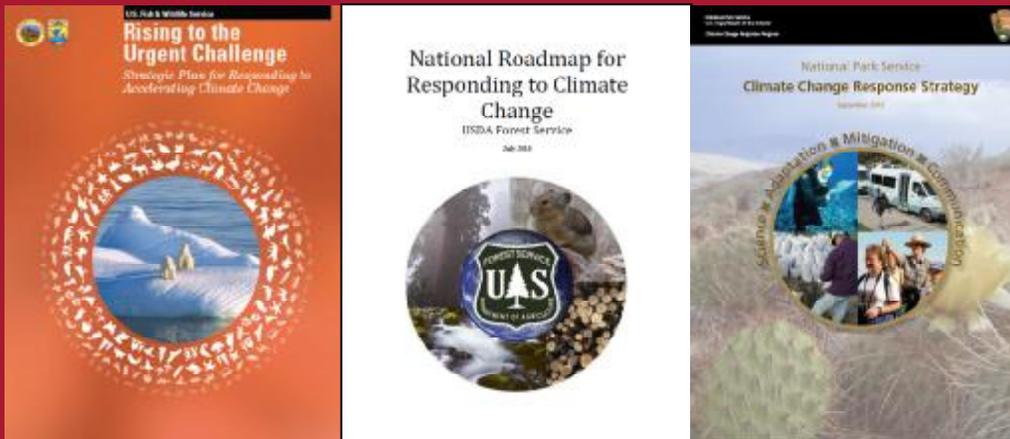


# Climate Change and Federal Land Management

A Comparison of the U.S. Fish & Wildlife Service, National Park Service, and U.S. Forest Service Climate Change Strategies



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## Introduction

The past few years have seen the emergence of nearly unanimous acknowledgement of the reality of anthropogenic climate change among scientists both within the U.S. (USGCRP 2009, NAS 2008) and internationally (IPCC 2007). Emissions of greenhouse gases have already caused a 2°F increase in the average temperature in the U.S., which is contributing to heat waves, melting glaciers, and more frequent and severe droughts and strong storms. These impacts are expected to continue and intensify in the future, given the current trajectory of greenhouse gas emissions. In fact, even if nations do move quickly to curtail emissions from transportation, electricity generation, land use, and industrial processes, we can expect climate change to proceed, albeit to a lesser degree, due to the “built-in” effect from emissions to date. Thus, scientists and policymakers have increasingly recognized the need to adapt to the impacts of climate change on both human and natural communities (NAS 2010).

Natural resource agencies are increasingly incorporating climate change considerations into their wildlife and ecosystem science, planning, and conservation activities, and the need to do so has been recognized at the highest levels of the federal government. For instance, the Department of the Interior, which manages 500 million acres of public lands through the Bureau of Land Management, the U.S. Fish and Wildlife Service, National Park Service and other agencies, issued Secretarial Order 3289 (22 Feb 2010), which states: “The Department is also taking the lead in protecting our country’s water, land, fish and wildlife, and cultural heritage and tribal lands and resources from the dramatic effects of climate change that are already occurring – from the Arctic to the Everglades. The realities of climate change require us to change how we manage the land, water, fish and wildlife, and cultural heritage and tribal lands and resources we oversee” (DOI 2010). Similarly, the U.S. Department of Agriculture, which includes the 193 million acres of National Forests and Grasslands, is guided by a Strategic Plan which states as one of its goals: “Ensure our National Forests and private working lands are conserved, restored, and made more resilient to climate change, while enhancing our water resources.”

In October 2010, the White House Council on Environmental Quality released its “Progress Report of the Interagency Climate Change Adaptation Task Force: Recommended Actions in Support of a National Climate Change Adaptation Strategy” (CEQ 2010). The Adaptation Task Force Report reaffirmed the importance of adaptation for “fish, wildlife and plant resources and their habitats” as one of the “Key Cross-Cutting issues” to be addressed (Goal 3). The Adaptation Task Force Report reiterated that development of a National Fish, Wildlife and Plants Climate Adaptation Strategy was mandated by the Fiscal Year 2010 Appropriations Act. The strategy, due to be completed by 2012, is being developed by the Council on Environmental Quality (CEQ), the U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration (NOAA) in partnership with scores of federal and state agencies and other stakeholders (see <http://www.fws.gov/nfwcas.html>). In addition, the Task Force report called for the development of individual agency climate adaptation strategies. Guidance on the development of these plans is expected by early 2011.

In the meantime, several agencies have moved forward with their own climate change strategies. Within the past two years, three of the four major federal land management agencies (The U.S. Fish and Wildlife Service and National Park Service within Interior and the U.S. Forest Service in USDA) have released strategies for responding to the various challenges posed by climate change. This paper compares and contrasts the goals, objectives and actions proposed by these plans. While each of these agencies developed their strategies in isolation, our analysis found considerable overlap between them, both in the overall organization and categorization of their goals, as well as in the individual objectives within the goals. We are highlighting these common elements in hope that this

can facilitate coordination between these agencies as well as offer lessons for the National Fish, Wildlife, and Plant Climate Adaptation Strategy and other individual agencies undertaking similar planning.

## Plan Organization and Goals

The U.S. Fish and Wildlife Service (FWS) released its final climate plan, titled “Rising to the Urgent Challenge: Strategic Plan for Responding to Accelerating Climate Change,” in September, 2010. The FWS plan contains seven goals, grouped in three categories: Adaptation (four goals), Mitigation (two goals) and Engagement (one goal).

The National Park Service (NPS) released its “Climate Change Response Strategy” also in September, 2010. The NPS plan is similar in structure to the FWS plan, except that it splits “Science” into a separate category of goals. The NPS plan contains 15 goals, grouped in four categories, Science (4 goals), Adaptation (4 goals), Mitigation (3 goals) and Communication (4 goals).

The U.S Forest Service (USFS) released its “Strategic Framework for Responding to Climate Change” in October, 2008. The structure of this plan differs from the two Interior Department plans in that it articulates 7 broad goals, each in a category of its own: Science, Adaptation, Policy, Mitigation, Sustainable Operations, Education, and Alliance. Despite these differences in organization, there are parallels with the other two plans. Science, Adaptation, and Mitigation goals each correspond exactly to a category in the NPS plan, and while Science does not get its own heading in the FWS plan, science-related goals and objectives suffuse the document. Similarly, whereas neither the NPS nor FWS plans have an overarching “Policy” category, both have policy-related goals and objectives. Furthermore, the USFS “Sustainable Operations” goal corresponds to goals set out by both FWS and NPS under their Mitigation headings. “Education” and “Alliances” conform well to goals laid out under the FWS “Engagement” heading and the NPS “Communication” heading. The Forest Service followed the Strategic Framework with a 2010 “Roadmap” describing the ongoing, immediate and long-term actions to be taken to implement the strategic framework, by “Assessing”, “Managing”, and “Engaging” on various issues. As we compared the agency plans, we found in several instances that it added significant new detail to the USFS objectives, and we have included the Roadmap elements accordingly.

One way to visualize the organization of the three agency plans is as follows:

	FWS	NPS	USFS	COMBINED
Individual agency categorization of goals	1. Adaptation	1. Science 2. Adaptation	1. Science 2. Adaptation 4. Policy	<i>Policy</i> <i>Adaptation Science &amp; Management</i>
	2. Mitigation	3. Mitigation	3. Mitigation 5. Sustainable Operations	<i>Mitigation</i>
	3. Engagement	4. Communication	6. Education 7. Alliances	<i>Education, Outreach &amp; Collaboration</i>

The three plans also contain considerable overlap in the recommendations and objectives set forth in each, as will be explored below.

## Individual Objectives within Plans

Many nations, federal agencies, and other entities are currently grappling with the question of what should be addressed in both broad climate change strategies and in specifically adaptation-related climate change strategies. While an exhaustive review of these is beyond the scope of this paper, the three land-management agencies explored here are well in line with other plans currently under development. For instance, the Environmental Protection Agency's "National Water Program Strategy: Response to Climate Change" (September 2008), outlines five goals for the National Water Program, which include mitigation, adaptation, research, education, and capacity building – all parallel to the three plans discussed here.

Delving into the individual objectives in the plans allows us to compare and contrast the agencies' approaches, and taken together they provide a fairly comprehensive template for national climate change strategic planning.

### Policy

While only the USFS included Policy as a broad goal, all three agencies had objectives relating to the overarching importance of climate change to the agency and the need to evaluate current agency law and policy in light of it.

#### *Broad Objectives of Incorporating Climate Change into Agency Function*

All three agencies' strategic plans include "paradigm-shifting" objectives, stating their intent to more fully integrate climate change into their management activities and decision-making processes. The FWS strategy states that consideration of present and future climate will be included in Endangered Species Act listing decisions, management plans, recovery plans. The Forest Service also provides a new paradigm under which management decisions will be linked to the results of climate change assessments, as well recognition of the need to make management decisions in the face of uncertainty. NPS also recognizes the need to incorporate climate change planning and adaptive management into agency functions.

FWS	<ul style="list-style-type: none"><li>•Inspire, organize, and carry out a collaborative process that brings together diverse interests to develop a National Fish and Wildlife Climate Adaptation Strategy; and fully integrate resource management agencies and organizations from around the country and internationally into the process. (Objective 1.1)</li><li>•Incorporate climate change in Service activities and decisions. (Objective 2.4)</li></ul>
NPS	<ul style="list-style-type: none"><li>•Incorporate the Department of the Interior adaptive management framework into routine planning to facilitate flexible responses to climate change as new information arises. (Objective 5.2)</li></ul>
USFS	<ul style="list-style-type: none"><li>•Implement approaches and incentives to encourage managers to make responsible management decisions in the face of uncertainty. (Objective 4.5)</li><li>•Promote innovation by incorporating the results of Environmental Management System's scientifically-designed monitoring into decision-making. (Objective 4.7)</li></ul>

## Law and Policy

Each of the three agencies has signaled the intent to examine its existing policies to identify barriers to adapting to and mitigating climate change. For instance, modification of grant criteria under fish and wildlife statutes like Pittman-Robertson is not allowed under current law. Furthermore, new policies may be needed in order to implement certain adaptation tools, such as managed relocation.

<b>FWS</b>	• Evaluate Fish and Wildlife Service laws, regulations and policies to identify barriers to and opportunities for successful implementation of climate change actions. (Objective 2.6)
<b>NPS</b>	• Evaluate legal and policy considerations for planning and climate adaptation and revise guidance where appropriate. (Objective 5.3)
<b>USFS</b>	• Evaluate and remove the institutional barriers, policies, and constraints that exist to implementing effective management activities to address climate change (Objective 4.4)

## Adaptation Science and Management

We identified ten areas of emphasis in the agencies' approaches to Adaptation, Science and Management. These fell into two categories, "Science, Assessment and Planning" and "Management Actions":

### Science, Assessment and Planning

- Planning
- Modeling
- Assessments & Prioritization
- Research and Evaluation
- Monitoring

### Management

- Species-level Adaptation Actions
- Ecosystem-level Adaptation Actions
- Aquatic and Marine Resources
- Cultural Resources
- Infrastructure

## Planning

All three agencies have identified planning as a critically important component of their climate change responses. Planning objectives span multiple geographic scales and agency functions. At the largest scale, FWS has stated its intent to develop a National Fish, Wildlife, and Plant Climate Adaptation Strategy (FWS Objective 1.1 is repeated here because the two clauses in this objective relate to planning and to overall agency policy). Such a strategy would encompass multiple land ownership jurisdictions, resource types, and habitats. FWS's commitment to planning at a large scale is also evident in its use of Landscape Conservation Cooperatives, which are based on existing conservation partnerships geared toward coordinating conservation activities (such as migratory bird management) at an ecoregional scale.

Forest Service also identifies multiple levels of planning, including individual forest plans, multi-unit plans to address issues like fire response, water, and ecological restoration, up to agency-wide strategic and budget planning.

FWS	<ul style="list-style-type: none"><li>•Inspire, organize, and carry out a collaborative process that brings together diverse interests to develop a National Fish and Wildlife Climate Adaptation Strategy; and fully integrate resource management agencies and organizations from around the country and internationally into the process. (Objective 1.1)</li><li>•Develop Landscape Conservation Cooperatives to acquire biological planning and conservation design expertise (Objective 2.2)</li></ul>
NPS	<ul style="list-style-type: none"><li>•Complete guidance for anticipating, evaluating, and addressing climate change in planning products and identify resources needed to fully implement new planning guidelines (Objective 5.1)</li><li>•Conduct scenario planning to explore the range of potential conditions that parks may experience and the possible consequences associated with particular actions (Objective 5.4)</li></ul>
USFS	<ul style="list-style-type: none"><li>•Address climate change as a part of agency plans and direction to the field, including: Program budgeting, Forest planning and NEPA, Strategic plans at various levels (Forest Service Strategic Plan, Ecological Restoration Plan, Cohesive Fuels Management Strategy, Water Strategy, Open Space Conservation Strategy, and others) (Objective 4.3)</li></ul>

### Modeling

Each agency is actively engaged in using climate models to predict climate change impacts and inform the planning and assessment processes described above. FWS and NPS state in their narratives the intent to access the expertise of the U.S.G.S. Climate Change and Wildlife Science Center for modeling and spatial analysis. NPS also emphasizes the need to provide input to modelers to ensure that their data is incorporated into models and that the results are useful for NPS decision making. USFS includes a goal of creating a “rapid national analysis of the implications of climate change” in their policy section. They also mention prediction of ecological effects as part of one of their broader science goals (see “Science” section below).

FWS	<ul style="list-style-type: none"><li>• Access regional climate science and modeling expertise through Regional Climate Science Partnerships. (Objective 2.1)</li></ul>
NPS	<ul style="list-style-type: none"><li>• Characterize the locations and severity of change expected for key climate attributes. (Objective 2.2)</li><li>• Facilitate development of models that can be used by managers to plan for and adapt to climate change impacts. (Objective 2.3)</li></ul>
USFS	<ul style="list-style-type: none"><li>• Create a rapid national analysis of the implications of climate change for the Nation’s forests and grasslands and our capacity to respond to them, including economic and social costs and benefits to the agency and society. (Objective 4.1)</li></ul>

### Assessments & Prioritization

Each agency's plan recognizes the need to developing tools for the assessment of vulnerability. An early draft of the FWS strategic plan listed "Conduct species and habitat vulnerability assessments" but this was replaced in the final with a broader objective of "conducting adaptation planning for key species and habitats." The narrative associated with this objective makes clear that vulnerability assessments are one such tool, along with scenario planning, use of downscaled projections, risk assessments, and other tools. NPS also signals its intent to use multiple tools, including both vulnerability assessments and scenario planning. USFS provides less detail in their plan narrative about the types of tools, but does specify that they will conduct assessments at regional and landscape scales. FWS and NPS view these assessments as furthering their adaptation goals, whereas USFS places assessments within their science goal. NPS and USFS also include in their plans a specific objective related to prioritization of climate change-threatened resources and needed management actions. FWS does not list prioritization as an independent objective; however, priority-setting is one of the overarching principles that inform their strategic plan, and prioritization is mentioned repeatedly throughout the narrative.

FWS	<ul style="list-style-type: none"><li>•Develop expertise in and conduct adaptation planning for key species and habitats. (Objective 2.3)</li></ul>
NPS	<ul style="list-style-type: none"><li>•Collaborate with federal, state, and local partners and programs to acquire, evaluate, and develop tools, such as vulnerability assessments and scenario planning, to inform the development of adaptation plans at appropriate scales. (Objective 6.1)</li><li>•Develop methods to prioritize resources that are threatened by climate change using scientific assessments, policy, management capacity, and information from stakeholders. (Objective 6.2)</li></ul>
USFS	<ul style="list-style-type: none"><li>•In collaboration with partners and stakeholders, carry out integrated regional and sub-regional landscape-scale assessments of the multiple implications of climate change to improve adaptation, mitigation, and conservation activities on forest and grassland ecosystems and the values, outputs and ecosystem services they provide. (Objective 1.5)</li><li>•Set priorities for where, when and how to employ adaptation activities and implement actions that will: Facilitate adaptation to the long-term effects of climate change by fostering resilient, productive, and functional ecosystems, and Prioritize types and distribution of management activities for the greatest benefits to ecosystems and society. (Objective 2.1)</li></ul>

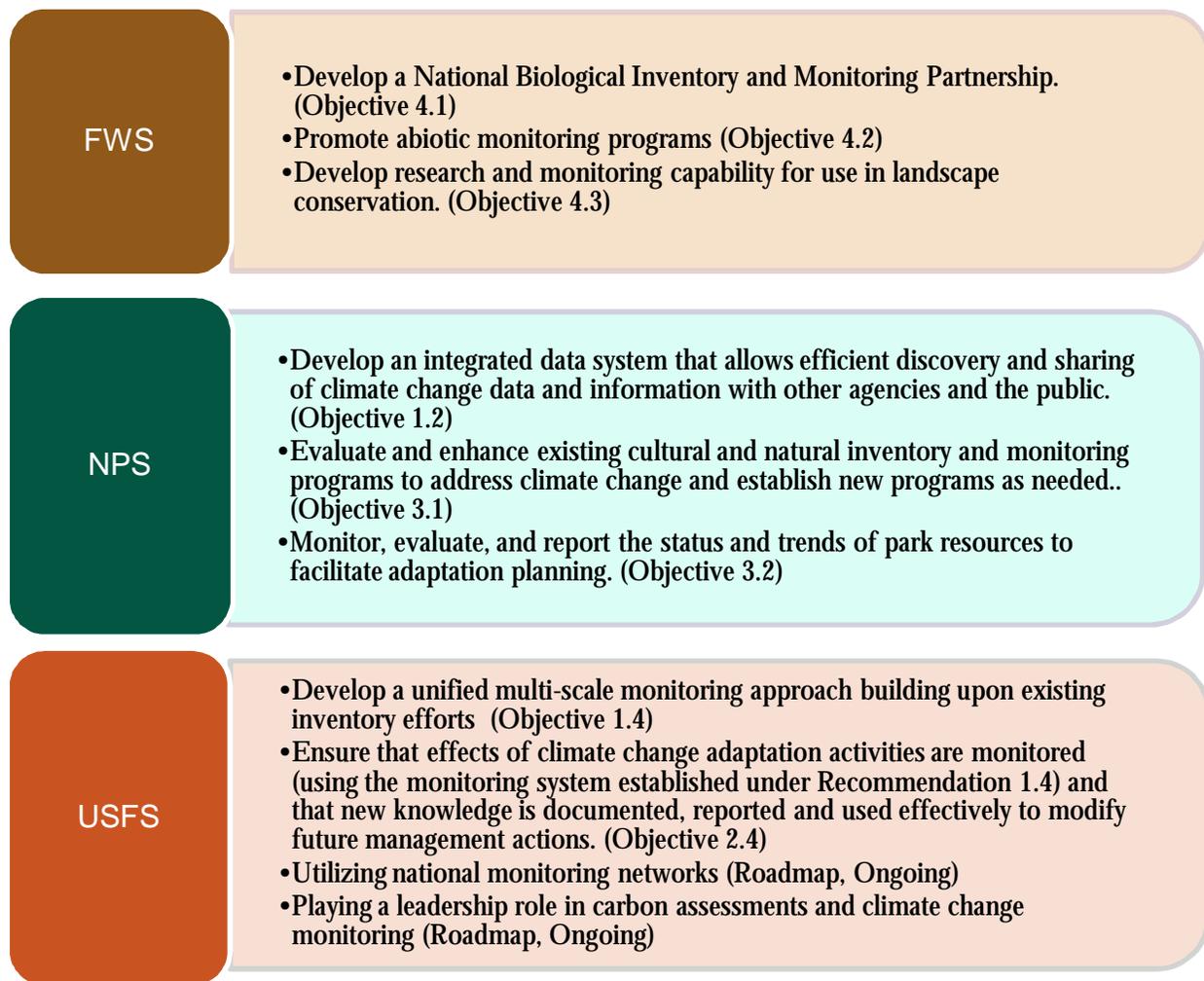
### Research & Evaluation

FWS describes their science goals extensively in the narrative of their modeling objective (see above), and they only have one other objective that addresses science needs. NPS and USFS, on the other hand, both list “Science” as one of their categories or top-level goals, and thus have more detailed and numerous objectives pertaining to research needs, evaluation criteria, and development of effectiveness measures. NPS lists a broad objective of better integrating climate change into all aspects of their science-related activities. NPS also identifies basic science needs that are intended to feed into their modeling and assessment activities.

FWS	<ul style="list-style-type: none"><li>• Access regional climate science and modeling expertise through Regional Climate Science Partnerships. (Objective 2.1)</li><li>• Further Develop Collaborative Research Partnerships (Objective 4.4)</li></ul>
NPS	<ul style="list-style-type: none"><li>• Integrate climate change considerations into all science activities where appropriate, including research, assessments, planning, reporting, and operational evaluations. (Objective 1.1)</li><li>• Identify and characterize the climate attributes and variables that are most important to park resources, infrastructure, and visitor experience. (Objective 2.1)</li><li>• Develop criteria with other federal, state, and local partners and programs to measure and evaluate core concepts that may be used to direct adaptation strategies. (Objective 3.3)</li></ul>
USFS	<ul style="list-style-type: none"><li>• Review and adjust priorities for the most critical focus areas for Forest Service research, development, and application activities. (Objective 1.2)</li><li>• Effectively move science into application, including synthesis of current research and monitoring information, incorporating science into decision support tools, disseminating new knowledge to managers, and integrating tools into common data and analysis structures. (Objective 1.3)</li><li>• Implement effectiveness monitoring systems to evaluate the results of management actions designed to facilitate adaptation and mitigation. (Roadmap)</li></ul>

## Monitoring

All three agencies identified monitoring as an important aspect of their adaptation responses. FWS combines development of monitoring capabilities with other research needs; whereas NPS and USFS place monitoring as a stand-alone objective. USFS and NPS also separate their monitoring needs into two objectives: development of a monitoring program as one goal, with the undertaking and evaluation of the program as a separate goal. The agencies also concur that national partnerships and data sharing are needed for effective monitoring and data sharing. FWS proposes a National Biological Inventory and Monitoring Partnership that would build ongoing efforts by both NPS and USFS, along with the USGS National Phenology Network and others. FWS also specifically sets a goal of improving abiotic monitoring and remote sensing programs. USFS monitoring coordination efforts are described in the Roadmap.



### *Species-Level Adaptation Actions*

Only FWS specifically lists objectives intended to directly benefit individual species that are threatened by climate change. They list both a very general objective of “taking conservation action” for those species that face vulnerabilities due to climate change, and they also list two more specific species-related objectives: reducing vulnerability to diseases, pathogens and pests, and managing genetic resources. The Forest Service, however, does mention conservation of genetic resources in its 2010 “Roadmap” for implementing their strategy.

FWS	<ul style="list-style-type: none"><li>•Take conservation action for climate-vulnerable species. (Objective 3.1)</li><li>•Manage genetic resources (Objective 3.6)</li><li>•Reduce susceptibility to diseases, pathogens, and pests. (Objective 3.7)</li></ul>
NPS	<ul style="list-style-type: none"><li>• <i>Specific species-level adaptation considerations not directly addressed.</i></li></ul>
USFS	<ul style="list-style-type: none"><li>•Implement a genetic resources conservation strategy. (Roadmap)</li></ul>

### *Ecosystem-Level Adaptation Actions*

Two major categories of ecosystem-level adaptation actions stand out in the plans. Protection and restoration of habitat connectivity is an objective under the adaptation goals of both FWS and NPS. FWS also intends to reduce ecosystem stressors not directly related to climate. NPS intends more broadly to apply the management guidelines of the U.S. Climate Change Science Program’s Synthesis and Assessment Product on “Adaptation Options for Climate-Sensitive Ecosystems and Resources” (CCSP 2008). Chapter 4 of that document addresses adaptation in National Parks, and includes recommendations for planning, evaluation, diversifying management approaches, and reducing human-caused ecosystem stressors. The Forest Service’s original Strategic Framework did not extensively articulate their planned adaptation actions; however the more recent “Roadmap” listed numerous ongoing and future activities related to habitat connectivity, ecosystem restoration, reducing other stressors, and building ecosystem resilience. The USFS Roadmap also contains the only mention of the possible future need to facilitate transition to other ecosystem types where changing climate conditions necessitate this.

FWS

- Promote habitat connectivity and integrity (Objective 3.2)
- Reduce non-climate change ecosystem stressors. (Objective 3.3)

NPS

- Collaborate to develop cross-jurisdictional conservation plans to protect and restore connectivity and other landscape-scale components of resilience. (Objective 6.3)
- Establish management guidance for applying adaptation recommendations put forward by the U.S. Climate Change Science Program Synthesis and Assessment Product 4.4. (Objective 6.4)

USFS

- Assess how land management activities (e.g., fire suppression, fuels treatment, post-fire rehabilitation, timber harvest, forest health and invasive species management, ecological restoration, and watershed management) contribute toward adaptation objectives and how they can be modified to better facilitate adaptation to climate change at various spatial scales. (Objective 2.3)
- Protecting rare and sensitive species by restoring and reconnecting their habitats. (Roadmap, Ongoing)
- Connect habitats to improve adaptive capacity. (Roadmap, Immediate)
- Restoring healthy, resilient forest and grassland ecosystems (Roadmap, Ongoing)
- Refine management practices for addressing projected climate change impacts and ecosystem dynamics, using the principles of risk management and adaptive management (Roadmap, Immediate).
- Develop a longer term restoration capacity (Roadmap, Long-term).
- Develop transition strategies. Where changing conditions will lead new ecosystems to emerge, develop and implement strategies for facilitating the transition (Roadmap, Long-term)
- Develop comprehensive strategies for maintaining and restoring habitat connectivity. (Roadmap, Long-term)

### *Aquatic and Marine Resources*

Despite the fact that all three agencies have extensive freshwater ecosystems within their boundaries, and the overwhelming evidence that climate changes is already threatening aquatic resources in many parts of the country (via increased water temperature, the impact of drought on water resources, and an increased frequency of severe precipitation events), only the FWS specifically includes freshwater needs in its strategy. Similarly, only FWS identifies the need to address coastal and marine issues, despite the presence of a number of coastal or near-coastal units in the National Forest System, and the numerous National Seashores and island units in the National Park System.

FWS	<ul style="list-style-type: none"><li>• Identify and fill priority freshwater needs. (Objective 3.4)</li><li>• Conserve coastal and marine resources. (Objective 3.5)</li></ul>
NPS	<ul style="list-style-type: none"><li>• <i>Aquatic and marine resources not directly addressed.</i></li></ul>
USFS	<ul style="list-style-type: none"><li>• <i>Aquatic and marine resources not directly addressed.</i></li></ul>

### *Cultural Resources*

Consistent with its mission to protect cultural as well as natural resources, the National Park Service is the only agency to identify protection of cultural resources as a climate change challenge.

FWS	<ul style="list-style-type: none"><li>• <i>Cultural resources not directly addressed.</i></li></ul>
NPS	<ul style="list-style-type: none"><li>• Use the best available science to develop and apply a process to prioritize cultural resource adaptation projects that combine established management tools with newer methods, such as vulnerability assessments. (Objective 7.1)</li><li>• Increase the capacity and utility of the NPS Museum Program to preserve and protect resources. (Objective 7.2)</li><li>• Strengthen partnerships with traditionally associated peoples through consultation and civic engagement to ensure the preservation of ethnographically significant resources and continued access to these resources. (Objective 7.3)</li><li>• Expand NPS capacity to conduct inventory and monitoring of archeological sites in anticipation of climate change impacts and support curation of artifacts and associated documentation. (Objective 7.4)</li></ul>
USFS	<ul style="list-style-type: none"><li>• <i>Cultural resources not directly addressed.</i></li></ul>

## Infrastructure

Of the three agencies whose plans we compared, NPS put by far the most emphasis on adaptation projects relating to infrastructure. Forest Service and FWS both addressed infrastructure from the point of view of reducing the carbon footprint of their agencies and “greening” their operations (see Mitigation section below); however, neither cited as a main goal future efforts to protect their infrastructure from climate change impacts or incorporate climate planning into decisions relating to future infrastructure. USFS did, however, incorporate infrastructure adaptation into its later “Roadmap” of actions to implement their climate change strategy.

FWS	<ul style="list-style-type: none"><li>• <i>Infrastructure resources not directly addressed.</i></li></ul>
NPS	<ul style="list-style-type: none"><li>• Consider climate change vulnerability assessments and scenarios in decision processes for project approval and funding. (Objective 8.1)</li><li>• Collaborate with federal, state, and local partners and programs to identify sustainability and adaptation designs for planning, design, and construction documents. (Objective 8.2)</li><li>• Inventory high-risk facilities, assets, infrastructure, and utilities Servicewide; determine priorities for protection and adaptation; and implement actions. (Objective 8.3)</li><li>• Incorporate sustainable designs in new construction and substantial restoration or rehabilitation of facilities where feasible. (Objective 8.4)</li><li>• Incorporate sustainability and climate change adaptation into the maintenance and operation of existing facilities and programs. (Objective 8.5)</li><li>• Revise the Development Advisory Board (DAB) guidelines to require LEED (Leadership in Energy and Environmental Design) certification on all NPS projects. (Objective 8.6)</li></ul>
USFS	<ul style="list-style-type: none"><li>• Protecting infrastructure by modifying or relocating roads, culverts, trails, campgrounds, and other facilities to resist floods and other major disturbances. (Roadmap, Ongoing)</li></ul>

## Climate Change Mitigation

All three agencies included climate change mitigation as a major section of their strategic plan. The number of goals and emphasis varied among the three agencies, but parallels were apparent. Each agency signaled a commitment to:

- Assessing and reducing the carbon footprint of its operations
- Exploring opportunities for carbon sequestration on and under its landholdings
- Supporting development of renewable energy in a manner consistent with agency mission

## Agency "Footprint" Reduction

<p>FWS</p>	<ul style="list-style-type: none"> <li>• Assess and reduce the carbon footprint of the Service's facilities, vehicles, workforce, and operations (Objective 5.1)</li> <li>• Assess and reduce the Service's land management carbon footprint (Objective 5.2)</li> <li>• Offset the remaining carbon balance (Objective 5.3)</li> </ul>
<p>NPS</p>	<ul style="list-style-type: none"> <li>• Develop and apply a scientifically valid, standardized approach for reducing the National Park Service's carbon footprint. (Objective 4.1)</li> <li>• Collaborate with partners to evaluate biological carbon accounting tools and their appropriate application to NPS units. (Objective 4.2)</li> <li>• Implement a Servicewide 2008 baseline inventory of greenhouse gas emissions that accounts for all National Park System activities within the parks and NPS activities outside the parks. (Objective 9.1)</li> <li>• Develop Climate Friendly Action Plans so that every park, park concession, and administrative office promotes energy and water conservation; supports alternative transportation, infrastructure, programs, and policies; and eliminates waste. (Objective 9.2)</li> <li>• Participate in the Department of the Interior's Carbon Footprint Project to develop and implement a unified greenhouse gas emission reduction program. (Objective 9.3)</li> <li>• Investigate the effectiveness, applications, and verification for using carbon offset programs in NPS operations and visitor recreation. (Objective 9.5)</li> <li>• Identify and evaluate greenhouse gas reduction options in general management plans and other planning and environmental compliance documents and processes. (Objective 10.1)</li> <li>• Mandate integration of greenhouse gas reduction strategies that are consistent with NPS resource stewardship responsibilities into current operational practices. (Objective 10.2)</li> <li>• Integrate greenhouse gas reduction into Environmental Management Systems (EMS), procurement, design and construction contracts, and new commercial services contracts and agreements. (Objective 10.3)</li> <li>• Aggressively promote the expanded use of flexible schedule and telecommuting arrangements for NPS employees where it will save energy and improve productivity without compromising public services. (Objective 10.4)</li> </ul>
<p>USFS</p>	<ul style="list-style-type: none"> <li>• Finalize Forest Service directives supporting standards for fleet, facilities, energy, water, recycling, and other operations to reduce our ecological footprint. (Objective 5.1)</li> <li>• Finalize and implement the Sustainable Operations portions of the Environmental Management System and the applicable chapter of the Forest Service Manual. (Objective 5.2)</li> <li>• Continue to implement Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management. (Objective 5.3)</li> <li>• Make available to employees opportunities for reducing individual environmental footprints, such as recycling, telecommuting, and video conferencing. (Objective 5.4)</li> <li>• Incorporate life cycle analyses into forest management and operations as appropriate. (Objective 5.5)</li> </ul>

## Sequestration

FWS	<ul style="list-style-type: none"><li>• Develop Biological Carbon Sequestration Expertise (Objective 6.1)</li><li>• Develop Standards, Guidelines, and Best Management Practices for Biological Carbon Sequestration (Objective 6.2)</li><li>• Integrate Biological Carbon Sequestration Activities into Landscape Conservation Approaches (Objective 6.3)</li><li>• Facilitate Biological Carbon Sequestration Internationally (Objective 6.4)</li><li>• Facilitate Biological Carbon Sequestration Research (Objective 6.5)</li><li>• Evaluate Geologic Carbon Sequestration (Objective 6.6)</li></ul>
NPS	<ul style="list-style-type: none"><li>• Leverage participation in the DOI Carbon Storage Project to evaluate the science, develop policies, provide technical guidance, and promote best management practices for carbon sequestration where it is consistent with NPS policies and mission (see Goals 4 and 6). (Objective 11.1)</li></ul>
USFS	<ul style="list-style-type: none"><li>• Participate in the development of protocols for carbon accounting at the international, national, regional and state levels that fully incorporate the potential for forests, forest products, and grassland ecosystems and products to mitigate the build-up of greenhouse gases. Develop a consistent approach to guide that participation. Develop a national-level central “clearinghouse” for information and Forest Service positions on carbon protocols to provide consistency across efforts. (Objective 3.1)</li><li>• Facilitate the participation of private landowners in ecosystem services markets, including carbon, and promote needed technical assistance and incentives. (Objective 3.2)</li><li>• Identify opportunities across all ownerships for afforestation, reforestation, and forest management to reduce greenhouse gas emissions and increase sequestration, domestically and globally. (Objective 3.3)</li><li>• Work internationally and with States and other partners to identify opportunities to reduce the rate of conversion of forests and grassland ecosystems to other uses, and in cooperation with partners, facilitate participation by landowners in programs, including market incentives to retain forest cover. (Objective 3.4)</li><li>• Determine in real world situations, the combinations of sequestration, bio-products, and bio-energy that are optimal under different economic and policy conditions involving carbon (links to Recommendation 1.6). (Objective 3.5)</li><li>• Clarify the appropriate role of National Forest System lands in participating in or supporting the development of carbon markets. (Objective 4.6)</li></ul>

## Renewable Energy

FWS	<ul style="list-style-type: none"><li>•Address fish and wildlife needs in renewable energy development (Objective 3.8)</li></ul>
NPS	<ul style="list-style-type: none"><li>•Support the development and application of renewable energy and the use of renewable energy technology in a manner consistent with the NPS mission. (Objective 9.4)</li></ul>
USFS	<ul style="list-style-type: none"><li>•Develop improved life cycle analysis of bio-products from forests and grasslands. Promote development of methods, operational processes, and decision support tools to enhance the capacity of these bio-products to offset fossil fuel emissions and to sequester carbon. (Objective 1.6)</li><li>•Provide policy and guidelines addressing the development of non-biomass renewable energy resources on National Forest System lands (wind, solar, and other renewable energy; geologic sequestration sites; locations of corridor rights-of-way on National Forest System lands). (Objective 4.8)</li></ul>

## Education, Outreach and Collaboration

We identified three sets of common elements in the agencies' plans for outreach, communication, and collaboration:

- Internal Education & Communication
- Partnerships and coordination
- External Education & Communication

### *Internal Education & Communication*

All three agencies recognized the need to strengthen communications internally to ensure that all employees have the climate change information and training they need, and to make sure that climate literacy improves across programs and throughout the agency hierarchy.

FWS	<ul style="list-style-type: none"><li>•Provide Service employees with climate change information, education and training. (Objective 7.1)</li></ul>
NPS	<ul style="list-style-type: none"><li>•Collaborate with technical experts to produce and distribute summaries of relevant research on climate change and management response strategies. (Objective 12.2)</li><li>•Train employees in climate change literacy to enhance leadership and decision making at all agency levels and with partners and the public. (Objective 13.1)</li><li>•Routinely emphasize and highlight climate change information in internal communications. (Objective 13.2)</li></ul>
USFS	<ul style="list-style-type: none"><li>•Implement the appropriate mechanisms and institutional structures to promote effective collaboration between Deputy Areas of Research, National Forest System, and State &amp; Private Forestry to assure that relevant and helpful research and science is being conducted and distributed (Objective 4.2).</li></ul>

### Partnerships and Coordination

NPS and FWS both emphasize partnerships and alliances, but generally within the context of another goal (see, for instance, FWS goal 7.3 under International Policy). Forest Service, perhaps in part because of its role both as managers of national forests and as a resource for private landowners, has two goals specifically addressing partnerships with other federal and non-federal entities. Consistent with their agencies' missions to support conservation efforts outside of the lands that they manage, both the FWS and the USFS include objectives related to providing support for state and tribal wildlife managers and other partners.

FWS	<ul style="list-style-type: none"><li>• Provide requested support to State and Tribal managers to address climate change issues that affect Fish and Wildlife Service trust resources. (Objective 2.5).</li></ul>
NPS	<ul style="list-style-type: none"><li>• <i>Not addressed as an independent objective</i></li></ul>
USFS	<ul style="list-style-type: none"><li>• Develop and implement internal mechanisms to assure a systematic, interactive dialogue between researchers, public and private land and resource managers, and other users to promote effective alignment of climate change science delivery efforts. (Objective 1.1)</li><li>• Work with partners, including other federal agencies, international partners, State and local governments, Tribes, private landowners, managers, consultants, non-governmental organizations, and other stakeholders to be most effective in supporting their efforts to adapt lands, ecosystems, and species to climate change. (Objective 2.2)</li><li>• Work with others to provide technical, financial, and educational support for partners and landowners to incorporate climate change in management decisions. (Objective 7.1)</li><li>• Actively seek new partnerships and cooperative relationships with other federal and non-federal entities, including non-traditional partners, to address the multiple challenges of climate change across the U.S. and internationally. (Objective 7.2)</li></ul>

### External Education & Communication

All three agencies put strong emphasis on external communication. The agencies parse their goals somewhat differently, with FWS providing one broad “engagement with external audiences” goal that leaves open most aspects of anticipated targeting and messaging. NPS has six separate goals relating to different aspects of public engagement: producing research summaries, developing communication capacity, demonstrating environmentally friendly technologies and their applicability to individuals, and engaging teachers and students. USFS falls in the middle in the level of detail in its education-related objectives.

FWS	<ul style="list-style-type: none"> <li>• Share climate change information, education, and training opportunities with external audiences (Objective 7.2)</li> </ul>
NPS	<ul style="list-style-type: none"> <li>• Collaborate with technical experts to produce and distribute summaries of relevant research on climate change and management response strategies. (Objective 12.2)</li> <li>• Develop capacity to communicate within the NPS about the impacts and significance of climate science and related aspects of natural and cultural resources. (Objective 12.3)</li> <li>• Develop key agency messages about climate change and provide guidance on their use. (Objective 14.1)</li> <li>• Create interpretive products and programs that educate general audiences about the impacts of climate change and climate friendly technologies and practices. (Objective 14.2)</li> <li>• Create opportunities for teachers and students to learn about climate change in the national parks and how their actions make a difference in the parks and at home. (Objective 14.3)</li> <li>• Demonstrate how the public can reduce the impacts of climate change in their own lives and in national parks by interpreting NPS sustainable practices including agency operations, facilities, and use of technologies. (Objective 15.1)</li> </ul>
USFS	<ul style="list-style-type: none"> <li>• Work with scientists, land and community managers, educators, and communicators to translate climate change science into accurate, audience-appropriate, and easily accessible tools and information. (Objective 6.1)</li> <li>• Recruit, hire, train, and support employees to improve our ability to incorporate climate change into communication, management, technical assistance, and research and development programs. (Objective 6.2)</li> <li>• Build environmental awareness, knowledge, and skills through enhanced educational programs and materials for various audiences including: agency employees; private landowners, and communities; Tribes; educational institutions, non-governmental organizations (including youth groups); visitors to National Forests and grasslands, the public, and the international community. (Objective 6.3)</li> </ul>

## Conclusions & Additional Considerations for Future Climate Change Plans

The U.S. Fish and Wildlife Service, National Park Service and Forest Service each produced an agency climate change strategic plan independently and in the absence of overarching guidance for the elements those plans should contain. Looking at the three plans in tandem provides a clearer vision of the types of goals and actions needed to prepare agencies to respond to climate change than any of the three plans offer alone. Thus, viewing the three in this crosswalk format and drawing lessons from that is more useful than using any single plan as a template for future plans. We suggest that future climate change planning efforts can benefit from this crosswalk, which shows both the commonality among the agencies and highlights ways in which their thinking on particular aspects of climate change planning have differed.

Common elements that appear in these three agency's plans include:

- Broad objectives incorporating climate change into agency function
- Examination of existing laws and policies to determine potential barriers and opportunities
- Incorporate climate change into agency planning
- Assess climate change vulnerabilities and prioritize actions
- Provide better modeling information to agency staff

- Improve science, research and evaluation capabilities
- Take conservation actions to benefit species impacted by climate change
- Take conservation actions to benefit ecosystems and landscapes impacted by climate change
- Expand monitoring activities, utilizing partnerships where appropriate
- Improve internal communication and education of agency staff
- Coordinate with partners outside of the agency
- Improve outreach to the broader community
- Take actions to mitigate climate change, both through reduction of the carbon footprint of agency activities, and through the exploration of renewable energy generation and carbon sequestration

We recommend agencies embarking on climate change strategic planning consider adopting these approaches. We also recommend that CEQ, the White House Office of Science and Technology Policy (OSTP) or the Interagency Climate Adaptation Task Force establish a common climate change strategy framework to organize agency plans and provide a common terminology to facilitate better coordination between federal agencies. We recommend that comprehensive national climate change plans include all the elements listed above, organized in the broad categories we identified:

- Climate Change Policy
- Adaptation Science and Management
- Mitigation
- Education, Outreach and Collaboration

In addition to these common elements, there a few areas where all three agencies could have provided better and more strongly defined goals and objectives:

***Give priority to wildlife and natural resources adaptation.*** All three agencies we compared also had in their plans substantial sections on climate change mitigation, with emphasis both on improving the operational efficiency and lowering the carbon footprint of the agency (with measures like improving fuel economy of vehicles, reducing energy consumption of buildings, etc.) and also on investigating the potential for lands in their jurisdiction to contribute to renewable energy production and carbon sequestration. These are important initiatives. However, due to their large land holdings the federal land management agencies have a much bigger contribution to make to help conserve wildlife and ecosystems in a changing climate. We believe that these agencies should explicitly prioritize wildlife and natural resources adaptation when assigning resources to the various aspects of their national climate change response strategies.

***Clarify relationships between federal, state, tribal and local authorities.*** In any nationwide strategic plan, issues of roles and responsibilities invariably arise, whether the plan is to deal with climate change, national security, or the spread of influenza. The more thought that can be given to these difficult issues early on in the planning process, the less likely conflicts will arise in the future.

***Specific direction in integrating climate change with existing programs.*** Our analysis shows the agencies are thinking about this in general terms, but more explicit linkages to existing conservation initiatives within each agency would help clarify this.

***Include specific reference to the “adaptation approaches” laid out in the USCGRP’s SAP 4.4.*** The U.S. Climate Change Science Program in 2008 released its Synthesis and Assessment Product on Adaptation Options for Climate-Sensitive Ecosystems and Resources (aka SAP 4.4) (CCSP 2008). This report outlined several adaptation options in detail. One of these, “managing for resilience,” included seven

approaches: protecting key ecosystem features, reducing anthropogenic stresses, representation of various forms of species or ecosystems, replication of more than one example of ecosystem types in protection, restoration of degraded ecosystems, protection of refugia that are predicted to be less impacted by climate change, and relocation of organisms around barriers to natural movement. The SAP also points out that we may need to eventually move beyond “managing for resilience” and into “managing for change.” These specific types of adaptation options have not been fully integrated into existing adaptation plans; the role of each should be more fully explored, either in the strategic plan itself, or in an action plan (see below).

***Develop an action plan that matches the scope and scale of the strategic plan.*** It is critical that every agency match their strategic plan with an action plan detailing how each objective will be reached. The action plan must be equivalent in scope and scale to answer the tremendous challenge at hand and the goals ambitious goals of the strategic plan.

***Develop an agency climate change adaptation plan.*** The three plans we analyzed are important overarching strategic documents for setting the policy direction of the agencies comprehensively addressing the impacts and causes of climate change. Though the plans include many important actions regarding climate change adaptation, each agency still needs to develop a more detailed adaptation plan that identifies the specific climate change vulnerabilities to the agency mission and programs, and charts a course for addressing them.

Finally, we hope the crosswalk between these plans helps foster increased collaboration between the U.S. Fish and Wildlife Service, the U.S. Forest Service, and the National Park Service to more effectively achieve their shared goals.

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## **APPENDIX: Plan Organization and Goals**

### ***Fish and Wildlife Service***

#### **Adaptation**

**Goal 1:** We will work with partners to develop and implement a National Fish and Wildlife Climate Adaptation Strategy

**Goal 2:** We will develop long-term capacity for biological planning and conservation design and apply it to drive conservation at broad, landscape scales

**Goal 3:** We will plan and deliver landscape conservation actions that support climate change adaptations by fish and wildlife of ecological and societal significance

**Goal 4:** We will develop monitoring and research partnerships that make available complete and objective information to plan, deliver, evaluate, and improve actions that facilitate fish and wildlife adaptation to accelerating climate change

#### **Mitigation**

**Goal 5:** We will change our business practices to achieve carbon neutrality by the Year 2020

**Goal 6:** To conserve and restore fish and wildlife habitats at landscape scales while simultaneously sequestering atmospheric greenhouse gases, we will build our capacity to understand, apply, and share biological carbon sequestration science; and we will work with partners to implement carbon sequestration projects in strategic locations

#### **Engagement**

**Goal 7:** We will engage Service employees; our local, State, Tribal, national, and international partners in the public and private sectors; our key constituencies and stakeholders; and everyday citizens in a new era of collaborative conservation in which, together, we seek solutions to the impacts of climate change and other 21st century stressors of fish and wildlife

### ***National Park Service***

#### **Science**

**Goal 1:** Use the best available scientific data and knowledge to inform decision making about climate change.

**Goal 2:** Collaborate with partners to develop, test and appropriately apply climate change models to NPS activities.

**Goal 3:** Inventory and monitor key attributes of the natural systems, cultural resources, and visitor experiences likely to be affected by climate change.

**Goal 4:** Use best available science to evaluate and manage greenhouse gas storage and emissions in national parks.

#### **Adaptation**

**Goal 5:** Incorporate climate change considerations and responses in all levels of NPS planning.

**Goal 6:** Implement adaptation strategies that promote ecosystem resilience and enhance restoration, conservation, and preservation of park resources.

**Goal 7:** Develop, prioritize, and implement management strategies to preserve climate-sensitive cultural resources.

**Goal 8:** Enhance the sustainable design, construction, and maintenance of park infrastructure.

## **Mitigation**

**Goal 9:** Substantially reduce the National Park System's carbon footprint from 2008 levels by 2016 through aggressive commitment to environmentally preferable operations.

**Goal 10:** Integrate climate change mitigation into NPS business practices.

**Goal 11:** Promote biological carbon sequestration as a function of healthy ecosystems.

## **Communication**

**Goal 12:** Coordinate and distribute climate change information throughout the National Park Service.

**Goal 13:** Increase climate change knowledge and understanding within the National Park Service.

**Goal 14:** Provide external communications about the implications of climate change and the National Park Service response

**Goal 15:** Model and communicate sustainable practices that lead by example.

## **Forest Service**

**1. SCIENCE - Advance our understanding** of the environmental, economic, and social implications of climate change and related adaptation and mitigation activities on forests and grasslands.

**2. ADAPTATION - Enhance the capacity of forests and grasslands to adapt** to the environmental stresses of climate change and maintain ecosystem services.

**3. MITIGATION - Promote the management of forests and grasslands to reduce the buildup of greenhouse gases**, while sustaining the multiple benefits and services of these ecosystems.

**4. POLICY - Integrate climate change, as appropriate, into Forest Service policies, program guidance, and communications** and put in place effective mechanisms to coordinate across and within Deputy Areas.

**5. SUSTAINABLE OPERATIONS - Reduce the environmental footprint of Forest Service operations** and be a leading example of a green organization.

**6. EDUCATION - Advance awareness and understanding** regarding principles and methods for sustaining forests and grasslands, and sustainable resource consumption, in a changing climate.

**7. ALLIANCES - Establish, enhance, and retain strong alliances and partnerships** with federal agencies, State and local governments, Tribes, private landowners, non-governmental organizations, and international partners to provide sustainable forests and grasslands for present and future generations.