea level rise and higher storm surge may affect employee, volunteer, and visitor safety, and recreational opportunities and experiences, with resulting impacts on local employment and economies.

- Increased temperature would cause:

    - Changes in the incidence of heat-related illnesses and deaths and, in combination with changes in cloud-cover, may affect the incidence of adverse health outcomes related to poor air quality; and
    - Melting permafrost and reduced sea ice, threatening livelihoods of Alaska Natives.

- Sea level rise and higher storm surge will lead to inundation of and damage to shore ecosystems, dwellings, infrastructure, and cultural and heritage resources (inundation threatens the existence of low-lying island societies). Sea level rise and higher storm surge could ultimately result in disproportionate environmental, health, social, and economic conditions.

- Several climate change-related impacts such as drought, shortage of water supply, and increased wildfires may immediately threaten property and economic interests. Over the long-term, these impacts will likely threaten traditional ways of life and livelihoods that are tied closely to nature, such as farming and fishing, which are important to rural communities. Climate change impacts may also threaten plant and animal species of importance to native people and indigenous communities.

<u>Bureau examples</u>

**Bureau of Indian Affairs**: Like many small rural communities many tribes face infrastructure vulnerabilities due to increased storm frequency and intensity, and potential social and economic stresses from indirect climate impacts. Tribes have traditional, cultural, and spiritual ties to the land, and close relationships make them especially susceptible to impacts from climate change. Moreover, as governments, tribes manage not only their land and local ecosystems, but plan development, maintain infrastructure, address human service needs, and plan or implement emergency operations.

**National Park Service**: Visitation patterns are changing as warmer conditions enable longer "shoulder seasons" in northern latitude and mountainous parks. Visitors are able to access areas of some parks that were historically inaccessible due to ice or perennial snow cover, while other parks are experiencing dangerous heat events during traditional peak use periods. Altered use patterns, and more difficult conditions associated with weather extremes challenge the ability of individual park units to budget for additional staff to cover longer seasons, and to respond to visitor injuries, heat stroke, etc., as the frequency or intensity of climate-driven events increases. Changing visitation patterns associated with increasing temperatures and altered precipitation regimes will also affect communities surrounding parks. The need to respond to emergencies associated with health and safety for staff and the public may increasingly result in less acute but chronic issues being pushed to the "back burner" as parks respond to expectations to protect personal property, access, and services within the parks and in gateway communities.

**U.S. Fish and Wildlife Service**: Providing hunting, fishing, and outdoor recreation opportunities to the American people is a central function of the agency, and the National Wildlife Refuge System provides some of the most outstanding hunting opportunities in the country. Because climate change is affecting wildlife, there are serious ramifications to the hunting, fishing, recreational boating and wildlife viewing industries, as well as the tribes who rely on these resources for cultural and subsistence purposes. Climate change will likely have negative effects on hunting and fishing guides, boating concessionaires, beneficiaries of license revenues, and industries that support hunters and anglers.

*Infrastructure and Equipment*

The Department has significant investments in infrastructure and equipment, including buildings, dams, water delivery systems, roads, vehicles, fences, scientific labs, and equipment. These assets typically require significant investments and long-term commitments, and modifications and repairs can be costly. Climate change impacts could alter the operations, efficiency, and safety of infrastructure and equipment, making it more difficult for the Department to achieve its mission and fulfill its responsibilities. Climate change impacts on infrastructure include:

- Sea level rise and higher storm surge may damage or reduce the effectiveness of offshore and coastal infrastructure, potentially eliminating access to coastal areas, for example;

- Changes in precipitation patterns and increased temperature in some areas may impact operations of buildings, vehicles, and other equipment, and may impact the capacity for dams to supply water and generate electricity;

- Flooding may damage buildings, roads, vehicles, and other equipment and dramatically alter water supply planning and management, and access to DOI lands; and

- Changes in intensity, timing, and location of weather events may disrupt use of DOI lands, including for water management, recreation, hunting, subsistence, energy exploration and development, mineral extraction, forestry and other commercial use, and may impose different stresses on the Department's infrastructure, such as buildings, roads, and electrical systems.

Bureau examples

**Bureau of Indian Affairs**: Equipment vulnerabilities include interruptions in telecommunications and data services that support the mission critical operations or emergency management. For example, during significant weather events the employee emergency notification system is telecommunications dependent.

**Bureau of Reclamation**: Climate change impacts raise difficult questions about how best to operate Reclamation facilities to meet growing demands for water and hydropower now, and how to upgrade and maintain infrastructure to optimize operations in the future. The more extreme variations in climate will make it more difficult for Reclamation to meet competing demands for water, exacerbating tensions and increasing the potential for conflict. Increased intensity of droughts and floods also raise concerns about infrastructure safety, the resiliency of species and ecosystems to these changes, and the ability to maintain adequate levels of hydropower production.

**Bureau of Safety and Environmental Enforcement**: Extreme weather events due to climate change, such as hurricanes could damage oil and gas infrastructure on the Outer Continental Shelf thereby increasing the risk of oil spills.

**Offshore drilling platform**

***Departmental and Bureau Priorities***

As discussed above, in confronting and addressing the risks posed by a changing climate, the Department will be guided by the science to build resilience into Bureau-managed lands and resources as well as carrying out its trust responsibilities. The Department will work with its bureaus to address the threats to missions and programs. Priority actions include:

- Investing in research and supplying critical data and information;
- Working with communities that rely on the Department's lands, facilities, and resources to prepare for climate change impacts and develop measures to reduce future risks; and
- Implementing actions that highlight the benefits of new technologies, innovative resource management, and infrastructure improvements that will improve the resiliency of our communities and landscapes.

Carrying out these priorities will require that the Department continue to develop a robust policy and guidance framework, build institutional capacity to effectively address the impacts of climate change; and conserve and restore resilient landscapes through large landscape conservation planning.

As the climate changes, Department and Bureau ongoing conservation and restoration initiatives become even more critical for their added benefits in effectively addressing and mitigating climate–related impacts and increasing resiliency in communities and landscapes across the country. These landscape conservation and restoration initiatives cut across many Departmental programs and bureaus and include:

- A proposal to increase stability in funding for Wildland Fire programs that ensures necessary resources for fire suppression while improving fuels management and landscape resilience programs;

- Coastal restoration and resilience programs such as Hurricane Sandy resilience investments and Gulf of Mexico restoration;

- Large-scale restoration efforts such as those ongoing in the Florida Everglades, California's Bay-Delta, and the Great Lakes Region;

- Drought resilience actions with state and local entities through WaterSMART and related programs (e.g., California's Central Valley and Colorado River Basin); and

- A proposal to increase and provide mandatory funding for the Land & Water Conservation Fund, which is critical to build resiliency by reducing habitat fragmentation and increasing the connectivity of important habitats.

In addition, the following is a list of climate adaptation priorities identified for each of the Department's bureaus.

**Bureau of Indian Affairs**

- Supporting to Tribes to address climate change.

- Creating policy to guide climate response.

- Demonstrating regional leadership for climate response.

- Connecting Tribes and climate change communities of practice.

**Bureau of Land Management**

- Conducting vulnerability assessments.

- Strengthening existing landscape level planning efforts.

**Bureau of Ocean Energy Management**

- Obtaining scientific data to inform evaluation and decision making.

**Bureau of Reclamation**

- Comprehensive climate adaptation planning.
- Increasing water management flexibility.
- Improving infrastructure resilience.

**Bureau of Safety and Environmental Enforcement**

- Assessing impacts to Bureau of Safety and Environmental Enforcement owned facilities.
- Coordinating with the Bureau of Ocean Energy Management on climate adaptation issues.
- Assessing Bureau of Safety and Environmental Enforcement regulations and policies to determine if climate change is addressed.

**Office of Surface Mining Reclamation and Enforcement**

- Using best available science to inform restoration planning and implementation.
- Ensuring human and environmental health and safety by incorporating climate considerations into regulations and policies for coal mining and restoration.
- Using existing Office of Surface Mining, Reclamation and Enforcement programs and activities to advance climate adaptation. Programs include the Technical Innovation and Professional Services program, GeoMine, the National Mine Map Repository, and the Appalachia Regional Reforestation Initiative.

**National Park Service**

- Developing guidance incorporating climate change science into park and strategic plans and implement at the field level.
- Building capacity in the workforce to apply climate smart conservation practices.
- Improving infrastructure resilience and sustainability.

- Communicating climate science, potential impacts, and strategies to 300 million park visitors.

- Implementing a comprehensive approach for evaluating risk and prioritizing adaptation actions to protect facilities, and cultural and historic resources.

**U.S. Fish and Wildlife Service**

- Facilitating sustainable landscapes through Landscape Conservation Cooperative-based collaborative planning and management.

- Building capacity in the workforce to apply climate smart practices.

- Developing a Service climate change policy framework.

- Incorporating climate change considerations in existing capital grant programs.

- Increased support for states and tribes to integrate climate adaptation into their conservation planning.

- Using the National Fish, Wildlife and Plants Climate Adaptation Strategy Joint Implementation Working Group to promote wildlife adaptation efforts across agencies and with the states and tribes.

**U.S. Geological Survey**

- Facilitating applied climate change research through the Climate Science Centers.

- Providing tools to access and use climate science research and data to inform planning and management.

***Departmental Climate Adaptation Agenda***

This Plan demonstrates numerous ongoing Departmental climate adaptation activities, as the Department simultaneously works with its bureaus to identify cross-bureau climate adaptation needs that could represent additional steps in an integrated Departmental climate adaptation agenda. The items below represent common bureau needs where additional Departmental direction and coordination may be warranted.

**Development of Additional Policy and Guidance**: Additional climate adaptation policies and guidance may be needed such as incorporating climate change into NEPA analyses, determining appropriate situations that may warrant novel adaptation strategies, including climate criteria into grant selection criteria, and incorporating climate change effects in planning and infrastructure design. In some cases, Department-level guidance may be necessary to create consistency across bureaus. The Department will work through the Energy and Climate Task Force, the Climate Change Working Group, and the network of climate adaptation practitioners to discuss and identify additional policy and guidance needs.

**Climate Change Incorporated into New National Park Service Facilities and Development Planning**

**Pearce Ferry Rapid,**
**Lake Mead National Recreation Area**

The National Park Service created a standard protocol for addressing the effects of climate change on proposed capital improvement projects. As part of the Director's review process in 2013, subject matter experts from the Climate Change Response Program, Denver Service Center and NPS Directorates reviewed a total of 64 projects and provided recommendations with respect to climate change considerations. Examples include recommending a floating dock system that accommodates sea level rise in Salt River Bay National Historic Park, and highlighting the need for new culverts to accommodate potentially larger flood events in Lake Mead National Recreation Area.

**Create a Climate Literate Workforce**: A climate literate workforce is necessary to build the broad institutional capacity to effectively address the impacts of climate change on bureau programs and activities. The Department will explore options to build on existing training resources created by partnerships between bureaus, other Federal agencies and non-Federal partners. The Department will continue to support these partnerships and will encourage bureaus to take advantage of existing opportunities. In addition, the Department will work to incorporate relevant climate change content into existing curricula and training programs. The Department will also explore opportunities to improve communication technology, such as video and online training platforms, to enable larger numbers of people to benefit from training resources and materials.

**Landscape Level Planning**: Several bureaus have identified landscape level planning as an important mechanism for addressing climate adaptation. The Department has a number of landscape-level initiatives in progress that will address long-term resiliency in important habitats and will continue to make landscape level planning a priority for maintaining resilient landscapes that meet conservation and development goals. The network of 22 Landscape Conservation

Cooperatives (LCCs) and 8 Climate Science Centers (CSCs) represent the front lines of the Department's landscape level planning efforts.

In April 2014, the Department released *A Strategy for Improving the Mitigation Policies and Practices of the Department of the Interior*.[12] The Strategy provides a framework for incorporating landscape-scale approaches into all facets of development, conservation planning and mitigation. The Department will continue to work with LCCs, CSCs, bureaus and partners to explore additional landscape level planning opportunities.

In addition to the agenda items discussed above, the Department recognizes the need to engage youth on climate science education and awareness. The Department's bureaus have a unique opportunity to promote climate science understanding by demonstrating climate impacts on the landscape. The Department will continue to look for opportunities to build the climate science awareness of our next generation.

***Departmental Climate Change Coordination***

The Department coordinates climate adaptation activities primarily through two Department-wide groups. The Energy and Climate Task Force consists of the Department's assistant secretaries and bureau directors and is chaired by the Deputy Secretary. The Task Force serves as a leadership forum to discuss broad energy and climate policy issues, including climate adaptation. The Department's Climate Change Working Group consists of Departmental office and bureau staff, including those responsible for coordinating bureau climate adaptation activities. The Working Group meets monthly and serves as a forum to coordinate climate change policy, guidance and planning needs. The Associate Deputy Secretary chairs the Working Group.

The members of the Working Group also serve as the nexus of the Department's climate adaptation network by which information, best practices and coordination occurs between the Department and bureaus and among bureaus. Members of the Working Group

**Planning for Climate Change in California's Central Valley**

**Black-crowned Night-Heron**

In California's Central Valley, the California Landscape Conservation Cooperative is supporting a team led by the U.S. Geological Survey to develop plans for waterbirds that account for climate change. The team adapted a new model to look at climate driven changes in water supplies and several other factors. The work will help develop a holistic management approach for the Central Valley, where competing and often conflicting demands exist from urbanization, agriculture, and even other species, such as salmon.

also serve on interagency climate adaptation groups, including the Federal Interagency Climate Adaptation Community of Practice. Section IV of this Plan contains additional information about the Department's climate adaptation work with interagency partners.

Several bureaus also have existing internal climate change working groups or networks that work to develop policy and guidance, provide information and resources to employees, and coordinate climate change-related activities.

The network of 22 LCCs and 8 CSCs are the forum where both Department land managers and external partners can come together to address landscape issues. The LCC's bring together federal, state, and local governments along with Tribes and First Nations, non-governmental organizations, universities, and interested public and private organizations to integrate science and management to address climate change and other landscape scale issues. LCCs fill a critical need by providing a forum for connecting the conservation community within a defined geography and focusing investments and actions on shared priorities. LCCs help align large-scale conservation efforts such as climate adaptation planning to ensure federal efforts complement each other, and lead to more efficient and coordinated management across jurisdictions. The CSC's provide scientific information, tools, and techniques that land, water, wildlife, and cultural resource managers and other interested parties can apply to anticipate, monitor, and adapt to climate change impacts. Much of the information and tools provided by the CSCs, including physical and biological research, ecological forecasting, and multi-scale modeling, will be in response to the landscape-level priority needs identified by the LCCs, as well as the cross-sector needs of other agencies and communities in the region.

## II. The Department of the Interior's Climate Change Adaptation Policy

The Department's Climate Change Adaptation Policy (523 DM 1) is available to the public on the Department's website. The following policy statement is taken directly from the official policy.

### *Official Policy*

It is the policy of the Department to effectively and efficiently adapt to the challenges posed by climate change to its mission, programs, operations, and personnel. The Department will use the best available science to increase understanding of climate change impacts, inform decisionmaking, and coordinate an appropriate response to impacts on land, water, wildlife, cultural and tribal resources, and other assets. The Department will integrate climate change adaptation strategies into its policies, planning, programs, and operations, including, but not limited to, park, refuge, and public land management; habitat restoration; conservation of species and ecosystems; services and support for tribes and Alaska Natives; protection and restoration of cultural, archeological and tribal resources; water management; scientific research and data collection; land acquisition; management of employees and volunteers; visitor services; construction; use authorizations; and facilities maintenance.

Consistent with existing laws and regulations, it is the Department's policy to:

- Ensure that climate adaptation plans are grounded in the best available science and understanding of climate change risks, impacts, and vulnerabilities, incorporating traditional knowledge where available.

- Use the network of Landscape Conservation Cooperatives, Climate Science Centers, and other partnerships to increase understanding of climate change impacts; build upon and monitor existing response efforts; coordinate adaptation strategies across multiple sectors, geographical scales, and levels of government; and inform decision makers.

- Ensure consistent and in-depth government-to-government engagement with tribes, Alaska Natives, and Native Hawaiians to address climate change impacts on health, infrastructure, livelihoods, traditional practices, natural and cultural resources, and to apply adaptation strategies.

- Consider climate change when developing or revising management plans and making major investment decisions.

- Consider climate change when setting priorities for scientific research and assessments.

- Identify and avoid investments that are likely to be undermined by climate impacts, such as investing in infrastructure likely to be adversely affected by repeated severe weather events, floods or inundation, or planting/introducing species vulnerable to changes in temperature or precipitation patterns.

- Address the impacts of climate change on the U.S. territories and Freely Associated States.

- Use well-defined and established approaches, as appropriate, for managing through uncertainty, including: (1) vulnerability assessments, (2) scenario planning, (3) adaptive management, and (4) other risk management or structured decision making approaches. The Department's Adaptive Management Implementation Policy is provided in 522 DM 1.

- Avoid "maladaptive" actions, that is, actions intended to avoid or reduce vulnerability to climate change that negatively impact or increase the vulnerability of other systems, sectors, or social groups.

- Promote landscape-scale, ecosystem-based management approaches to enhance the resilience and sustainability of linked human and natural systems.

- Advance approaches to managing linked human and natural systems that help mitigate the impacts of climate change, including:

  - Protect diversity of habitat, communities and species;

  - Protect and restore core, unfragmented habitat areas and the key habitat linkages among them;

  - Anticipate and prepare for shifting wildlife movement patterns;

**Climate Science in the Southeast United States**

**Secretary Jewell at Cape Romain National Wildlife Refuge with Refuge Manager Sarah Dawsey, discussing the impact of rising seas (11/20/2013)**

The Southeast Climate Science Center is working on a research project, "Assessment of Terrestrial and Aquatic Monitoring Programs in the Southeastern United States," which aims to support the efforts of multiple federal, state, and other organizations in the development of a comprehensive and integrated assessment of monitoring programs associated with atmospheric, stream, and terrestrial ecosystems. As part of this project, the Southeast Global Change Monitoring Portal was developed to provide a centralized, comprehensive catalog of observational networks associated with aquatic and terrestrial ecosystems in the southeastern United States that may be influenced by climate change.

- Maintain key ecosystem services;

- Monitor, prevent, and slow the spread of invasive species (defined in Executive Order 13112 as alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health);

- focus development activities in ecologically disturbed areas when possible, and avoid ecologically sensitive landscapes, culturally sensitive areas, and crucial wildlife corridors; and

- Anticipate changes to access on DOI lands as a result of increases in severe weather events, changes in hydrologic processes (e.g., coast inundation, river flooding, stream bed aggradation, etc.) and other ecosystem changes (e.g., change in fire regime.)

- Routinely track, record, and report on the progress and results of climate change adaptation activities to help further public understanding, encourage the engagement of partners, promote the conduct of similar activities, and better inform decision making on a broader scale.

***Guiding Principles***

In addition to the Department's policy, the Department and its component bureaus and offices adhere to the following Guiding Principles for climate change adaptation.[13] Not all Guiding Principles apply to all components within the Department.

**Science**: The Department will use the best available social, physical and natural science to increase understanding of climate change impacts, to inform decision making, and to coordinate an effective response to impacts on land, water, wildlife, cultural, heritage, and tribal resources, and other assets. To ensure that climate science and services meet internal decision-making needs, bureaus should:

- Ensure that management decisions are informed by science, including projected impacts from climate change.

- Build or access regional and local capacity to identify vulnerabilities and interpret climate science to inform adaptation plans for infrastructure, natural and cultural resources and bureau operations.

- Develop and utilize scientific information and tools at a landscape scale to ensure a detailed understanding of current baselines and effectively track impacts associated with climate change.

- Coordinate with other regional science resources in order to inform adaptation plans and actions (e.g., leveraging, co-locating or integrating scientific efforts with regional climate

change science consortia such as the CSCs, the National Oceanic and Atmospheric Administration Climate Program Office Regional Integrated Science and Assessment Centers, and the Department of Agriculture Regional Climate Hubs).

- Ensure representation at the executive level on the Stakeholder Advisory Committee for each CSC and the Steering Committee for each LCC.

- Facilitate and support data integration across the physical and social sciences to enable broad use of scientific information for management decisions.

- Respectfully consider and incorporate Traditional Ecological Knowledge and long-term observational information as data sources.

- Ensure that scientific activities conform to appropriate laws, regulations and policies (e.g., Information Quality Act, the Department's Scientific and Scholarly Integrity Policy) and apply best scientific practices (e.g., peer review).

**Ecosystem-Based Management**: Integrating the management of natural and human systems and helping understand and display trade-offs is an essential management function in a changing environment. Ecosystem-based management (EBM) is a science-driven alternative to sector-based or species-based management approaches that are poorly suited to address such changes. Effective EBM allows decision makers to understand tradeoffs across different resources, provides guidance at multiple scales, and requires meaningful input from a broad range of stakeholders, including indigenous communities. While implementing EBM, bureaus should consider employing the following strategies:

- Bureaus should incorporate consideration of climate change impacts as a component of cumulative impacts. Climate change is a threat multiplier, in that it amplifies and adds complexity to existing impacts and the interactions among them.
- Risk management provides an effective means to assess and respond to climate change. The timing, likelihood, and nature of specific climate risks are difficult to predict. Risk management approaches are already used in many critical decisions (e.g., for fire, flood, and disease outbreaks), and can aid in understanding the potential consequences of inaction as well as options for risk reduction.

- Given the inherent uncertainties, it may be optimal to implement some climate change adaptation actions before completely understanding potential climate change impacts. Bureaus can use adaptive management, as appropriate, for managing resources in the face of uncertainty. Adaptive management can provide feedback to managers as conditions change, by setting project goals carefully and monitoring progress toward stated goals.[14]

- Bureaus should employ scenario planning to allow planners and managers to explore the effectiveness of various strategies across a range of plausible futures. Targeting a single preferred outcome under a single presumed future is not an adequate management strategy in a rapidly changing environment.[15]

- Use economic analysis to help evaluate the benefits, costs, and risks of alternative investments and strategies to address potential impacts and adaptation plans.

**Ecosystems and Wildlife**: Bureaus should implement the following general approaches in a cost-effective manner to enhance the ability of ecosystems and wildlife populations to absorb change and maintain key qualities and services:

- Protect diversity of habitat, communities, and species.

- Prioritize restoration efforts already moving forward that address current resource management issues but also build resiliency into landscapes facing long-term climate change challenges (e.g., Everglades Restoration, Trinity River Restoration).

- Develop adaptation plans that protect and restore contiguous blocks of un-fragmented habitat and enhance connectivity among habitat blocks.

- Identify and protect resilient ecosystems (i.e., places that can absorb change and maintain healthy community structure and function) and climate refugia (i.e., places that do not exhibit as much change as surrounding landscapes).

- Monitor invasive species (defined as non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human health) and coordinate with other agencies to prevent new introductions and stop the spread of such species.

**Habitat Restoration for Vulnerable Species**

**Restored Montana Wetland**

From March 2013 to present, the Partners for Fish and Wildlife (PFW) Program in the U.S. Fish and Wildlife Service Mountain Prairie Region was able to restore or enhance 37 river miles of river and stream habitat to benefit high priority native fishes stressed by climate change. These projects also benefited many riparian obligate species, greater sage-grouse and amphibians. In addition, the PFW program restored, created or enhanced 4,555 acres of wetlands to benefit suites of high priority migratory birds, the imperiled Dakota Skipper, boreal toad, and many other wetland dependent species that have been shown to be impacted by climate change. The program also restored and/or enhanced 81,474 upland acres, benefiting suites of grassland-dependent birds, sagebrush obligate species, grizzly bear and other species in the Mountain Prairie Region.

- Consider the landscape context of adaptation actions: Bureaus should work together and with other partners to jointly identify large landscape features (e.g., core habitat, specific corridors, etc.) and mutual conservation goals for their protection.

- Reduce non-climate stressors that interact with climate change impacts (e.g., pollution, invasive species, habitat fragmentation, and human activities contributing to resource scarcity or degradation of natural resources).

These general approaches reflect "best practices" at the present time; they should be tailored to specific locations based on anticipated benefits, costs, and uncertainties maximize net benefits.

**Energy, Mining, and Water**: The Department is responsible for managing water supplies and leasing areas for mining and development of renewable and non-renewable energy sources. In addition to the implementation of EBM as described above, bureaus should ensure the sustainability of these efforts by adopting the following approaches:

- Employ a basin-wide approach to achieve sustainable water management and to address current and future water shortages, including the potential for decreased water availability due to drought and climate change.

- Where appropriate, consider opportunity costs of resources in management decisions and analysis of tradeoffs.

- Focus development activities in ecologically disturbed areas when possible, and avoid ecologically sensitive landscapes, culturally sensitive areas, and crucial wildlife corridors. Implement the mitigation hierarchy of avoid, minimize and mitigate for major development activities.

- Strengthen and enhance assessments of the vulnerability of water resources to climate change.

- Expand and encourage efficiency measures for water and energy use. Facilitate the development and use of management approaches that provide information about opportunity costs to users of DOI resources.

**Cultural and Heritage Resources**: Human societies have inhabited the areas that are now the United States, including affiliated states and insular areas, for many thousands of years. Consequently, many ecosystems and plant, fish, and wildlife species hold cultural significance, as do fixed-place cultural and heritage resources including archaeological sites, prehistoric and historical period structures, districts, cultural and sacred landscapes, and museums and curation facilities. In addition, there are various intangible cultural heritage resources, including inherited traditions or living expressions such as oral traditions, performing arts, social practices, rituals, festive events, knowledge and practices concerning nature and the universe or the knowledge and skills to produce traditional crafts.[16] To address impacts to these resources and the information

they provide regarding long-term human interactions with variable environments, managing bureaus should:

- Integrate cultural resources into climate change vulnerability assessments to identify both inventoried resources and uninventoried areas (if any) at risk from projected impacts.

- Use projected climate change impacts, as determined by the National Climate Assessment and federal partners, as a factor to prioritize completion of cultural resource inventories pursuant to bureau responsibilities under the National Historic Preservation Act (NHPA) Sections 110 and 106, respectively.

- Evaluate planned capital investments in cultural resources and historic properties that are vulnerable to climate change, and focus on critical stabilization needs of those resources until long-term impacts from climate change are defined and inform broader restoration plans.

- Update or implement cultural resource monitoring systems to track environmental effects that may vary under altered climate regimes and adversely affect cultural resources. Some monitoring needs may overlap partially or fully with natural resource monitoring. For example, monitoring of changes in water tables can inform wetland and drainage issues as well as alteration of archaeological sites.

- Coordinate cultural resource preservation and research priorities across local, regional, and national scales (such as through LCC and DOI CSC networks).

- Engage indigenous communities in dialogue and incorporate traditional knowledge in assessing climate change effects on cultural, natural, and heritage resources and developing appropriate adaptation strategies.

- Engage minority populations and low-income populations in dialogue and through stakeholder outreach in assessing climate change effects on cultural, natural, and heritage resources and developing appropriate adaptation strategies.

- Engage federal stakeholders to coordinate requirements and processes of compliance with NHPA, such as programmatic agreements, for all climate change response actions.

- Incorporate cultural resource significance as a factor in management decisions and adaptation actions for vulnerable resources. Significance determinations may require stakeholder consultation.

- Incorporate knowledge from prehistoric and historic human adaptation (contained in cultural and heritage resources) into contemporary adaptation planning, decision-making, and communication.

**Minority Populations and Low Income Populations:** It is a priority of the Department and a responsibility under Executive Order 12898 to work with minority populations, and low-income

populations to anticipate and prepare for climate change impacts to their health, environment, and communities.[17] To do so, bureaus should:

- Provide minority populations and low-income populations with the most recent climate change information and climate adaptation guidance.
- Participate in community capacity building, training, and outreach activities and provide technical assistance as appropriate for communities at greater risk.
- Expand and include minority populations and low-income populations and communities in science, mapping, research, data collection activities, and other studies as appropriate.
- Actively participate in the Intergovernmental Working Group on Environmental Justice.

**American Indians, Alaska Natives, and Insular Areas**: It is a priority of the Department to work with American Indians, Alaska Natives, and residents of Insular Areas to anticipate and prepare for climate change impacts to their lands, communities, and ways of life. To do so, bureaus should:

- Provide tribes, communities, and Insular Areas with the most recent climate change information and climate adaptation guidance.
- Respectfully solicit traditional knowledge from tribes, communities, and villages to complement existing scientific resources on past and present ecological and sociological changes.
- Ensure ongoing inclusion of indigenous groups in any EBM implementation by providing avenues for participation and soliciting information on areas of cultural value.

**Salmon Hatcheries and Restoration Efforts**

**Nez Perce Tribal Hatchery. Credit: CRITFC**

Salmon is culturally important traditional food for native people on the west coast and Alaska. Loss of snow pack due to climate change exacerbates stresses from land use change to threaten salmon survival and return rates. Tribes, states and the federal government have invested heavily in hatcheries and restoration efforts. Climate threats, habitat degradation, and other stressors all need to be part of the adaptation management considerations to minimize loss of this cultural and economically important species.

**Coordination and Partnerships**: Adaptation requires coordination across multiple sectors, geographical scales, and levels of government and should build on the existing efforts and knowledge of a wide range of stakeholders. Bureaus should:

- Coordinate and collaborate with federal, state, tribal, and local governments, nongovernmental organizations and with private landowners, in support of activities that contribute to effective management of endangered and other species, natural communities, cultural resources, lands, waters, infrastructure and other assets placed at risk by changing climate conditions.

- Ensure consistent and in-depth government-to-government engagement with tribes, Alaska and Hawaii Natives, and insular areas to address climate change impacts on natural and cultural resources and to apply adaptation strategies.

- Engage with the Landscape Conservation Cooperatives to ensure integration with local and regional climate adaptation priorities.

- Co-lead efforts to implement the National Fish, Wildlife, and Plants Climate Adaptation Strategy and coordinate with and undertake actions consistent with the National Ocean Policy Implementation Plan and the *National Action Plan: Priorities for Managing Freshwater Resources in a Changing Climate* (Freshwater Action Plan).

- Coordinate scientific activities and plans with the relevant DOI Climate Science Centers or the National Climate Change and Wildlife Science Center, and with federal, state, tribal, university, and other science partners to ensure maximum efficiency.

- Adjust partnerships to the scale of the adaptation action. For example, a local adaptation action will be most effective when driven by local interests, risks, and needs, but must also be congruent with regional or landscape-level actions.

- To the extent feasible, include participation from those charged with implementing adaptation plans.

- Support local capacity building since adaptation actions will mainly be implemented at the local level.

- Incorporate outreach efforts into adaptation strategies and actions; tailor adaptation communications to the local context. Communicate information about adaptation plans and projects to stakeholders using clear language that addresses local concerns.

- Provide training to bureau staff and managers on climate change, adaptation, and mitigation to increase climate change knowledge within the Department.

- Where possible, implement adaptation strategies and actions that complement or directly support other related management goals such as efforts to improve disaster preparedness, promote sustainable resource management, and reduce greenhouse gas emissions.

- Minimize maladaptation, that is, actions to avoid or reduce vulnerability to climate change that negatively impact, or increase the vulnerability of other systems, sectors, or social groups.

- Engage youth to provide educational opportunities to observe and understand the impacts of climate change occurring on the landscape and to help build the next generation of climate leaders, consistent with Secretarial Order 3332 – Engaging the Next Generation.

**Human Health and Safety**: The Department will anticipate, prepare for, and develop cost-effective approaches to ameliorate adverse impacts that climate change may have on the safety of employees, volunteers, visitors, contractors and others for whom it has special responsibilities.

**Public Use and Enjoyment**: Bureaus should consider climate change impacts on the public's ability to recreate on, visit or use DOI-managed lands and waters. This may include impacts to infrastructure that supports visitor use, such as roads, visitor facilities (e.g., campgrounds, picnic areas, parking areas, trailheads, etc.), trails, and boat ramps. This may also include impacts to visitor experiences, such as viewing wildlife and scenery, hunting, fishing, boating, walking and hiking.

**Infrastructure and Equipment:** All components of the Department should consider potential climate change impacts when planning, designing, building, purchasing, leasing, upgrading, maintaining, and decommissioning infrastructure and equipment. The Department should systematically evaluate infrastructure investments in a benefit-cost context to help determine if such investments are justified.

## III. Planning for Climate Related Risks

### *Programs, Policies and Plans to Manage Climate Risks and Build Resilience*

The Department has numerous ongoing and planned activities to manage climate risks and build resilience. The Department developed a Climate Change Adaptation Priority Performance Goal to manage implementation of bureau climate resilience activities. The Priority Goal will measure bureau performance and achievements toward implementing climate change adaptation strategies, which were established in the 2013 Strategic Sustainability Performance Plan. The Climate Change Adaptation Priority Performance Goal will be used to target, track, and report progress on a quarterly basis over the next two years. Each bureau is required to identify actions under each of the following Priority Goal strategies. The information below was reported to the Department on March 31, 2014, and is current through the Second Quarter FY 2014.

**Strategy 1**: Mainstream and integrate climate change adaptation into both agency-wide and regional planning efforts, in coordination with other federal agencies as well as state and local partners, Tribal governments and private stakeholders.

Bureau highlights

Responsible bureau: Bureau of Ocean Energy Management
*Incorporate climate science into the Bureau of Ocean Energy Management's environmental reviews to support decisions that promote mitigation of and adaptation to climate change, including enhanced coastal resiliency through use of Outer Continental Shelf sand resources for beach and barrier island restoration.*

- Climate risk/vulnerability: Sea level rise, coastal erosion
- Level of progress: Design underway or project activity initiated (Q1/FY2014)
- Milestones: 30% completed (FY2015/FY2016)

Responsible bureau: Bureau of Safety and Environmental Enforcement
*Continue to explore ways to implement policies that enhance the safety of offshore platforms in the face of extreme weather events.*

- Climate risk/vulnerability: Extreme weather events
- Level of progress: Implementation planning phase
- Milestones: Project initiation (Q3/FY2014)

Responsible bureau: U.S. Geological Survey
*Establish Climate Science Centers, with stakeholder advisory committees, regional science plans, effective linkages between U.S. Geological Survey assets and partners. Establish national science strategy and national advisory committee.*

- Climate risk/vulnerability: Multiple climate risks
- Level of progress: At least 90% of projects completed
- Milestones: 90% is the highest level of implementation measured in the Priority Goal.

Responsible bureau: U.S. Fish and Wildlife Service
*Working through the LCCs and with the CSCs, develop shared climate change adaptation goals with conservation partners and develop resilient landscape designs to guide conservation efforts.*

- Climate risk/vulnerability: Multiple
- Level of progress: Design underway or project activity initiated (Q1/FY2014)
- Milestones: Drafts available for 30% of LCCs (Q4/FY2015)

**Strategy 2:** Ensure agency principals demonstrate commitment to adaptation efforts through internal communications and policies.

Bureau highlights

Responsible bureau: Bureau of Ocean Energy Management
*Incorporate science into Bureau of Ocean Energy Management's Environmental Studies Program research that enhances our understanding of actions and impacts related to climate change.*

- Climate risk/vulnerability: Sea level rise, extreme weather events, etc.

- Level of progress: Design underway or project activity initiated (Q1/FY2014)
- Milestones: 30% completed (FY2015/FY2016)

Responsible bureau: Bureau of Reclamation
*Development of Bureau of Reclamation Climate Adaptation Policy in response to 523 DM 1.*
- Climate risk/vulnerability: Multiple climate risks
- Level of progress: Implementation planning phase
- Milestones: Project initiation (Q3/FY2014)

Responsible bureau: Office of Surface Mining and Reclamation Enforcement
*Incorporate a climate change section into Office of Surface Mining and Reclamation Enforcement agency NEPA training. Training is given annually in April to OSM employees, state and tribal employees.*
- Climate risk/vulnerability: Multiple climate risks
- Level of progress: Design underway or project activity initiated (Q1/FY2014)
- Milestones: 30% completed (Q3/FY2014)

**Strategy 3:** Ensure workforce protocols and policies reflect projected human health and safety impacts of climate change.

Bureau highlights

Responsible bureau: Bureau of Indian Affairs/Bureau of Indian Education
*Design and implement administrative guidance to identify & address climate driven human health challenges in the Bureau of Indian Education (BIE) School Safety Plans, BIA facilities Continuity of Operations Plans (COOP), and national BIA All Hazards Emergency Response Operations (A-HERO) program.*
- Climate risk/vulnerability: Extreme weather events, heat waves, etc.
- Level of progress: Implementation planning phase
- Milestones: Project initiation (Q3/FY2014)

Responsible bureau: Bureau of Safety and Environmental Enforcement
*Provide support, education, and training for employees about preparedness and response to natural disasters and other impacts associated with climate change, including telework options at designated work sites.*
- Climate risk/vulnerability: Extreme weather events
- Level of progress: Design underway or project activity initiated (Q1/FY2014)
- Milestones: 30% completed (FY2015/FY2016)

Responsible bureau: National Park Service
*Include sea level rise and storm surge science into new & existing hurricane response plans for coastal parks in the Southeast and Northeast Regions.*
- Climate risk/vulnerability: Sea level rise
- Level of progress: Design underway or project activity initiated (Q1/FY2014)

- Milestones: 30% completed (FY2015/FY2016)

**Strategy 4:** Design and construct new or modify/manage existing agency facilities and/or infrastructure with consideration for the potential impacts of projected climate change.

Bureau highlights

Responsible bureau: Bureau of Land Management
*Review design criteria for climate change considerations in Bureau of Land Management capital improvement projects over $1 million.*

- Climate risk/vulnerability: Multiple climate risks
- Level of progress: Implementation planning phase
- Milestones: Project initiation (Q3/FY2014)

**Red Rocks Canyon National Conservation Area, BLM Nevada**

Responsible bureau: Bureau of Reclamation
*Installation of new turbines that increase the operational range and flexibility of hydropower operations at Hoover Dam.*

- Climate risk/vulnerability: Impacts to water resources
- Level of progress: Design underway or project activity initiated (Q1/2014)
- Milestones: 30% completed (Q3/FY2014)

Responsible bureau: U.S. Fish and Wildlife Service
*Implement continuing improvements of the Roads Module of the SLAMM (Sea Level Affecting Marshes Model) system.*

- Climate risk/vulnerability: Sea level rise
- Level of progress: 30% completion
- Milestones: 90% completed (Q4/FY2015)

**Strategy 5:** Update agency external programs and policies (including grants, loans, technical assistance, etc.) to incentivize planning for and addressing the impacts of climate change.

Bureau highlights

Responsible bureau: Bureau of Land Management
*Develop a program to help public land users understand how climate change may affect use and enjoyment of public lands.*

- Climate risk/vulnerability: Multiple climate risks
- Level of progress: Implementation planning phase
- Milestones: Project initiation (Q3/FY2014)

Responsible bureau: National Park Service
*Include provisions addressing climate change and related issues into grants from the Historic Preservation Fund to state, local, tribal grantees.*
- Climate risk/vulnerability: Multiple climate risks
- Level of progress: Design underway or project activity initiated (Q1/FY2014)
- Milestones: 90% completed (Q4/FY2015)

Responsible bureau: U.S. Geological Survey
*Provide funding for external climate adaptation activities, especially from Climate Science Centers.*
- Climate risk/vulnerability: Multiple climate risks
- Level of progress: At least 90% of projects completed
- Milestones: 90% is the highest level of implementation measured in the Priority Goal.

***Addressing Critical Climate Risks***

Climate change will have a significant impact on the land and natural resources managed by the Department of the Interior. The following is a list of the Department's critical climate change risks and plans to address those risks.

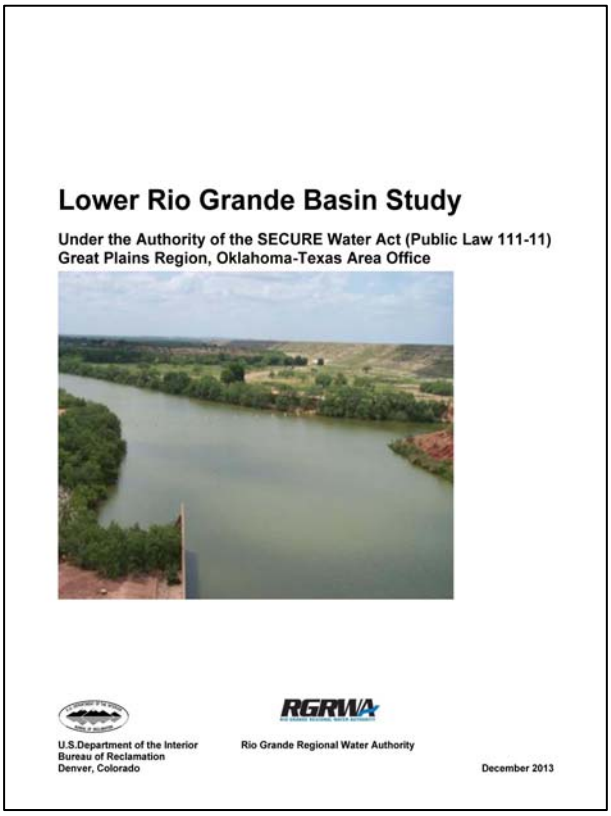
*Water supply*

Description: Changes occurring now are altering the historical weather and streamflow patterns that framed the development of water and power systems across the west. Temperature increases have resulted in decreased snowpack, differences in the timing and volume of spring runoff, and an increase in peak flows for some western U.S. basins. Collectively, these changes raise difficult questions about how best to operate Reclamation facilities to meet growing demands for water and hydropower now, and how to upgrade and maintain infrastructure to optimize operations in the future. The more extreme variations in climate will make it more difficult for Reclamation to meet competing demands for water, exacerbating tensions and increasing the potential for conflict.

Implemented and planned actions: Reclamation is taking a leading role to develop sound and actionable science and tools needed to better understand the impacts of climate change to water resources. Reclamation leads a partnership of eight federal, academic, and Non-Governmental Organizations that have made downscaled climate and hydrology projections available through a public website, available at http://gdo-dcp.ucllnl.org/downscaled_cmip_projections/.

In 2009, Reclamation initiated the WaterSMART West-Wide Climate Impact Assessments (WWCRAs) to evaluate the risks and impacts of climate change to water resources in river basins across the West, as authorized in the SECURE Water Act, Subtitle F of P.L. 111-11. The WWCRAs are baseline assessments of the potential impacts of climate change to water supply and demand, and to Reclamation's operational responsibilities. The WWCRAs form the basis for a consistent evaluation across the eight major river basins in the west and provide information that can be utilized in the WaterSMART Basin Studies, which are focused on addressing climate change vulnerabilities.

In 2009, Reclamation initiated the WaterSMART Basin Studies and West-Wide Climate Impact Assessments (WWCRAs) to evaluate the risks and impacts of climate change to water resources and identify strategies to mitigate those impacts in river basins across the West, as authorized in the SECURE Water Act, Subtitle F of Title IX of P.L. 111-11. Through the Basin Studies, Reclamation partners with non-Federal stakeholders to evaluate the impacts of climate change to multiple water uses within a basin, and to identify adaptation strategies. To date, 22 Basin Studies have been selected in 15 western states. Reclamation has now completed 7 Basin Studies, including the Colorado River Basin Study; Yakima River Basin Study; and the Santa Ana River Watershed Basin Study.




These three completed studies provide examples of how Basin Studies serve to identify likely supply demand imbalances and generated collaborative efforts to plan for the future including:

- The Colorado River Basin Study, completed in December 2012, confirmed that there are likely to be significant shortfalls between projected water supplies and demands in the Basin in coming decades and generated collaborative teams to identify actions that have broad based support to address projected supply and demand imbalances.

- The Yakima River Basin Study, completed in December 2011, resulted in the Yakima River Basin Integrated Water Resource Management Plan, which is a comprehensive planning effort to address water resource and habitat challenges that can be met through collaborative local and regional solutions. One example of this is the Manastash Creek Project, which will convert 3.2 miles of unlined lateral to pressured pipeline conserving an estimated 1,300 acre-feet of water annually and providing improved local irrigation system reliability and access to approximately 25 miles of important habitat for steelhead, coho, bull trout, and spring Chinook.

- The Santa Ana River Watershed Basin Study, completed in September 2013, Reclamation developed a Green House Gas (GHG) Emissions Calculator that can be used by water managers in California to analyze the carbon footprint of potential water management decisions and is a vital tool for decision makers when developing water supply plans for the future.

In addition to Basin Studies, Reclamation analyzes the risks and impacts of climate change through WWRCAs. The WWCRAs are baseline assessments of the potential impacts of climate change to water supply and demand, and to Reclamation's operational responsibilities. The WWCRAs form the basis for a consistent evaluation across the eight major river basins in the west and provide information that can be utilized in the Basin Studies. Reclamation completed the first WWCRA Impact Assessment in 2013 in the Rio Grande river basin in partnership with Sandia National Laboratories and the U.S. Army Corps of Engineers. Three additional WWCRA Impact Assessments are currently underway. Reclamation also leads a partnership of eight Federal, academic, and Non-Governmental Organizations that have made downscaled climate and hydrology projections available through a public website, available at http://gdo-dcp.ucllnl.org/downscaled_cmip_projections/. Collectively, the WWCRAs, Basin Studies and science efforts will inform Reclamation's second report to Congress under the SECURE Water Act, to be completed in 2016.

Water conservation, water reuse and efficient water operations can help provide the flexibility that is needed to optimize water supplies in response to drought and to build resiliency to climate change by stretching water supplies further. The President's Climate Action Plan for the Nation (President's Plan) specifically highlights the contributions of WaterSMART Grants in providing funding to agricultural water users for more efficient practices to address long-term climate change. Since 2009, Reclamation has supported projects contributing over 730,000 acre-feet of conserved water under Interior's Priority Goal for Water Conservation through WaterSMART Grants, the Title XVI Water Reclamation and Reuse Program, and other conservation efforts. Water conserved through these programs has benefitted municipalities, agriculture, and the environment. Interior's goal is to enable addition water savings to increase the available supply by 840,000 acre-feet of water by September 2015.

In addition to supporting water conservation and reuse projects, Reclamation is collaborating with stakeholders in basins across the West to identify water management solutions to water shortage problems. In many basins, competing needs for water by farmers, endangered species, and municipalities are currently amplified by unprecedented drought conditions.

Looking forward, Reclamation has recently initiated several new efforts to improve the ability to address vulnerabilities from climate change in the future. In FY 2014, Reclamation is beginning a pilot initiative to develop guidance for considering climate change information in reservoir operations. Historically, uncertainties in weather prediction and assumptions of a stationary climate have resulted in general rules for reservoir management, often seasonal to annual in definition, in terms of allocating water resources. Reclamation plans to complete one pilot to evaluate how utilization of weather, hydrology, and climate change information could better inform reservoir operations at one Reclamation reservoir by the end of FY 2015. Contingent on

available funding, additional pilots targeting reservoir systems with different geographic and administrative conditions will be initiated in FY 2015.

The U.S. Geological Survey provides hydrologic and remote sensing science supporting the WaterSMART program, and brings to bear a number of science and data resources, including long-term records quantifying climate-linked changes in hydrologic regime; present-day measurements of groundwater supplies necessary to increase resilience to drought; and a growing set of near-real-time applications of Landsat and other remotely sensed data to support water resources management by Reclamation, by states, and by individual water users such as growers. The National Water Census effort, a component of WaterSMART, is well underway and provides the critical data underpinning to the ability of water managers to make smart decisions. Contingent on available funds, the U.S. Geological Survey has proposed to better quantify changes in streamflow, precipitation, and groundwater availability under drought conditions, to link these findings with data on the impacts of drought on ecological systems, and to work through the Climate Science Centers to inform adaptive management plans focused on the ecological and wildlife implications of severe or sustained drought.

*Tribal resources*

Description: The Department has an important role for supporting tribes as they address climate change impacts. Core to the Department's mission is trust responsibility for resources, as well as providing technical support across a wide range of services. Tribes have traditional, cultural, and spiritual ties to the land and may also have treaty and subsistence rights and interests off the reservation, and as such natural resource impacts are a serious concern. Further, tribal governance and resource rights are tied to their lands, and tribes cannot easily migrate to follow traditional subsistence animals moving due to changing habitats.

Implemented and planned actions: The Department is investing in data, technical and training needs for land managers and is committed to incorporating tribal needs into that investment. The Department is also committed to respectfully and appropriately incorporating traditional ecological knowledge into the body of knowledge that will underpin adaptation management. The Department's bureaus bring different technical skills and resources that can assist tribes. The BIA will work with tribes and other agency's tribal liaisons to help identify specific needs and direct support.

BIA activities to address climate change can be broken into two categories: *policy* and guidance to address climate challenges with the BIA structure, and *support for tribes* and trust managers (including BIA managers) as they address climate change challenges, both on a government scale and within specific programs.

The BIA is committed to mainstreaming climate change considerations into all programs through policy, guidance, training and manager support. BIA regional leaders are committed to developing a Climate Action Plan to serve as a regional roadmap for activities needed to mainstream climate considerations in all programs. Given regional differences in impacts and tribal areas of concern, the BIA is taking a regional approach to identification of policy needs,

communication, employee training, and tribal focus areas. Once the regions have set priorities and timelines, national priorities will be identified and addressed.

The BIA provides both management and technical support for tribes. Starting in 2014, BIA plans to provide support for five tribal liaison positions located at Climate Science Centers. These positions would provide translational linkages between CSC scientists and tribal adaptation planners. Under self-determination, tribes can set their own management agendas and priorities. BIA or tribal managers then develop plans, objectives and management guidelines to reach those priorities. Given the crosscutting nature of climate change, the BIA Cooperative Landscape Conservations (Climate Change) program coordinates BIA climate change funding and technical support for tribes.

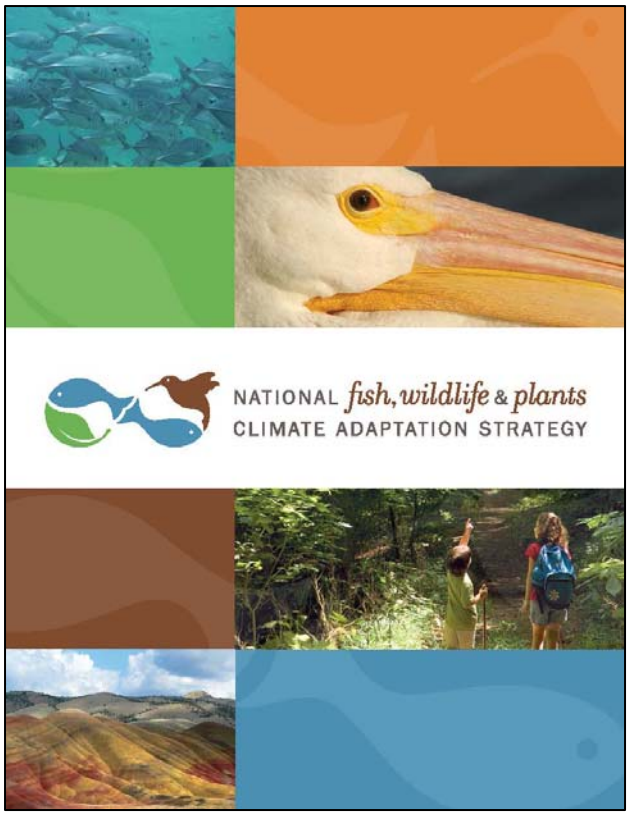
*Species and habitat*

Description: Climate change acts upon large landscapes and ecosystems and exacerbates the impact of other stressors such as habitat fragmentation or loss due to land use changes, invasive species, fish and wildlife disease, wildfire, floods, and drought. The lands and the species managed by the U.S. Fish and Wildlife Service (Service) and other bureaus within the Department are vulnerable to these ecological changes.

Accelerated climate change is impacting many species right now, and is contributing to changes in the character and functionality of habitats upon which species depend to breed, migrate, and over-winter. Climate change is affecting wildlife diseases, is facilitating the spread of detrimental invasive species, and is disrupting critical relationships between certain species and their food sources. As the climate changes, habitat areas for many species will likely expand while habitat available for other species will likely shrink or otherwise be altered. Species' distribution shifts can lead to a number of new challenges for state, tribal and federal natural resource managers, such as the arrival of new pests, the disruption of ecological communities, and the loss of species particularly valued by people from some areas.

Implemented and planned actions: Through its cooperative conservation programs, the Service works with many other entities to provide technical and financial assistance and outreach for habitat restoration efforts. Two such programs include the Partners for Fish and Wildlife Program and the Coastal Program. Each year, the Service completes more than 3,500 public-private partnership habitat restoration projects under these programs, which also help support local communities and create thousands of jobs each year. Habitat restoration can be an important strategy to address climate change vulnerabilities not only to resist ecosystem change, but also to establish ecosystems that are resilient in a changing climate, focusing on rehabilitation of ecosystem functions rather than necessarily restoring the original composition of species.

Beginning with the 2008 listing of the polar bear as a threatened species under the Endangered Species Act (ESA), the Service has routinely considered various aspects of climate change vulnerability in its assessments of the status of species. In addition, new and revised recovery plans for species already listed under the ESA also are considering the various components of climate change vulnerability of species and habitat, so that appropriate actions can be planned and implemented to help conserve these species.




The Service has also made a major contribution to coordinated interagency efforts to support climate preparedness and resilience through its work to co-lead development of the *National Fish, Wildlife, and Plants Climate Adaptation Strategy* (Strategy).

The Strategy was published in 2013, and involved representatives from 15 federal agencies, ten states, and six tribal agencies. It is currently the only adaptation strategy in the United States that was developed collaboratively by all relevant levels of government. Many of the activities described in this Climate Adaptation Plan are called for in the Strategy.

In addition to these programmatic and regional efforts, the Service is continuing to lead, in partnership with NOAA and the state of California, the Joint Implementation Working Group (JIWG) formed to promote interagency implementation of the Strategy and report on implementation progress. The JIWG is composed of representatives from essentially the same federal, state and tribal organizations that worked together to produce the Strategy. Membership is voluntary. The first meeting of the JIWG was held in late November 2013, and its first report on Strategy implementation is expected by fall of 2014.

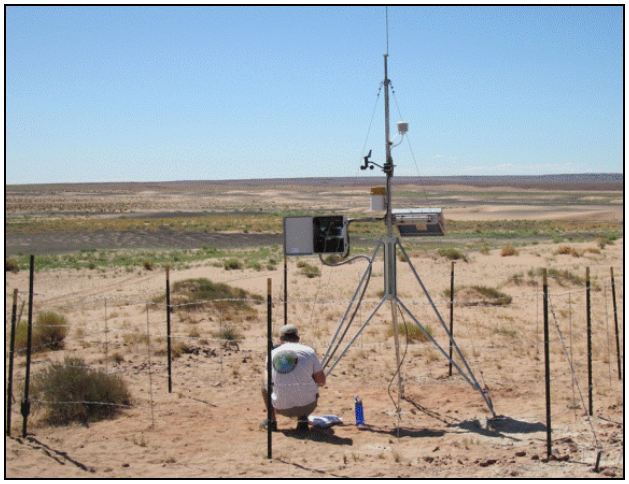
A robust inventory and monitoring program is also an important part of assessing Service vulnerabilities to climate change. The nationally-coordinated Refuge System Inventory and Monitoring (I&M) initiative works with partners to assess the status of refuge lands, waters, plants and animals, including recording the impacts of environmental stressors such as climate change. Every refuge is currently developing an I&M plan, selecting and documenting surveys and protocols, storing and managing data, and standardizing methodologies across stations.

Through Fish and Aquatic Conservation habitat restoration programs and Fish and Wildlife Conservation Offices, the Service works to remove aquatic barriers across the country. Not only does this provide habitat connectivity benefits for species impacted by climate change, but it

provides additional benefits to local communities by restoring natural function to riverine systems increasing their resiliency to flood events.

Under the national leadership of the Bureau of Land Management Plant Conservation Program, the interagency Native Plant Materials Development Program (NPMDP) has been working since 2001 to develop high quality seeds and seedlings of America's native plant species for restoration, rehabilitation, and reclamation. Ecoregional programs have been established to prioritize research and guide the development of restoration seed needed within each ecoregion. The goal of the program is to increase capacity with the federal agencies and private sector for ecologically appropriate native seed. The work of the NPMDP supports action 2.3.4 in the Strategy.

**U.S. Geological Survey**
**Land Change Science Program**



**Automated Digital Imaging in Southwest U.S.**

The Land Change Science (LCS) Program is focused on understanding the types, rates, causes, and consequences of land change. LCS scientists conduct studies of the land cover and disturbance histories of the United States and overseas areas to determine the reasons for and the impacts of land-surface change. They seek to answer questions such as "What kinds of changes are occurring and why?", and "What are the impacts of these changes on the land for environment and society?" Recording any type of land change requires the characterization of land features at two or more times. However, a long-term, scientific perspective of land change requires continued, periodic monitoring of the land surface.

The Climate Science Centers provide a number of examples of the close coordination between science and management that is required to address the effects of climate on species and habitats. For example, the North Central Climate Science Center is coordinating science and decision support for the implementation of the Greater Yellowstone Coordinating Committee's Whitebark Pine Strategy. Whitebark pine is a keystone and candidate endangered species undergoing rapid die-offs under changing climate conditions. Partners in the development of the implementation plan include the Montana State University, University of Montana, U.S. Geological Survey Rocky Mountain Science Center, Great Northern Landscape Conservation Cooperation, National Park Service, GYCC & GYCC WBP Subcommittee (Bridger Teton National Forest, National Park Service, and Yellowstone National Park). Planned outcomes of the collaboration include: Ecosystem processes and whitebark pine habitat suitability are being forecast under future climate scenarios to 2100. Paleoclimate data will be used to quantify whitebark pine/climate relationships over the past 15,000 years and growth rates during extreme climate events over the past 800 years. Four management alternatives will be developed in a workshop using the North Central CSC's Resource for Advanced Modeling. These alternatives

will be evaluated relative to whitebark pine viability and ecosystem function, costs of implementation, and public valuation of change in ecosystem services. Recommendations will be derived in a scenario planning workshop, and can be immediately acted upon by the Greater Yellowstone Area management community. The methods will be readily applicable to the several other tree species that are undergoing die-offs under changing climate.

Seeds of Success (SOS) is the national native seed collection program, also led by the Bureau of Land Management in partnership with a variety of federal agencies and non-federal organizations. As the first step of the NPMDP, the SOS mission is to collect wildland native seed for research, development, germplasm conservation, and ecosystem restoration. To date, SOS partners have made of 16,000 collections of about 5,000 species of native plants from across the United States. As plant communities are altered by climate change, the seed and plant resources developed by these programs and used in restoration will be essential to support plants, animals, and sustain resilient ecosystems.

*Coastal resources*

Description: The Department manages, protects and provides access to significant ocean and coastal resources, including:

- 34 million acres in 84 marine and coastal National Parks,
- more than 35,000 miles of coastline,
- 180 marine and coastal National Wildlife Refuges,
- energy and mineral development on 1.7 billion underwater acres of the Outer Continental Shelf,
- nearly all federal land, and the majority of all land in the U.S. Arctic,
- hundreds of thousands of square miles in Marine National Monuments, and
- 1,100 miles of California coastline.

Significant climate impacts are expected for coastal areas, including sea level rise, more frequent and more intense coastal storms and flooding. According to the National Climate Assessment, coastal ecosystems are particularly vulnerable to climate change because many have already been dramatically altered by human stresses. Climate change will result in further reduction or loss of the services that these ecosystems provide, including potentially irreversible impacts.[18]

Implemented and planned actions: The Department's bureaus are actively implementing and planning actions to prepare their coastal resources for the impacts of climate change. For example, the U.S. Fish and Wildlife Service has conducted analyses of sea level rise vulnerability using the Sea Level Affecting Marshes Model (SLAMM) to project the effects of sea-level rise on coastal marshes and related habitats for all coastal Refuges, and is actively working to build resilience and help slow and offset habitat loss through a variety of habitat restoration and other projects. The National Park Service is designing criteria and guidance to promote a thorough analysis of facility location and design features in all coastal park units so that agency staff can make wise decisions regarding facility location, replacement, and construction designs. The Bureau of Ocean Energy Management's Marine Minerals Program, which provides sand for coastal restoration and resilience projects, is analyzing data, conducting

studies, and using tools such as Geospatial Information Systems (GIS) and the Multipurpose Marine Cadastre to manage risks associated with climate change. The U.S. Geological Survey is bringing a number of scientific resources to bear on the issue of coastal change, combining existing expertise with the opportunity to build on recent studies funded by the Hurricane Sandy supplemental. These U.S. Geological Survey resources include the Coastal and Marine Geology Program's work to develop improved forecasts and assessments of vulnerability of coastal lands and resources to future extreme storms and sea-level rise, the Land Change Science Program's developing studies on the impacts of coastal land use change on community risk and vulnerability to sea-level rise and storm surges, the Climate Science Centers' work to incorporate structured decision-making approaches that integrate the latest sea-level rise projections to refuge and other land managers, and a number of regional studies by the National Cooperative Geologic Mapping Program and the Climate Research and Development Program, focused on the geologic record of past sea level and past storms.

The Department has invested Hurricane Sandy Supplemental Funding to increase the resilience of its coastal resources as well as communities in the Hurricane Sandy-affected region to sea level rise and more frequent and intense extreme weather and will evaluate the impacts of these investments to inform federal, state, tribal and local decisionmakers into the future. The Department is engaged with several federal agencies and the five Gulf of Mexico states in a major restoration initiative that will protect coastal communities and their way of life as the climate changes. The Department is also working with federal partners on National Ocean Policy coordination to address coastal climate impacts.

*Disaster response – Natural and Cultural Resources Recovery*

Description: The Department is responsible for coordinating federal efforts of the Natural and Cultural Resources (NCR) Recovery Support Function (RSF) established by the Natural Disaster Recovery Framework (NDRF). Under this Framework, the NCR RSF helps FEMA assist local, State and Tribal authorities restore and recover natural and cultural resources that have been damaged by natural disasters, including those caused by climate- or weather-related extreme events. The NCR RSF also helps reduce vulnerability of such resources to similar future events, were they to recur. The NCR RSF is one of six RSFs that may be mobilized in the wake of a natural disaster.

**Hurricane Katrina Impacts at Big Branch National Wildlife Refuge, Louisiana**

The Department is conducting a review of NCR RSF activities in response to Superstorm Sandy. While the review recognizes numerous accomplishments, several opportunities for improvement were also noted. A robust program is an important component of National climate preparedness for protecting natural and cultural resources after catastrophic events.

Implemented and planned actions: Options for improving the NCR RSF include:

- Advanced planning prior to any disaster declaration, including assembling "Go-Teams" composed of qualified and trained individuals to staff and manage NCR RSF activities at JFOs and in headquarter and regional offices.
- Improvements in communications and information dissemination within JFOs, NCR RSF agencies, and among the various RSFs and partners.
- Development of inventories of affected natural and cultural resources, including their nature, locations, and extent of damage.
- Development of an exit strategy following demobilization or ramp-down of the JFO.
- Post-deployment follow-up to capture lessons learned, and ensure continuing improvement in NCR RSF performance.

Additional resources will likely be required to successfully implement the options above.

### *Considerations for Climate Adaptation and Resilience Improvements*

The Department will continue to work with its bureaus and interagency partners to identify opportunities to improve climate adaptation and resilience. The Department is working to develop an approach for evaluating the costs and benefits of resilience improvements for agency suppliers, supply chain, real property investments, and capital equipment purchases such as updating agency policies for leasing, building upgrades, relocation of existing facilities and equipment, and construction of new facilities. The Department will continue to work with the General Services Administration (GSA) and other interagency partners to develop consistent approaches and guidelines for evaluating potential resilience improvements.

The Department of the Interior owns more than 42,000 buildings and 75,000 structures. The Department has established a Facilities/Infrastructure Climate Change Adaptation working group to assist bureau efforts to address vulnerabilities of mission critical and mission dependent buildings and structures to climate change.

In FY 2013, the Department of the Interior funded more than $470,000,000 in actions made both directly and indirectly against GSA schedule contracts. The Department will partner with GSA to stratify these actions into mission critical and mission dependent actions to address vulnerabilities to climate change, as well as extreme weather incidents.

In FY 2013, the Department of the Interior occupied space provided by GSA in more than 300 locations. The Department will partner with GSA to address the vulnerabilities of these sites and facilities to incremental climate change and variability.

***Interagency Coordination on Climate Preparedness and Planning***

The Department and its bureaus are involved in numerous efforts to support climate preparedness and resilience at all levels of government, including collaborative work across agencies' regional offices and hubs, and through coordinated development of information, data, and tools. Examples of collaborative climate adaptation efforts with active Departmental involvement include:

- leading the Landscape Conservation Cooperatives (federal, state, tribal, and local governments along with First Nations, non-governmental organizations, universities, and interested public and private organizations);
- leading the Climate Science Centers (located at partner universities and are often comprised of multi-institution consortia, including other universities, tribal partners, and federal research labs);
- co-leading the Joint Implementation Working Group for the *National Fish, Wildlife, and Plants Climate Adaptation Strategy;*
- co-chairing the federal Interagency Adaptation Community of Practice;
- active multiple-bureau involvement in the Interagency Land Management Adaptation Group;
- involvement in the Interagency Climate Change and Ocean Acidification sub-group (National Ocean Policy implementation);
- co-chairing the U.S. Group on Earth Observations, which assesses and coordinates to support the Nation's critical Earth science data collection efforts, including the U.S. Geological Survey's Landsat satellites and streamgage network, among other Departmental programs, and works to enhance the availability and usability of data underpinning natural resource decisionmaking; and playing a leadership role in the U.S. delegation to the international Group on Earth Observations, which similarly coordinates to improve data collection and provision across national boundaries; and
- engaging youth in community resilience activities through interagency involvement in the 21st Century Conservation Service Corps.

## IV. Modernizing Programs to Support Climate Resilience Investment

The Department is working with its bureaus to:

- identify and seek to remove or reform barriers that discourage investments or other actions to increase the Nation's resilience to climate change while ensuring continued protection of public health and the environment;
- to identify policies and federal funding programs that may, perhaps unintentionally, increase the vulnerability of natural or built systems, economic sectors, natural resources, or communities to climate change related risks; and
- identify opportunities to support and encourage smarter, more climate resilient investments by States, Tribes, and local communities, including by providing incentives through agency guidance, grants, technical assistance, performance measures, safety considerations, and other programs.

The Department's bureaus have completed initial reviews of programs and activities and have identified opportunities to modernize federal programs under their authorities. The Department continues to work with bureaus to ensure that the list of opportunities to improve climate resilience is comprehensive. The Department will also take into consideration the advice and recommendations of the Climate Preparedness and Resilience Council, the Council's four working groups, and the State, Local, and Tribal Leaders Task Force

The Department's bureaus identified the following as potential opportunities to improve the Nation's climate resilience. The initial action needed, timing, and additional resources required generally reflect the first level of action required to address the barrier.

***Barriers to Climate Resilience Investments***

*Water rights for trust resources*

- Description: The third National Climate Assessment projects an increased prevalence of drought in the Western United States due to climate change,[19] which could reduce water availability for fish, wildlife and plant habitats. The lack of sufficient water supplies for trust resources is a potential barrier to climate resilience. Increased federal prioritization for the acquisition and protection of water rights for trust resources will likely be needed to ensure sufficient water supply.
- Action: Conduct review of legal, programmatic and policy considerations.
- Timing: Q4/FY2014, Q1/FY2015
- Additional resources needed: Undetermined

*Streamlining land acquisition procedures*

- Description: Climate change is projected to impact species habitat in a number of ways including range shifts, habitat fragmentation and spread of invasive species. Acquisition of new habitat –via fee simple or easement – will likely become an important tool for vulnerable species protection. Current land acquisition projects often require several years to complete from start to finish – years that may not be available for species in certain situations. New streamlined tools for land acquisitions under existing authorities would help improve climate resilience for vulnerable species.
- Action: Examine the Department's implementation of the Land and Water Conservation Fund and other land acquisition mechanisms to identify opportunities to develop streamlined procedures.
- Timing: Q4/FY2014, Q1/FY2015
- Additional resources needed: Undetermined

*Facilitating pooling of resources across agencies for common needs*

- Description: Many climate change adaptation actions addressing natural resource management will involve multiple federal agencies. While some tools currently exist for agencies to pool resources to address common needs, there are likely more that could be developed. Having better tools to pool resources across agencies for common climate adaptation needs would enhance the Department's ability to increase resilience.

- Action: Work with the Department's bureaus and partner agencies to identify opportunities for pooling resources.
- Timing: FY2015
- Additional resources needed: Undetermined

*Funding for proactive approaches to wildfire management such as prescribed fire and fuel treatments*

- Description: The third National Climate Assessment projects increased wildland fire activity for areas in the Western United States due to increased drought.[20] Additional funding for proactive approaches to wildfire management could help manage wildland fire fuels and reduce the risk of catastrophic fires.
- Action: Work with the Office of Management and Budget and Congress to explore mechanisms to fund additional proactive wildland fire management activities.
- Timing: FY2015 and beyond.
- Additional resources needed: Undetermined

**Prescribed Fire at Yosemite National Park**

*Lifting the SECURE Water Act Section 9504(a) Appropriations Ceiling*:

- Description: Section 9504(a) of the SECURE Water Act is a critical tool for engaging stakeholders and creating incentives to address climate change adaptation strategies, and is the basis for important programs such as the Bureau of Reclamation's WaterSMART Grants program; the Water Conservation Field Services Program; grants in California under the Bay-Delta Restoration Program (including both CALFED Water Use Efficiency Grants and Agricultural Water Conservation and Efficiency Projects implemented in coordination with the Natural Resources Conservation Service); including the grants highlighted in the President's Climate Action Plan (Section II, "Protecting our Economy and Natural Resources") as key to maintaining agricultural sustainability in the face of drought and long-term climate change. Section 9504 authorizes the appropriation of $200 million to carry out cost-shared financial assistance. Reclamation's current estimate is that sufficient ceiling remains for FY 2014, but is insufficient to support the full suite of activities proposed in the President's FY 2015 Budget.
- Action: Congressional action is necessary to increase the appropriations ceiling.
- Timing: Immediate
- Additional resources needed: Undetermined

*Implement science-based carbon management*

- Description: The lands and waters managed by DOI and its partners could provide increased benefits for carbon storage, both globally by absorbing atmospheric carbon and locally by addressing soil and water quality issues, if appropriate carbon management strategies are employed. The U.S. Geological Survey has completed carbon assessments for the Lower 48 states; Alaska and Hawaii are in progress. The U.S. Geological Survey is currently working with the U.S. Fish and Wildlife Service and other partners to develop management-level decision tools to incorporate carbon management and carbon accounting into routine resource management actions, and to put climate change adaptation and mitigation actions into a single decision framework so as to decrease the likelihood of policies and management actions with contradictory effects.
- Action: Consider incorporating a formal policy requirement for DOI bureaus to incorporate carbon storage as an explicit element of resource management plans.
- Timing: Policy review to begin immediately. Implementation within one year.
- Additional resources needed: Undetermined

*Support full implementation of Climate Science Centers*

- Description: Climate Science Centers were designed to provide scientific information to support adaptation planning. Current funding levels are approximately half of planned levels, resulting in an inability to meet stakeholders' needs for both science and cross-partner consultation. The President's budget has requested substantial increases over the two most recent fiscal years, and early plans had called for contributions of staff or resources from other DOI bureaus. The July 2014 announcement of BIA's contribution of tribal staff to Climate Science Centers is a positive step toward the vision of Climate Science Centers supporting the science and decision-support needs of all of the Department's responsibilities.
- Action: Work with the Office of Management and Budget and Congress to increase the appropriations levels. Seek avenues to increase interactions with other bureaus, including by co-locating staff at Climate Science Centers.
- Timing: Immediate
- Additional resources needed: An annual budget of approximately $50 million

***Reform Policies and Programs that May Increase Climate Vulnerabilities***

*Reform Reclamation's Drought Program*

- Description: Historically, earmarked funding and limitations in program authority have created an incentive to use Drought program funding for drilling wells, and a disincentive to use funding for contingency planning to identify a range of other drought mitigation actions that might be more effective in the long-term. Reclamation is in the process of reformulating this program to implement drought actions and comprehensive drought planning that incorporates climate change and involves collaboration by a broader range of stakeholders than in the past.
- Action: Broaden the Drought program from providing emergency support for wells, to identifying a suite of strategies and actions that will help mitigate the short-term impacts

of drought, and address the longer-term impacts of adapting to more severe and more frequent droughts.
- Timing: Immediate
- Additional resources needed: Undetermined

*Reduce incentives for development in fire-prone areas*
- Description: The third National Climate Assessment projects the prevalence of wildland fires to increase in the western United States while development in those areas is expected to expand.[21] The recently issued National Cohesive Wildland Fire Management Strategy and accompanying Action Plan identifies collaborative actions for all levels of government and partners that can assist in creating fire-adapted communities.[22]
- Action: Support the National Cohesive Wildland Fire Management Strategy and its collaborative actions. Conduct a review, with all appropriate stakeholders, of polices/procedures for fire prevention, suppression and disaster assistance payments.
- Timing: FY2015/FY2016
- Additional resources needed: Undetermined

***Opportunities to Support and Encourage Smarter, More Climate Resilient Investments by States, Tribes, and Local Communities***

*WaterSMART Grants (Bureau of Reclamation)*
- Description: Through the WaterSMART Grants, Reclamation provides cost-shared assistance on a competitive basis for water and energy efficiency improvements, including projects that save water, increase energy efficiency and the use of renewable energy in water management, address endangered species and facilitate transfers to new uses. Reclamation prioritizes WaterSMART Grant proposals that implement a climate adaptation strategy identified in a WaterSMART Basin Study or that explain other ways that the project would contribute to sustainability (e.g., addressing water shortages due to climate variability or addressing an issue that could potentially result in an interruption to the water supply).
- Action: Continue to make funding available for projects that contribute to climate resilience.
- Timing: FY2014
- Additional resources needed: Undetermined

*CALFED Water Conservation Grants (Bureau of Reclamation)*
- Description: CALFED is a combined State of California and Federal program focused on the restoration of the Sacramento-San Joaquin Delta's fragile ecosystem while improving water supply reliability for urban and agricultural water users.
- Action: Continue to make funding available for projects that improve water supply to better prepare for the impacts of climate change.
- Timing: FY2014
- Additional resources needed: Undetermined

*Title XVI Water Reclamation and Reuse Program (Bureau of Reclamation)*

- Description: Through the Title XVI Water Reclamation and Reuse Program, Reclamation provides funding for projects that reclaim and reuse municipal, industrial, domestic or agricultural wastewater and naturally impaired ground or surface waters. Water recycling through the Title XVI Program provides flexibility, helps to diversify the water supply, and reduces the pressure to transfer water from agricultural to urban uses. Reuse is often a drought-resistant supply, since sources such as treated municipal wastewater continue to be available during periods of water shortage. Reclamation prioritizes Title XVI projects that address water supply shortages due to climate variability.
- Action: Continue to make funding available for projects that contribute to climate resilience and explore opportunities to strengthen consideration of climate resilience in project planning.
- Timing: FY2014/FY2015
- Additional resources needed: Undetermined

*Appalachian Regional Reforestation Initiative (Office of Surface Mining Reclamation and Enforcement)*

- Description: A cooperative effort by the states of the Appalachian Region with the Office of Surface Mining to encourage restoration of high quality forests on reclaimed coalmines in the eastern USA. The Appalachian Regional Reforestation Initiative continues to focus on establishing productive forests on reclaimed mine lands to aid restoration of ecosystem services provided by forests – services such as watershed protection, water quality enhancement, carbon storage and native wildlife habitat.
- Action: Explore opportunities to expand climate resilience strategies.
- Timing: Q4/FY2014
- Additional resources needed: Undetermined

*State Wildlife Grants Program (U.S. Fish and Wildlife Service)*

- Description: The State Wildlife Grants Program provides federal grant funds for developing and implementing programs that benefit wildlife and their habitats, including species not hunted or fished. Priority is placed on projects that benefit species of greatest conservation need. Grant funds must be used to address conservation needs, such as research, surveys, species and habitat management, and monitoring, identified within a State's Comprehensive Wildlife Conservation Plan/Strategy. The Service has been working to integrate climate change into the competitive portion of this program to help incentivize adaptation planning at a variety of scales.
- Action: Explore opportunities to further integrate climate change adaptation into the Program, overall.
- Timing: Q4/FY2014
- Additional resources needed: Undetermined

*Cooperative Landscape Conservation (Climate Change)*

- Description: BIA created the Cooperative Landscape Conservations (Climate Change) Program to coordinate climate change funding and technical support for tribes. Support can be categorized into 6 areas: coordination; expanding climate knowledge and capacity; participating in the climate communities; developing science and tools; cultivating the

next generation of tribal climate experts; and enabling Tribes to prepare for climate resilience through direct support of tribal government adaptation planning, development of vulnerability assessments, supplemental monitoring, and identification and implementation of pilot projects.

- Action: Continue Program in FY2014.
- Timing: FY2014
- Additional resources needed: Undetermined

## V. Conclusion

This climate change adaptation plan describes the Department of the Interior's ongoing and planned activities to address climate change by building resilience in natural and cultural resources and the communities that are impacted by the Department's management and operations. Climate change adaptation is a long-term endeavor requiring a scientific understanding of vulnerabilities and a sound, yet flexible, plan to address the impacts. The Department is committed to incorporating adaptation into planning and operations and looks forward to working with federal and nonfederal partners to improve understanding, develop effective tools, and identify and implement best practices.

## References and Notes

[1] Ice Patch Archeology and Paleoecology at Glacier National Park. National Park Service. May 23, 2014. http://www.nps.gov/stories/glacicepatch.htm

Pederson, G.T., L.J. Graumlich, D.B. Fagre, T. Kipfer and C.C. Muhlfeld. 2009. A century of climate and ecosystem change in Western Montana: what do temperature trends portend?. Climatic Change 96: DOI 10.1007/s10584-009-9642-y, 22pp..

Peterson, D.L. 1998. Climate, limiting factors, and environmental change in high-altitude forests of western North America. Pages 191-208 In M. Beniston and J.L. Innes (eds), The Impacts of Climate Variability on Forests, Springer, Heidelberg.

Western Forestry Leadership Coalition, 2009. Western Bark Beetle Assessment, 20pp.

Mote, P., A. Hamlet, M. Clark, and D. Lettenmaier. 2005: Declining mountain snowpack in western North America. Bulletin of the American Meteorological Society 86-1-39, DOI: 10.1175.

A. L. Westerling, H. G. Hidalgo1, D. R. Cayan and T. W. Swetnam. 2006: Warming and Earlier Spring Increase Western U.S. Forest Wildfire Activity. Science Vol. 313 no. 5789 pp. 940-943 DOI: 10.1126

Ice Patch Archeology and Paleoecology at Glacier National Park. National Park Service. May, 24 2014. http://www.nps.gov/stories/glacicepatch.htm

[2] Walsh, J., D. Wuebbles, K. Hayhoe, J. Kossin, K. Kunkel, G. Stephens, P. Thorne, R. Vose, M. Wehner, J. Willis, D. Anderson, S. Doney, R. Feely, P. Hennon, V. Kharin, T. Knutson, F. Landerer, T. Lenton, J. Kennedy, and R. Somerville, 2014: Ch. 2: Our Changing Climate. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 19-67. doi:10.7930/J0KW5CXT.

[3] United States Environmental Protection Agency. Adaptation Overview. September 2013.

[4] The Department's use of the term *resilience* in this document is consistent with the definition of resilience in Executive Order 13653, "the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions."

[5] Department of the Interior Climate Change Adaptation Policy. (532 DM 1) December 2012. http://www.epa.gov/climatechange/impacts-adaptation/adapt-overview.html

[6] Executive Order 13653 – Preparing the United States for the Impacts of Climate Change. November 2013

[7] National Action Plan: Priorities for Managing Freshwater Resources in a Changing Climate. October 2011

[8] National Fish, Wildlife and Plants Climate Adaptation Partnership. 2012. National Fish, Wildlife and Plants Climate adaptation Strategy. Association of Fish and Wildlife Agencies, Council on Environmental Quality, Great Lakes Indian Fish and Wildlife Commission, National Oceanic and Atmospheric Administration, and U.S. Fish and Wildlife Service. Washington, DC.

[9] Interagency Climate Adaptation Task Force. April 2013. National Ocean Policy Implementation Plan. Washington, DC.

[10] Clement, J.P., J.L. Bengtson, and B.P. Kelly. 2013. Managing for the Future in a Rapidly Changing Arctic. A Report to the President. Interagency Working Group on Coordination of Domestic Energy Development and Permitting in Alaska (D.J. Hayes, Chair), Washington, D.C.

[11] Insular areas include: The territories of American Samoa, Guam, the U.S. Virgin Islands, and the Commonwealth of the Northern Mariana Islands; and the Freely Associated States of the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau.

[12] Clement, J.P. et al. 2014. A strategy for improving the mitigation policies and practices of the Department of the Interior. A report to the Secretary of the Interior from the Energy and Climate Change Task Force, Washington, D.C., 25 p.

[13] DOI's Guiding Principles are informed by the Interagency Climate Change Adaptation Task Force's "Guiding Principles" and "National Action Plan: Priorities for Managing Freshwater Resources in a Changing Climate;" the National Fish, Wildlife, and Plants Climate Adaptation Strategy; and the National Ocean Council's "Draft National Ocean Policy Implementation Plan."

[14] http://www.doi.gov/ppa/Adaptive-Management.cfm

[15] The principles and general approach for scenario planning in the context of natural resource management are discussed in: Peterson, G.D., G.S. Cumming, and S.R. Carpenter. 2003. Scenario Planning: a Tool for Conservation in an Uncertain World. Conservation Biology 17: 358-366.

[16] Additional information available at the United Nations Educational, Scientific, and Cultural Organization website: http://www.unesco.org/culture/ich/index.php?lg=en&pg=00001

[17] Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. February 1994

[18] Moser, S. C., M. A. Davidson, P. Kirshen, P. Mulvaney, J. F. Murley, J. E. Neumann, L. Petes, and D. Reed, 2014: Ch. 25:*Coastal Zone Development and Ecosystems. Climate Change Impacts in the United States: The Third National Climate As- sessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, , 579-618.

[19] Walsh, J., D. Wuebbles, K. Hayhoe, J. Kossin, K. Kunkel, G. Stephens, P. Thorne, R. Vose, M. Wehner, J. Willis, D. Anderson, V. Kharin, T. Knutson, F. Landerer, T. Lenton, J. Kennedy, and R. Somerville, 2014: Appendix 3: Climate Science Supplement. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, p. 771.

[20] Walsh, J., D. Wuebbles, K. Hayhoe, J. Kossin, K. Kunkel, G. Stephens, P. Thorne, R. Vose, M. Wehner, J. Willis, D. Anderson, V. Kharin, T. Knutson, F. Landerer, T. Lenton, J. Kennedy, and R. Somerville, 2014: Appendix 3: Climate Science Supplement. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, p. 772.

[21] Walsh, J., D. Wuebbles, K. Hayhoe, J. Kossin, K. Kunkel, G. Stephens, P. Thorne, R. Vose, M. Wehner, J. Willis, D. Anderson, V. Kharin, T. Knutson, F. Landerer, T. Lenton, J. Kennedy, and R. Somerville, 2014: Appendix 3: Climate Science Supplement. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, p. 772.

[22] National Cohesive Wildland Fire Management Strategy. June 2014. http://www.forestsandrangelands.gov/strategy/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