USDA Forest Service
Climate Change Adaptation Plan 2014

Forest Service Climate Change Adaptation Plan 2014

DRAFT

I. Policy Framework

Mission
The mission of the Forest Service (FS) is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations.

Americans rely on their forests and grasslands for a wide range of benefits—for provisioning services such as water, wood, and wild foods; for regulating services such as erosion, flood, and climate control; and for cultural services such as outdoor recreation, spiritual renewal, and aesthetic enjoyment. These services are connected and sustained through the integrity of the ecosystems on these lands.

Goals and Strategic Approach
FS policies, developed over many years, were mostly devised before the agency took climate change into account in its programs for public land management, private forest landowner assistance, and research. Such policies might not provide the most effective means for guiding actions to address climate change across broad landscapes, jurisdictions, and resource areas; however, these policies did consider establishing and maintaining resilient forests and rangelands in light of stressors. The FS is identifying shortcomings in its current policies, procedures, and program guidance. The goal is to reformulate them where necessary to align resources with an effective climate change response and to more effectively collaborate with other Federal agencies, States, Tribes, and other stakeholders for landscape-scale conservation.

The FS approach for adapting to climate change encompasses a) climate-specific strategies across the agency and b) direct program-by-program efforts to integrate climate-related policies and guidance, where climate change is one of many drivers of change to be considered in sustaining forest and grassland ecosystems. Climate-specific goals and strategies include:

- ***USDA 2010-2015 Strategic Plan - Goal 2.*** Ensure our national forests and private working lands are conserved, restored, and made more resilient to climate change, while enhancing our water resources.
    - Objective 2.2 - Lead efforts to mitigate and adapt to climate change.
- ***FS National Roadmap for Responding to Climate Change (Roadmap).*** In October 2008, the FS had introduced a *Strategic Framework for Responding to Climate Change*. The Roadmap builds upon the strategic framework and lays out three types of actions for the FS to employ in a continuous cycle of adaptive management informed by monitoring and evaluation:
    - **Assess** current risks, vulnerabilities, policies, and gaps in knowledge.
    - **Engage** internal and external partners in seeking solutions.
    - **Manage** for resilience, in ecosystems as well as in human communities, through adaptation, mitigation, and sustainable consumption strategies.

All three modes of action are dynamic and mutually reinforcing. They are interconnected through monitoring and evaluation, forming a continual feedback loop to allow opportunities for adjustment in direction or tactics.

- ***FS Climate Change Performance Scorecard (Scorecard) Individual*** National Forest System (NFS) field units apply the Scorecard to facilitate implementation of the Roadmap and USDA Strategic Plan. The Scorecard is completed annually in fiscal years 2011-2015. By 2015, each field unit is expected to answer *Yes* to at least seven of the Scorecard's 10 elements (questions), with at least one *Yes* in each of the four dimensions outlined below. The Scorecard's multiple dimensions ensure that each Unit works toward a balanced response to climate change. The four dimensions and ten elements are:

  - **Organizational capacity - Engage employees through training and integrate climate change into program of work.**
    1. Employee Education
    2. Designated Climate Change Coordinators
    3. Program Guidance
  - **Engagement – Develop partnerships and transfer knowledge.**
    4. Science and Management Partnerships
    5. Other Partnerships
  - **Adaptation – Assess impacts of climate change and manage change.**
    6. Assessing Vulnerability
    7. Adaptations Actions
    8. Monitoring
  - **Mitigation and Sustainable Consumption – Assess carbon stocks and reduce our Agency footprint.**
    9. Carbon Assessment and Stewardship
    10. Sustainable Operations

- ***Executive Order 13514 – Federal Leadership in Environmental, Energy, and Economic Performance.*** Directs each agency to not only develop a sustainability strategy and reduce greenhouse gas emissions but to develop policies and practices to support the Federal Adaptation Strategy. The Scorecard will simplify accomplishment reporting for this order.

- ***Executive Order 13653 – Preparing the United States for the Impacts of Climate Change***. Directs agencies to develop or continue to develop, implement, and update comprehensive plans that integrate consideration of climate change risks and vulnerabilities into agency operations and overall mission objectives.

- ***Forest Service Global Change Research Strategy 2009-2019.*** In keeping with the research goals of the U.S. Global Change Research Program, the FS Research and Development mission area helps define climate change policy and develop best management practices for forests (both rural and urban) and grasslands in order to sustain ecosystem health and services (adaptation), and

increase carbon sequestration (mitigation), all under changing climate conditions. The fundamental research focus of the FS Global Change Research Strategy is to increase understanding of forest, woodland, and grassland ecosystems, use this information to project potential futures. This information and the resulting tools will facilitate vulnerability assessments and the development of management practices to increase the probability of achieving projected futures that best meet the needs of the Nation.

The FS also incorporates climate considerations into program- or resource-specific policies and guidance. Examples include:

- ***Ecological Restoration and Resilience Directive (FSM 2020).*** The primary objective of this foundational policy for sustainable management of National Forest System (NFS) lands is to restore and maintain resilient ecosystems that will have greater capacity to withstand stressors and recover from disturbances, especially those under changing and uncertain environmental conditions, including climate change and extreme weather events.

- ***2012 Planning Rule.*** This new rule provides improved ability to respond to climate change and other stressors through an adaptive framework of assessment, planning and monitoring and new provisions intended to improve resilience of ecosystems on NFS lands. Examples include:
  - 219.6(b)(3): "Identify and evaluate existing information relevant to the plan area for…the ability of terrestrial and aquatic ecosystems on the plan area to adapt to change."
  - 219.12(a)(5)(vi): Monitoring programs must include monitoring questions and indicators that address "…measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area."

- ***Genetic Resource Management and Climate Change: Genetic Options for Adapting National Forests to Climate Change.*** This strategy provides an overview of current climate change knowledge and potential implications for forest tree species, as well as goals, principles, and recommendations for enhancing forest resilience and resistance through a re-aligned "climate-smart" NFS Genetic Resource Management Program.

II. Planning for Climate Change Related Risk

Section 5(a) of E.O. 13653 states that, "each agency shall develop or continue to develop, implement, and update comprehensive plans that integrate consideration of climate change into agency operations and overall mission objectives..." The five elements (subsections) are addressed in the remainder of this Plan.

Section 5(a)(i) - identification and assessment of climate change related impacts on and risks to the agency's ability to accomplish its missions, operations, and programs;

Impacts, Risks, and Vulnerability Assessment

The FS uses numerous national, regional, and local scale assessments to inform policies, programs, and land management planning of the impacts of climate change and other environmental stressors and influences. Examples include the Forest and Rangeland Renewable Resources Planning Act Assessment; National Climate Assessment – Forest Sector Report; Southern Forest Futures Assessment; and NFS land management plan assessments.

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- ***Physical and Biological Climatic Concerns***. The FS mission is impacted by shifts in temperature and precipitation patterns and amounts, extreme weather events, and climate variability. The FS manages public forests and grasslands and works with States, Tribes and private landowners to restore and sustain the health, diversity and productivity of the Nation's forests and grasslands. Changes in key climate variables affect the seasonality of hydrologic regimes, reproduction cycles of pests and pathogens, and length of fire seasons. Fire seasons in the West have increased by 78 days since the mid-1980s.[5] Disturbance facilitates the introduction and spread of invasive species, which increase extinction risks for native species and other alterations of ecosystem processes and functions. The changing climate is already altering species ranges and has the potential to alter ecosystem structure in the future as evidenced by the mountain pine beetle (a native insect) epidemic in the West. Management will require forward-looking approaches to novel ecosystems instead of depending on historical ranges of variability. These impacts pose challenges to sustaining forests and grasslands and the supply of goods and services upon which society depends, such as clean drinking water, forest products, outdoor recreation opportunities, and habitat.

    - **Wildfires - Increasing wildfire season length and extent of fire on the landscape**. Research estimates the potential for up to 100 percent increase in the number of acres burned annually by 2050. Increasing wildfire response requires increased funding. Fire suppression funding has grown from 16% of the FS budget in 1995 to 42% currently and funding is transferred from other agency programs in years when suppression funds are exhausted.

      All FS program accomplishments are reduced when wildfire suppression funds are exhausted. The increased extent of high severity fire on the landscape coupled with communities expanding into in the wild land-urban interface are reducing capacity to provide other services, including increasing the residence of ecosystems, and puts personnel, the public, communities, and infrastructure at higher risk.

      Tribal communities and firefighting- NFS lands and bordering tribal lands are increasingly at risk of fire. Tribes are particularly vulnerable to fires both on and off tribal lands (e.g., on NFS and/or private lands over which they have no control or jurisdiction) which complicates coordination of firefighting across shared landscapes with such frequent fires. These risks are frequently exacerbated by a lack of adaptive capacity due to lack of resources, poverty, poor or nonexistent infrastructure, and relative isolation.

      Human Health and Safety – Firefighting employees and contractors, and residents in the wild land-urban interface are increasingly at risk due to extreme wildfire behavior.

    - **Air Temperature – Prolonged personnel exposure to the elements during extreme temperatures.** Human health and safety - Risk to employees and contractor/cooperators. Events that include atypical weather patterns experienced during the 2013-2014 winter season has result in extremely cold temperatures in most regions, especially unusual in the southern states. Higher summer temperatures may increase field personnel risk of heat exhaustion, heat stroke, and dehydration. Has the potential to impact operations at all levels.

    - **Insects and Disease - Increased exposure to and spread of damaging insects and disease, especially invasive species.** Affects natural resource management on all lands. Tribal

[5] Westerling, Hidalgo, Cayan, and Swetnam. 2006. Science 313: 940-943.

communities and Forest Health – NFS and bordering tribal lands are increasingly at risk of damaging insects and disease.

- **Water Temperature - Increased water temperatures in rivers and lakes, lower water levels in late summer, and drying of streams and ponds.** Tribal communities and Watershed, Fish, Wildlife, Air and Rare Plants– Forest Service and bordering tribal lands are increasingly at risk regarding watershed and fisheries maintenance. Tribes are particularly vulnerable to fluctuations in water temperatures and flow as many communities rely on aquatic species for subsistence and cultural purposes. These risks are frequently exacerbated by a lack adaptive capacity due to lack of resources, poverty, poor or nonexistent infrastructure, and relative isolation. A further consideration is that failure to manage trust lands in a sustainable manner may result in abrogation of treaty rights, creating a risk position for federal natural resource agencies.

- **Rising Sea Levels - Tribal communities, NFS lands, infrastructure.** Coastal NFS lands and coastal Tribes are increasingly at risk of damage to their lands, including infrastructure, due to rising sea level. Tribes are particularly vulnerable to see level rise as many tribal communities are place-based, with limited or no opportunity to relocate without extreme cost and/or Congressional action. Those tribes that rely on aquatic species for subsistence and cultural purposes that are affected by sea level are further at risk. These risks are frequently exacerbated by a lack adaptive capacity due to lack of resources, poverty, poor or nonexistent infrastructure, and relative isolation. A further consideration is that failure to manage trust lands in a sustainable manner may result in abrogation of treaty rights, creating a risk position for federal natural resource agencies.

- **Extreme Weather Events - Impact to agency facilities, operations, and emergency response capability as a result of severe weather conditions.** Affects all agency operations and programs. Past events such as Hurricanes Katrina and Irene had significant impact to infrastructures and personnel. Because FS has employees in all states, there is a high probability that a major function could be impacted by such weather events, requiring those offices to transfer duties until they can relocate to their COOP facility and get up and running.

- **Increased Rainfall – Transportation infrastructure concerns.** With increasing heavy rain events, the extensive road system on NFS lands will require increased maintenance and/or modification of infrastructure (e.g. larger culverts or replacement of culverts with bridges).

- **Fluctuating Precipitation and Temperature - Outdoor recreation and recreation infrastructure.** Ski areas, reservoirs, and campgrounds are strongly influenced by past and current climate. Preserving high-quality outdoor recreation experiences will depend not only on the condition of the land, facilities, and transportation infrastructure but also on where such opportunities can be accommodated safely and managed under a changing climate. The projected increase in U.S. population and the continual decline of public access to privately-owned undeveloped land will increase demand for recreation opportunities on public land.

- ***Economic and Marketing Concerns.*** Climate change may influence the demand for energy and its mix of sources. Woody biomass is gaining attention as a renewable energy source. An increasing demand for renewable energy may affect how forests are managed and influence a wide range of ecosystem services, such as water quantity and quality, wildlife habitat, and carbon sequestration. Changes in forest management objectives could affect the price of traditional forest products and downstream products such as housing.

Management options to maintain healthy ecosystems include thinning stands to reduce moisture stress and regenerating stands where they have been decimated by insects or disease. Having a market for products from these operations is important to offset management costs and improve local/rural economies. Because of the demise of the forest industry in many areas, a major marketing effort will be necessary to reestablish mills and processing plants.

Potential impacts to other ecosystem services also may affect social and economic sectors. For example, climate change may adversely affect river-based outdoor recreation opportunities through changes in the timing and volumes of streamflow; thereby impacting many rural communities dependent on favorable water flow and a river based economy.

The economic benefits of outfitting and guiding and river-related recreation use are large contributors to local and rural economies where rivers are large enough to support such economies. They should be recognized just as are reservoir operations and other developed recreation opportunities (campgrounds) along riverways.

- ***Capacity Building.*** The FS provides a wide variety of climate change training opportunities and communication materials for its employees, other agencies, and the public. These range from basic awareness education to highly technical seminars, workshops, and courses for conducting vulnerability assessments and developing adaptation and mitigation strategies.

  Partnerships between scientists and land managers are being strengthened to improve the focus of research and technology to address current and emerging science and information needs. Resource inventory, monitoring, and assessment activities and decision support tools are being better aligned and coordinated across FS programs and with partner agencies at multiple scales. Examples of ongoing and newly initiated capacity-building efforts are:

  - ***Climate Change Resource Center*** – The primary web-based science delivery portal for FS employees and partners who need information and tools to address the impacts of climate change in land management decision making.
  - ***Environmental Threat Assessment Centers*** (Eastern Forest Environmental Threat Assessment Center and Western Wild land Environmental Threat Assessment Center) - Provide interdisciplinary resources that are actively developing new technology and tools to anticipate and respond to forest threats, including climate change.
  - **Regional Hubs –** Seven regional hubs now established across the US. They are repositories of data and offer practical, science-based tools and strategies farmers, ranchers, and forest land owners need to adapt and succeed in the face of a changing climate. The Hubs will provide outreach and information to producers on ways to mitigate risks; public education about the risks climate change poses to agriculture, ranchlands and forests; regional climate risk and vulnerability assessments; and centers of climate forecast data and information. They will also link a broad network of partners participating in climate risk adaptation and mitigation, including universities; non-governmental organizations; federal agencies such as the Department of Interior and the National Oceanic and Atmospheric Administration; Native Nations and organizations; state departments of environment and agriculture; research centers; farm groups and more.
  - **Conservation Education Programs** - Increase environmental literacy through partnerships with groups who educate urban populations on the value of well-managed public and private forested lands and, through natural resource stewardship, improve the public's quality of life.

Frequency of extreme events and more climatic variability will challenge stewardship programs that directly benefit urban dwellers.

Framework to Continually Review and Update Impact Assessment and Risk Determination

- ***Understanding Risks – Actions the FS takes to better understand risks and opportunities***. Management of forests and grasslands and associated resources involves making long-term commitments of resources and investments. The FS continues to refine its planning and decision making processes regarding the consideration of climate change risk and uncertainty. In January 2009, national guidance was developed for the NFS to address climate change in land management planning and project-level National Environmental Policy Act (NEPA) analyses. The 2012 Planning Rule and forthcoming directives and guidance are updating that initial guidance.

  Agency research scientists work closely with land managers to downscale climate projections to better understand the range of potential ecosystem impacts, conduct vulnerability assessments for key resources, and develop localized adaptation approaches and options. For example, vulnerability assessments for water resources and aquatic ecosystems were recently completed on 12 national forests, representing each of the nine FS regions. Likewise, two regions have completed risk assessments of their forest tree species. These serve as pilots for completing additional assessments. Also, comprehensive risk assessments are being completed when planning recreation infrastructure projects; and a risk assessment of all developed recreation sites was conducted recently to identify and mitigate public safety issues related to extreme weather events.

  In cooperation with national, state, and local partners, urban forest health monitoring efforts of the FS are underway to identify existing and potential pest and disease threats to our urban forests and help understand the impact of climate change on the vulnerability of urban forests to infestations.

  All NFS unit level land management planning and project planning involves collaboration with the public and key partners such as Tribes and local governments. The FS is engaged with Department of Interior and State agencies in using the newly formed Landscape Conservation Cooperatives (LCCs), Climate Science Centers, and USDA Regional Hubs to coordinate sharing of resource information and science and developing adaptation strategies across these broader landscapes.

  Following are example policies, programs, processes, and actions that provide frameworks for regularly monitoring and assessing risks and vulnerabilities:

  - Forest and Rangeland Renewable Resources Planning Act (RPA) Assessment - every 10 years
  - National Climate Assessment – Forest Sector Report - every four years
  - Regional assessments, such as the Southern Forest Futures Assessment.
  - National Cohesive Wild Land Fire Management Strategy
  - Collaborative Forest Landscape Restoration Program (CFLRP) monitoring

- Forest Health Monitoring Program – Determines the status, changes, and trends in indicators of forest condition on an annual basis and, in a federal/state partnership, produces the National Insect and Disease Risk Map every 5-6 years.
- NFS Land Management Planning – Monitor and assess regularly. Revise plans every 10-15 years, including consideration of changes in environmental, social and economic conditions and stressors.
- Watershed Condition Framework - assess conditions every four years
- Continuity of Operations (COOP) Plans
- FS Health and Safety Program

- ***Sustained Adaptation Process.*** The Climate Change Advisor's Office will lead the Adaptation Plan's review, monitoring of actions listed in the appendix, and Plan update. Monitoring of resource conditions and trends with input from FS Research and Development, field units, other agencies, and stakeholders will inform prioritization or adjustment of national policies and programs.

  Climate Change Performance Scorecard annual reporting will track progress on implementing major actions of the Roadmap and this Adaptation Plan. Improvement in Scorecard results will reflect effectiveness of agency strategic approaches, policies, this Adaptation Plan, and other efforts within the FS and by partners. The Scorecard itself will also be reviewed regularly to ensure it continues to meet the agency's needs, with potential to expand its application to other mission areas.

  The *Adaptation Services Framework*, a State & Private Forestry companion to the Performance Scorecard is being developed.

  National and regional assessments will continue to monitor the health and productivity of the Nation's forests and rangelands. Examples include:

  - Forest and Rangeland Renewable Resources Planning Act (RPA) Assessment
  - National Climate Assessment – Forest Sector Report
  - Southern Forest Futures Project
  - Northern Forest Futures Project.

  The 2012 Planning Rule requires national forests and grasslands to monitor progress towards their desired conditions and including key indicators of ecosystem status and measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.

Section 5(a)(iii) - a description of how any climate change related risk identified pursuant to paragraph (i) of this subsection that is deemed so significant that it impairs an agency's statutory mission or operation will be addressed, including through the agency's existing reporting requirements;

Significant Risk

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- ***Impact/Risk Considered Significant.*** Increasing wildfire season length, size and severity of large fires, coupled with an expanding wildland-urban interface, has been multiplying wildfire suppression costs. Fire suppression funding has grown from 16% of the FS budget in 1995 to 42% currently and funding is transferred from other agency programs in years when suppression funds are exhausted.

  All FS program accomplishments are reduced when wildfire suppression funds are exhausted. The increased extent of high severity fire on the landscape coupled with communities expanding into in the wild land-urban interface are reducing capacity to provide other services, including increasing the residence of ecosystems, and puts personnel, the public, communities, and infrastructure at higher risk.

- ***Rationale for Classifying the Risk as Significant.*** Wildfire suppression expenditures are now a significant percentage of the agency's budget, reducing capabilities to provide other critical services, including our capacity to manage forests for increased resilience, to protect their capacity to sequester and store carbon, and provide other ecosystem services. Increasingly large and severe wildfires will result in increased restoration needs as well as decreased capacity to manage for other services. They also increase risk to personnel and communities.

- ***Action(s) that may decrease the threat/risk***. Change funding mechanism for wildfire suppression to protect funding of programs and activities that restore fire-adapted ecosystems, resilience, and accomplish other adaptation priorities. The FLAME Act of 2009 established a separate account for funding emergency wildfire suppression activities undertaken on DOI and NFS lands. Additional legislation is being considered (Wildfire Disaster Funding Act of 2013 – HEN13D10).

- ***Can the action be addressed exclusively by the agency or do others need to be involved?*** Congressional action is required to change funding structure.

Section 5(a)(iv) - a description of how the agency will consider the need to improve climate adaptation and resilience, including the costs and benefits of such improvement, with respect to 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;

FS Engineering and Watershed programs are developing national guidance to ensure flood emergencies are appropriately responded to and infrastructure is rebuilt to be more flood resilient. This guidance includes FS Manual and Handbook direction and development of incident command procedures. This is being coordinated with the USFWS, NRCS, BLM, USACE, and State Department.

Section 5(a)(v) - a description of how the agency will contribute to coordinated interagency 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, consistent with section 4 of this order;

The FS supports coordinated climate adaptation efforts through its substantial contributions of science, data, information, tools, and technical support to Federal, State, and local agencies; Tribes; the business sector and producers; other partners and stakeholders; and the international community. Examples include:

- Regional Hubs: FS is host to five of the seven USDA regional hubs recently established. These provide outreach and information to producers (farmers, ranchers, and forest land owners) on ways to mitigate risks; public education about the risks climate change poses to agriculture, ranchlands and forests; regional climate risk and vulnerability assessments; and centers of climate forecast data and information. They will also link a broad network of partners participating in climate risk adaptation and mitigation, including universities; non-governmental organizations; federal agencies such as the Department of Interior and the National Oceanic and Atmospheric Administration; Native Nations and organizations; state departments of environment and agriculture; research centers; farm groups and more
- Western and Eastern Environmental Threat Assessment Centers
- Climate Change Resource Center (www.fs.fed.us/ccrc)
- Forest Service Global Change Research Strategy 2009-2019
- Interagency Coordination on Climate Projections
- Inventory, Monitoring, and Assessment Strategy
- Watershed and Terrestrial Condition Frameworks for integrated resource restoration
- Genetic Diversity
- National Cohesive Wild Land Fire Management Strategy
- National Fish, Wildlife and Plants Climate Adaptation Strategy
- FS is an active partner in Landscape Conservation Cooperatives and is lead agency for the Caribbean LCC.
- Tribal support through:
    - National Fish, Wildlife and Plants Climate Adaptation Strategy, Landscape Conservation Cooperatives, and other interagency efforts.
    - Tribal Climate Change Network and FS Regional Climate Hubs
    - Backstop tribal representatives on the White House/CEQ climate task force.
    - Tribal Climate Change Adaptation Community of Practice (FS, White House, DOI's BIA and USGS, DOE, EPA, and CEQ)
    - Inter-Agency Forum on Climate Change Impacts & Adaptations.

Section 5(a)(ii) - a description of programs, policies, and plans the agency has already put in place, as well as additional actions the agency will take, to manage climate risks in the near term and build resilience in the short and long term;

FS actions already completed, initiated, or proposed in response to climate-related impacts and risks (Section 5(a)(ii) are described in the Action Register below. In addition, the Action Register describes in greater detail those FS actions that contribute to interagency efforts to support climate preparedness and resilience, including coordinated development of information, data, and tools (Section 5(a)(v).

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Executive Order 13653, Sec. 5 - Federal Agency Planning for Climate Change Related Risk
USDA Forest Service Action Register

Action Description	Action Goal	Agency Lead	Risk/Opportunity Description	Scale	Timeframe	Implementation Methods	Performance Metrics	Inter-Governmental Coordination	Resource Implications	Challenges/ Further Implications	Highlights of Accomplishments to Date
Implement the USDA-Forest Service (FS) Climate Change Roadmap and Performance Scorecard	Integration of climate change response into the agency's policies, programs, and operations.	Climate Change Advisor's Office	Natural resources, FS mission and operations are broadly at risk Roadmap identifies ongoing actions and establishes short and longer term strategic actions and investments to respond and adapt to climate change. Performance Scorecard tracks progress implementing the Roadmap by individual national forests and grasslands.	Local, summarized at Regional and National levels	Ongoing	Through various means, including policy formulation, and science support at national, regional, and local levels.	Percent of National Forests in compliance with a climate change adaptation and mitigation strategy Annual reporting by field units on implementing at least seven of ten scorecard elements by end of FY2015.	Increased collaboration such as sharing of science, data, and tools,		Need to improve scorecard guidance; limitations of field units to conduct vulnerability assessments.	Roadmap and Scorecard issued in 2011. By end of FY2013, 49% of NFS units have met the performance scorecard target.

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Action Description	Action Goal	Agency Lead	Risk/Opportunity Description	Scale	Timeframe	Implementation Methods	Performance Metrics	Inter-Governmental Coordination	Resource Implications	Challenges/ Further Implications	Highlights of Accomplishments to Date
Develop Adaptation Services Framework	Adaptation integrated into S&PF program and service delivery, improving assistance to forest landowners and managers, allowing them to continue to meet their unique management objectives in a changing climate	Climate Change Advisor's Office, S&PF-NA	Opportunity to collaboratively develop and provide a system to evaluate and adapt State & Private Forestry programs and policies in the delivery of climate change services to partners (non-Federal forest managers, landowners and urban communities).	National, but may include region-specific goals and guidance.	Draft Framework in development. Final in December 2014 Northeast Area pilot in FY2015 along with updated S&PF program guidance. FS-wide implementation of Framework reporting in FY2020.	The deliverable would be the S&PF counterpart to the NFS Climate Change Performance Scorecard.	Publication of the S&PF Adaptation Services Framework and Guidance Document				Framework Proposal drafted and currently under internal review.

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Action Description	Action Goal	Agency Lead	Risk/Opportunity Description	Scale	Timeframe	Implementation Methods	Performance Metrics	Inter-Governmental Coordination	Resource Implications	Challenges/ Further Implications	Highlights of Accomplishments to Date
Develop national policy requiring the entire agency to develop COOP plans to ensure operability continues when impacted by an extreme weather-related event. Administrative units develop COOP Plans to ensure facilities have continuing operating capabilities if vulnerable to extreme weather events.	Entire FS will have COOP Plans to implement in the event of an emergency requiring relocation to an alternate operating facility, devolution of functions, etc.	Office of Safety and Occupational Health	Significant impact to facilities, other infrastructure, and agency operations, including emergency response, as a result of extreme weather events	National, Regional, Locals	Ongoing	WO will provide template to create COOP plans by October 1, 2014. Once created, plans will be reviewed/ updated at least yearly or when procedures change and warrant an immediate update.		Yes. Coordinate with local agencies, esp regarding continuity of FS emergency response assistance.	Personnel time required to develop new COOP plans		The WO and several regional offices currently have COOP Plans.

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Action Description	Action Goal	Agency Lead	Risk/Opportunity Description	Scale	Timeframe	Implementation Methods	Performance Metrics	Inter-Governmental Coordination	Resource Implications	Challenges/ Further Implications	Highlights of Accomplishments to Date
Safety Training: Train employees on proper procedures for working in and surviving extreme weather conditions, such as prolonged exposure to extremely high or low temperatures, precipitation, and wind	Employees are prepared to protect themselves when working in extreme weather conditions.	Office of Safety and Occupational Health	Human Health and Safety - Prolonged employee exposure to the elements during extreme high and low temperatures, potential flooding, or high wind events.	National, Regional, Local	Ongoing	Evaluations will be done during the WO assessments					USFS OSOH currently has procedures and policies to ensure employees understand hazards associated with prolonged exposure to extreme weather conditions as outlined in the Health and Safety Code Handbook, FSH 6709.11.
Develop Flood Response guidance and teams	Rebuild infrastructure to be more flood resilient	Engineering/ Watershed	Increased risk of flooding. Opportunity to create flood response guidance and teams to assist forest and non- forest lands in flood emergencies	National and International	December 2014	Guidance, manual handbook direction and development of incident command procedures	Flood emergencies responded to and infrastructure improved	USFWS, NRCS, BLM, USACE, State Department			Stream Simulation Design development

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Issue Ecological Restoration and Resilience Policy (FSM 2020)	Provides foundational policy for sustainable management of NFS lands.	Forest Management	Addresses all risks and vulnerabilities of ecosystems and associated infrastructure. Objective is to restore and maintain resilient ecosystems that will have greater capacity to withstand stressors and recover from disturbances, especially those under changing and uncertain environmental conditions, including climate change and extreme weather events.	National	Finalize directive in May 2014	Issue directive		USFWS and other federal land management agencies		Further integrating the policy into other agency policies and programs	Interim directive first issued in September 2008; reissued in 2010 2011,and 2013; Proposed directive published in Federal Register
Revise NFS Planning Rule	National Forest System (NFS) land management planning policy and procedures include consideration of climate change	Ecosystem Management Coordination	Prior rule was out of date. Revised process for establishing, amending and revising land management plans for national forests and grasslands. Incorporates consideration of climate change into land management plans through assessments and monitoring.	National	Completed	Early adopter units are developing new approaches, tools, etc. New rule will be implemented as forests and grasslands revise their plans.	Number or percentage of LMPs revised under the 2012 Rule	Coordinated with CEQ, OMB, DOJ, EPA USFWS, and NOAA Fisheries	NA	Several lawsuits filed	Planning Rule finalized March 2012

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Revise Planning Rule Directives (FSM 1920 and FSH 1909.12)	NFS units will have land management plans that provide long term direction for climate change adaptation and mitigation address the impacts and risks of climate change.	Ecosystem Management Coordination	Opportunity to incorporate climate change adaptation guidance into 2012 Planning Rule directives. Will ensure consideration of climate change when NFS units revise their land management plans.	National	May 2014	Issuance of directives to field units.	Final directives are issued.	Coordinating with CEQ, OMB, DOJ, EPA USFWS, and NOAA Fisheries	NA.	Work with science community on estimating uncertainty and risk and providing additional guidance in risk and vulnerability assessments and adaptation options.	Addressing 17,449 public comments on proposed planning directives.
Revise National Forest and Grassland Land Management Plans (LMPs) under the 2012 Planning Rule and directives.	LMPs are "climate-smart."	Ecosystem Management Coordination	Older LMPs may not reflect new science and information on risks to sustainable ecosystems and communities from impacts of stressors, including climate change. For plans under the 2012 Planning Rule, assessments should evaluate vulnerability of key resources related to LMP decisions. As LMPs are revised, climate adaptation strategies are developed and incorporated as needed.	Local	Ongoing. Unit LMPs are revised under the 2012 Rule and directives as per the national schedule	Land management planning process implemented by individual or grouped NFS units.	Number of plans revised annually under the 2012 Planning Rule.	Extensive intergovernmental coordination occurs at the scale of national forests, states and regions in preparation of these plans. Includes coordination with tribal, state and local governments and other federal agencies.	Budget limitations and collaboration slow the pace of LMP revisions. Insufficient field resources to complete revisions.	Difficulty meeting complex planning requirements . Controversy and litigation that drags out LMP revision process.	Baseline carbon assessments completed for each NFS unit. Publication of proposed final plans and Final EISs for 6 plan areas in the last 8 months.

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Action Description	Action Goal	Agency Lead	Risk/Opportunity Description	Scale	Timeframe	Implementation Methods	Performance Metrics	Inter-Governmental Coordination	Resource Implications	Challenges/ Further Implications	Highlights of Accomplishments to Date
Update Silvicultural Practices Directive (FSM 2470)	Update directive to incorporate current Forest Service policy direction	Forest Management	Opportunity to provide direction and guidance on ecological restoration, management at landscape scale, and managing for climate change.	National	Finalize in FY 2014	Issuance of directive to field units.	Final directive is issued.	None	NA	Accompanying handbook needs revision to reflect changes made in directive.	Draft directive completed with collaboration from R&D and S&PF. Final draft submitted to ORMS for review and publishing.

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Implement National Cohesive Wild Land Fire Management Strategy	Landscapes are more resilient, communities are adapted to fire, fire personnel have safe areas to work within	Fire and Aviation Management	Increasing wildfire season length, severity, and extent of fire on the landscape. Risk reduction - Addresses the nation's wildfire problems by focusing on three key areas: Restore and Maintain Landscapes, Fire Adapted Communities, and Response to Fire.	National, Regional	Ongoing. Phase III of plan to be finalized in FY 2014	Strategy being implemented in three phases. Restoration component involves establishing resilient fire-adapted ecosystems, which would also be better adapted to the effects of climate change and other stressors. Implement through programs and projects, in collaboration with partner agencies, Tribes, landowners.	Cohesive Strategy Goals and Performance Measures being developed. Five-year review cycle to provide updates to Congress.	Wild land Fire Leadership Council (WFLC), representing FS, DOI , States, Tribes, and local agencies			Phases I and II completed.

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Implement National Fish, Wildlife and Plants Climate Adaptation Strategy (NFWPCAS) and FS goals	Landscapes are more resilient, maintain function and productivity	Watershed, Fish, Wildlife, Air, and Rare Plants	Opportunity to improve efficiency and effectiveness by identifying FS goals and strategic actions that can be implemented in alignment with NFWPCAS	National	2014	Review agency programs and strategic plans and NFWPCAS	Crosswalk established between FS goals and strategic actions and NFWPCAS goals, strategies, and actions.	Joint Implementation Working Group (JIWG)			JIWG established

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Increase the pace of restoration on NFS lands	Landscapes are more resilient so as to maintain function, productivity, and adaptive capacity.	Forest Management	Risk reduction - Initiative lays out a series of ongoing and future actions related to the use of active forest management as one important tool to maintain and restore the functions and processes characteristic of healthy, resilient forests and watersheds. Many of these actions also support adaptation of ecosystems to climate change.	Local	Ongoing. FY 2012-2015	On-the-ground resource management treatments	FS annual restoration performance metrics (Resiliency Measure) FY 2014 target is 2.7 million ac	FS and NRCS are working in partnership to accomplish needed restoration across national forest/private land boundaries	Budget limitations restrict how much restoration work is accomplished	Phase II of the Restoration Strategy to Deputy Under-Secretary requesting department support, included advocating expanding Good Neighbor Authority and reauthorization of Stewardship Contracting.	Restoration accomplishments from 23 Collaborative Forest Landscape Restoration Projects A team has been developing restoration performance measures expected to be included in FY 16 Congressional Budget justification in July. 2014. Put in place 3 new categorical exclusions for soil and water projects. Acres treated: FY 2012: 2.56 million ac; FY2013: 2.5 million ac

Implement Western Bark Beetle Strategy (NFS lands)	Improve 1) human safety, 2) forest recovery, and 3) long-term forest resilience	Forest Management	Risk reduction - Addresses the West's bark beetle problems by focusing on three goals: human safety, forest recovery, and long-term forest resiliency. Removal of standing or dead hazardous trees near roads, along trails, and in campgrounds is top priority. The strategy is restoring healthy forest ecosystems in beetle-killed areas through planting appropriate species and thinning.	National – the strategy covers regions 1-6.	Ongoing. FY 2011 - 2016	Through FS programs and projects, in collaboration with state governments.	Acres treated for: hazardous fuels; vegetation established and improved; noxious weeds and invasive plants; native pests; Acres of forestlands treated using timber sales	FS works in collaboration with state governments in the Western States.	Budget limitations	Limited markets for dead trees; litigations are on-going challenges.	FY11-FY13: 85,0703 acres treated; 3,838 miles of roads and trails had hazard trees removed; 851.4 MBF of timber and 410,823 tons of biomass were produced. FS spent $321.3 M supporting safety, recovery and resiliency activities
Implement National Strategic Tree Planting Initiative	Dual goals: Increase community resilience and sequester and store carbon.	Cooperative Forestry	Risk reduction - Establish tree planting projects in urban and community forests to increase the amount of carbon sequestered and carbon emissions avoided. Also helps communities adapt to increasing temperatures by increasing cooling effect and other ecosystem services provided by urban trees.	National	Ongoing. FY 2012-2015	Through programs and projects, in collaboration with partner organizations and communities.	Number of trees planted. Amount of carbon sequestered and emissions offset per federal dollar invested	NA at this time.	Initiative made possible by a Cooperative Agreement in 2012 with Arbor Day Foundation. No other funding resource needs are anticipated at this time.	NA at this time.	Currently nine electric utility companies participate in the program with nearly 17,000 trees planted in the fall of 2013.

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Promote wood as a green building material (FS)	Supports dual goals of adaptation and mitigation. Increases utilization of wood to help facilitate ecological restoration and adaptation activities.	Research & Development	Opportunity - Promote and seek recognition by the U.S. Green Building Council and others of the environmental benefits of wood building products. Supports restoration of forest ecosystems to make them more resilient to climate change and other stressors, while mitigating climate change through wood's substitution for energy-intensive building materials.	National	Ongoing FY 2012-2014		Percent completion of Life Cycle Inventory (LCI) wood database update for Life Cycle Assessment (LCA) use and EDP establishment for wood products to meet Green Building standards	Collaborate on changes in certification			
Wood To Energy	Supports dual goals of adaptation and mitigation. Increase utilization of wood to help facilitate ecological restoration and adaptation activities.	Cooperative Forestry	Opportunity to create and expand markets for small-diameter material and low-valued trees removed from forest restoration activities. Grant funds are targeted to help communities, entrepreneurs, and others turn residues into marketable forest products and/or energy products. Products help fund treatments that restore resilience of forests to stressors, including climate change	National	Ongoing	Grant Program	Metric Tons		Budget limitations		

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Contributions to Coordinated Interagency Efforts, Including Development of Information, Data, and Tools											
Implement Forest Service Global Change Research Strategy 2009-2019	Provide science that supports adaptation	Research & Development	Fundamental research focus of the FS Global Change Research Strategy is to increase understanding of forest, woodland, grassland, and urban ecosystems so they can be managed to sustain and provide ecosystem services for future generations.	National	Ongoing FY 2009-2019	Research, publications and other technology transfer activities	Broad diversity of research products including peer-reviewed publications, number of tools developed, customer-satisfaction surveys and science delivery efforts, such as workshops.	Coordinates with USGCRP	Budget limitations		

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Forest and Rangeland Renewable Resources Planning Act (RPA) Assessments	Provide science to inform policy, including adaptation	Research & Development	Publication: *Future of America's Forests and Rangelands: Forest Service 2010 Resources Planning Act Assessment* This scientific assessment provides a snapshot of current U.S. forest and rangeland conditions and trends on all ownerships, identifies drivers of change, and projects conditions 50 years into the future. Includes analyses of forests, rangelands, wildlife and fish, biodiversity, water, outdoor recreation, wilderness, urban forests, and the effects of climate change on these resources.	National, Regional	Ongoing - every 10 years	Conduct assessment. Distribute/post publications	Research publications	Useful to other agencies, land managers, and sectors			2010 RPA Assessment published in 2012

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National Climate Assessment – Forest Sector Report	Provide science to inform policy, including adaptation	Research & Development	Publication: *Effects of Climatic Variability and Change on Forest Ecosystems: A Comprehensive Science Synthesis for the U.S. Forest Sector*. A scientific assessment of current condition and likely future condition of forest resources in US relative to climatic variability and change. Assessment provides technical input to the NCA and serves as a framework for managing forest resources in the US.	National, Regional	Ongoing - every four years	Conduct assessment. Distribute/post publication	Research publication	Useful to other agencies, land managers, and sectors			Forest Sector Report published in 2012

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Establish regional climate hubs for risk adaptation and mitigation to climate change. FS hosts five of the seven hubs.	Support adaptation by providing information and technical advice needed by producers (farmers, ranchers, and forest land owners).	Research & Development, USDA CCPO	Hubs will provide outreach and information to producers on ways to mitigate risks; public education about the risks climate change poses to agriculture, ranchlands and forests; regional climate risk and vulnerability assessments; and centers of climate forecast data and information.	Regional / Landscape, Local	Ongoing	Work through existing USDA programs.	In startup, but initially will examine the processes involved in vulnerability assessments and implementation of management actions	Yes, within USDA. Will also link a broad network of partners participating in climate risk adaptation and mitigation, including universities; non-governmental organizations; federal agencies such as DOI, NOAA, Native Nations and organizations; state departments of environment and agriculture; research centers; farm groups and more	No additional funding for this initiative	Limited resources	Hubs now established.

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Implement Inventory, Monitoring, and Assessment Strategy	Provide monitoring and assessment information that support adaptation planning and other business needs	Ecosystem Management Coordination	Opportunity to improve resource inventory, monitoring, and assessment. Goal is for land management information to be comprehensive, inclusive, credible, and responsive and adaptive to changes. Supports adaptation and mitigation policies, such as the President's Climate Action Plan and the National Fish, Wildlife, & Plants Climate Adaptation Strategy.	National, Regional, Local	Ongoing	Policy changes and improved information management	TBD - IM&A Strategy scorecard metrics	Coordination with other federal, state and local agencies on identifying and implementing opportunities to share data, standards, tools and products		Effectively addressing the large number of agency business areas and information needs; Conducting a collaborative process; Adjusting the way the agency has managed resource information over time – culture;	Drafted National Management Questions to guide Information Needs Assessment
Develop and implement Watershed and Terrestrial Condition Frameworks	Provide information that supports integrated resource restoration and CC adaptation	Sustainable Landscape Management Board of Directors	Opportunity to characterize and prioritize watersheds and landscapes for developing restoration and adaptation strategies. Continue effort to merge these into a comprehensive assessment tool and indicator set. Watershed Condition Framework is operational. TCF component is being developed.	National, Regional, Local	Ongoing FY2016	Development of indicators, tools, and guidance for assessments.	WCF and TCC become an integrated dataset, assessment, and monitoring tool.	Sharing of science, data, tools applicable to vulnerability assessments, priority setting, etc	Better coordinated land management across jurisdictions.		

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Improve the Climate Change Resource Center (www.fs.fed.us/ccrc)	Provide access to information and training that supports CC adaptation	Research & Development	Opportunity to enhance this web-based science-delivery portal for Forest Service employees and partners who need information and tools to address climate change in project planning and implementation.	National	2012-2015	Website development and improvement	Annual monitoring of website improvements completed.	Share science, data, tools, educational materials			
Improve Interagency Coordination on Climate Projections		Climate Change Advisor's Office, Research & Development	Opportunity to coordinate and provide guidance within Forest Service on the selection & use of downscaled climate projections and expand across land management agencies and climate science providers. The goal of this larger effort is to simplify the complex array of choices in a rigorous, defensible manner and facilitate greater comparability in data use	National but nested to apply at multiple levels	On-going. Work plan defined June 2013, draft products expected by end of year.	Coordinating with other agencies	Published # of agencies on-board Publication of guidance Adoption/use of guidance Outreach activities to promote awareness	This one of several projects sponsored by the Interagency Landscape Management Adaptation Group (ILMAG). Interagency work group formed. Sharing science and coordinating further work.			Climate Projections FAQs publication completed and distributed.
Conserve Genetic Diversity	Improve the success of adaptation projects.	Forest Management, Rangeland Management	Risk reduction - Genetic differences found in forest and rangeland plant species would be mapped to the landscape using GIS and other spatial analyses. From these genetic landscape maps, develop seed movement guidelines for species of restoration and reforestation concern by predicting their ability to be adapted to future climates.	National	On-going	Research, publication of guidelines.	Number of species genetically analyzed	No inter government coordination exists. However, inter-agency coordination exist between FS, ARS, NRCS, and BLM		Lack of funding and loss of trained geneticists.	Studies have been completed or are underway for 15 grass species, 9 forbs, and 7 trees and shrubs

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Improve Forest Tree Gene Conservation	Supports adaptation of forests to CC	Forest Health Protection	Risk reduction - Prioritize forest trees for gene conservation, develop conservation plans, carry them out	National	Ongoing FY2012-2015	Research, planning, implementation	Ensure at least 20 unrelated individuals (or seed) collected per seed zone.				
Implement National Insect and Disease Risk Assessment	Manage forest ecosystems to increase resilience	Forest Health Protection	Identifies areas at risk to catastrophic levels of forest insects, pathogens and abiotic mortality agents. Projects anticipated levels of tree mortality over the next 15 year period.	National, Regional, and Local	Completed in 2013	Risk map and supporting data and information are posted on Forest Health Monitoring website. information for strategic and tactical planning	Updated map is issued	Covers all treed lands in US. Assessment completed through Forest Health Monitoring Program – a federal and state partnership		Future plans include enhanced climate projections	National Insect and Disease Risk Map was just updated.
Create climate-sensitive version of the Forest Vegetation Simulator (FVS), a nationally supported forest dynamics model.	Improve ability to simulate effects of climate change on forested lands	Forest Management	Provides opportunity to model effects of climate change and develop management strategies that are likely to result in a resilient ecosystem when planning for restoration, watershed improvement, and other activities. Reduces risk of planning activities likely to have an adverse effect on ecosystem resilience as the climate changes.	National model applied at Regional and Local levels	2014 - 2015	Through collaboration with Research Stations and universities	Successful completion of the model and full integration into the production FVS software	An inter-agency steering team with members from the BIA, BLM, and NRCS helps direct work of the FVS staff, including development of the climate model.		Because climate change may result in conditions unlike anything recorded, data for validation of this model are lacking and will be slow to become available.	A climate sensitive version of FVS has been implemented for the western conterminous United States. Development of the eastern version is well underway.

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R&D All Station Climate Change and Tribes Project	Learn from and Assist Tribes and other native peoples in managing our nations' natural resources in the context of changing climate	R&D (Northern Station currently serving as project coordinator)		National, Regional	On-going	Plan and facilitate workshops, support Regional Scientist-Manager networks, develop "portfolio" studies highlighting particular local challenges and adaptation options.	# of Tribes/Native orgs engaged	Collaborative Work with many DOI LCCs and CSCs.		Highlights needs for funding for monitoring culturally important species.	Work with over 80 Tribes and 20 intertribal/native organizations. Active science-manager networks established in PNW and SW. Over 60 tribal experts/students supported to attend climate-related conferences/workshops. Dozens of publications and guides for Tribes.
Synthesize climate change adaptation across all federal land management agencies	Coordinate adaptation among agencies	Climate Change Advisor's Office, Research & Development	Opportunity to improve coordination by documenting past and ongoing climate change adaptation efforts of all federal land management agencies, developing overarching inferences regarding adaptation, and emphasizing the consistency among agencies.	National, Regional, Local	2014	Research, review existing programs and efforts	Publication				