STATEMENT
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CONCERNING

MANAGING FEDERAL FORESTS IN RESPONSE TO CLIMATE CHANGE: NATURAL RESOURCE ADAPTATION AND CARBON SEQUESTRATION

Mr. Chairman and members of the Subcommittee, thank you for inviting me today to discuss the important role National Forests and Grasslands play in addressing climate change. As you may know observations show that climate change is already altering our Nation's forests in significant ways and those alterations are very likely to accelerate in the future, in some cases dramatically[1]. These alterations present significant challenges to sustainable management of these forests. Decisions being made today by policymakers and resource managers will have implications through the next century.

Secretary Vilsack is asking the Forest Service and our sister agency, the Natural Resources Conservation Service (NRCS), to adopt an "all-lands approach" in our restoration efforts. Our approach takes actions across large landscapes so that our actions will make a substantive difference. It also, will include close collaboration on our part with Federal, State, local, tribal, and private landowners, land managers, and other stakeholders.

Climate Change - Managing Uncertainty

In the uncertain environment of climate change, risk management will become critical. This is managing ecosystems for resiliency to prepare for uncertain future outcomes. I have spoken many times in the past about our desire to restore the health of the nation's forests. When we use the term restoration, we do not mean returning a stand or forest to a previous condition but rather bringing back some of its previously lost ecosystem functions or returning its ability to withstand otherwise mild disturbance events. Our

[1] CCSP. May 2008. *Synthesis and Assessment Product 4.3 (SAP 4.3): The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States*, P. Backlund, A. Janetos, and D. Schimel, lead authors. A report by the U.S. Climate Change Science Program (CCSP). Abstract.

approach is to make forests and grasslands more resilient to disturbances under a range of future conditions.
To help the land management professionals deal with this uncertain environment, the Forest Service developed a Strategic Framework for Responding to Climate Change to guide our actions in addressing climate change. The Framework envisions a future where ecosystem services are sustained and forests and grasslands are adapting successfully to a changing climate and our management actions are contributing to mitigating impacts of climate change. The Strategic Framework identifies seven key goals:

- **Science** – Advance our understanding of climate change and its impacts and develop effective ways to improve science delivery to managers.
- **Adaptation** – Enhance the capacity of forests and grasslands to adjust to the impacts of climate change.
- **Mitigation** – Promote the management of forests and grasslands to reduce the build-up of heat-trapping gases in the atmosphere.
- **Policy** – Integrate climate change considerations as appropriate into Forest Service policies, program guidance, and communications.
- **Sustainable Operations** – Reduce the environmental footprint of our operations and facilities.
- **Education** – Advance awareness and understanding of climate change implications among Forest Service employees and the public.
- **Alliances** – Establish, enhance, and retain strong alliances and partnerships.

These goals have helped us organize our thinking about climate. Forest Service goal implementation teams are recommending key actions that the Agency can take for the short-term and to position itself for the long-term. I recognize these goals will not be realized immediately, but we have already done much. The Science, Adaptation, and Mitigation goals are most germane to today's topic, so I will focus my testimony there.

Current State of Science

Having science that advances our understanding of the environmental, economic, and social implications of how climate change affects forests and grasslands in the future is essential for managers and policy officials to make informed decisions. The Forest Service already has wide breadth of experience with managing and responding to weather extremes and natural catastrophes. The scientific community has generated an even greater abundance of knowledge and produced an extensive literature on the subject. These two bodies of knowledge, that of managers' and of scientists', is being transformed into best management practices, land management tools, and information. In addition, we are communicating through various means to citizens the effect of climate change and its impacts on ecosystems so they will be better prepared to participate in decisions and actions affecting their National Forests and Grasslands.

The Science & Management goal will be forwarded by Forest Service Research & Development. As you may be aware, the Forest Service has amassed over two decades

of focused climate change research, three decades of air pollution research, and a century of experience in scientific assessments and research that provides a firm scientific foundation for addressing the challenges of managing these ecosystems relative to climate change.

I need to stress again, however, that we are a long way from knowing all we need to know about the impacts of climate change on forests and grasslands. In some areas of study we have significant science gaps that need to be addressed. Climate models lack the ability to provide projections at the detailed scale that is more useful to land managers and local and regional planners. To address this gap, our scientists are working with the Department of Commerce's National Oceanic and Atmospheric Administration and USGS to improve these models. Our scientists are also looking for better ways of forecasting how terrestrial ecosystems will change in response to a changing climate and how the changes will affect animals and plants that depend on these ecosystems. The Strategic Framework recognizes these gaps and I want to assure you that the Forest Service is working with USDA and other Federal agencies and partners to address these and other issues.

Adaptation and Carbon Sequestration

I want to now switch my attention to how we are beginning to adapt our National Forests and Grasslands to a changing climate. During my many years with the Forest Service, I have come to realize that effectively accomplishing our mission will require us as land managers to anticipate and adapt to the profound environmental stresses of climate change. These systems must be capable of delivering the ecosystem goods and services that this country needs, such as pure, clean water; habitat for wildlife and fish; opportunities for outdoor recreation; wood products; and energy. These systems can create local economic opportunities to support local communities. I want to assure you that we at the Forest Service are committed to success in this enterprise.

Many of the same management techniques used to restore forest health can be used to help forests adapt to climate change impacts. Forest Service land management professionals know they will need to be vigilant, strategic and flexible in using new information to accommodate changing conditions because the scope of climate change and its impacts on ecosystems are difficult to predict. In addition, our management decision processes will need to include ways of dealing with risks and uncertainties introduced or made worse by climate change. In some cases, failing to take management actions will result in significant disruptions to ecosystems, so we must maintain as many options as possible, both now and in the future, for handling unexpected events and conditions.[2]

[2] CCSP. 2008: *Preliminary review of adaptation options for climate-sensitive ecosystems and resources.* A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. [Julius, S.H., J.M. West (eds.), J.S. Baron, L.A. Joyce, P. Kareiva, B.D. Keller, M.A. Palmer, C.H. Peterson, and J.M. Scott (Authors)]. U.S. Environmental Protection Agency, Washington, DC, USA, 873 pp. http://www.climatescience.gov/Library/sap/sap4-4/final-report/#finalreport

In addition, we are designing a better science-based adaptive management approach to, promote learning through doing, monitoring, and modifying. This approach involves actively making decisions and monitoring the results of those decisions to improve our understanding about the complex systems we manage. Some management actions may need to be expanded, such as reforestation with a more diverse species mix that may be better adapted to future climate projections.

Our land managers are also learning from their close working relations with our scientists. The West Wide Climate Initiative (WWCI), a partnership among scientists and managers at the three western Forest Service Research Stations and National Forests, is developing decision-support tools to help managers address climate change and adaptation in national forests and national park units representing major regions of the West. These case studies are on the Olympic National Forest and Olympic National Park, the Tahoe National Forest, the Inyo National Forest and Devils Postpile National Monument, and Shoshone National Forest. With these pilot projects the Forest Service is analyzing projections of future vegetation and developing specific adaptation strategies to promote resilience of national forest resources to climate change.

Another management responsibility is mitigating the effects of climate change. As we all know, to significantly reduce our greenhouse gas emissions, the United States will need to implement a variety of mitigation strategies. These strategies include storing more carbon in forests and wood products implementing greenhouse gas capture and storage from point sources, and reducing fossil fuel use through multiple options. For instance, biomass from restoration and hazardous fuels reduction projects can be used for energy production. However, the issue is complex and requires both science and thoughtful land management policy.

However, the potential of some of our forests to store additional carbon may be limited because of management designation, accessibility, and/or stand characteristics. In many areas our forests contain overly-dense stands that are under stress and have become more susceptible to wildfire, insects, and disease[3]. Management actions, designed to restore these forests and grasslands and protect communities, such as thinning or allowing fire to resume its natural role as a cleansing and regenerative force, can improve the ability of these ecosystems to adapt to the continually increasing stress of changing climate and

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Scott, D. and C. Lemieux. 2005. Climate change and protected area policy and planning in Canada. The Forestry Chronicle 81(5):696–703.

[3] Fettig, Christopher J.; Klepzig, Kier D.; Billings, Ronald F.; Munson, A. Steven; Nebeker, T. Evan; Negron, Jose F.; Nowak, John T. 2007. The effectiveness of vegetation management practices for prevention and control of bark beetle infestations in coniferous forests of the western and southern United States. Forest Ecology and Management, Vol. 238: 24-53.

Graham, Russell T.; McCaffrey, Sarah; Jain, Theresa B. 2004. Science basis for changing forest structure to modify wildfire behavior and severity. Gen. Tech. Rep. RMRS-GTR-120. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 43 p..

may have the increased benefit of sequestering more carbon over the long-run through increased net growth.[4]

While healthy functioning forests may serve as a means to sequester carbon, under current practices, many of our western forests are at risk of turning from a carbon sink to a carbon source. Projections indicate that while these forests continue to sequester more carbon in the short-term, in 30 to 50 years[5], disturbances such as fire and insects and disease could dramatically change the role of forests, thereby emitting more carbon than currently sequestering. Monitoring both climate change effects and the outcomes of management actions are key to adapting to a changing climate.

Working with Private Landowners

Although there is much we can do to sequester carbon on federal lands, it is also crucial for us to recognize the role that private forest land in the United States can and must play in the Nation's mitigation options for greenhouse gas emissions. People are often surprised to learn that the majority of forest land in the United States—about 56% —is owned privately[6]. An important contribution we can make to increase carbon sequestration in and decrease emissions from U.S. forests is by working with the owners of these 423 million privately-owned forested acres.

Privately-owned forests can be converted into subdivisions, other developed uses, or agriculture—all land uses that sequester substantially less carbon per acre than forest trees and soil[7]. Even though the private forest landowners of the United States are

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[4] CCSP. May 2008. *Synthesis and Assessment Product 4.3 (SAP 4.3): The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States*, P. Backlund, A. Janetos, and D. Schimel, lead authors. A report by the U.S. Climate Change Science Program (CCSP).

[5] Westerling, A. L., H. G. Hidalgo, D.R. Cayan, D. R., and T.W. Swetnam, 2006,. "Warming and earlier spring increase western US forest wildfire activity", Science 313(5789): 940-943.

Haynes, R.W., et al. 2007. The 2005 RPA timber assessment update. Gen. Tech. Rep. PNW-GTR-699. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 212p.

Smith, J.E.; Heath, L.S.; Nichols, M.C.. 2007. US Forest Carbon Calculation Tool: Forestland Carbon Stocks and Net Annual Stock Change. USDA, Forest Service, Northern Research Station, Gen. Tech. Report NRS-13.

Smith, J.E.; L.S. Heath, 2004. Carbon stocks and projections on public forestlands in the United States, 1952-2040. Environmental Management 33(4): 433-442.

U.S. Environmental Protection Agency. 2009. Inventory or U.S. Greenhouse Gas Emissions and Sinks: 1990-2007. EPA 430-R-09-004.

[6] USDA. May, 2008. Forest Ownership Patterns and Family Forest Highlights from the National Woodland Owner Survey. U.S. Forest Service. Northern Research Station. NRS-INF-06-08.

[7] Joyce, Linda A.; Birdsey, Richard 2000. The impact of climate change on America's forests. Gen. Tech. Rep. RMRS-GTR-59. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 133 p.. http://www.treesearch.fs.fed.us/pubs/4567

making significant contributions to cleaner air, cleaner water, and carbon sequestration simply by maintaining their land in a forested state, they often make decisions to convert their forest land.

Forest Stewardship, Forest Legacy, and the Community Forest and Open Space Program are voluntary landowner assistance programs that recognize how important it is that private forestland stays forested and continues to provide these benefits. Landowners across the U.S. can receive assistance with forest management and a written forest plan through the Forest Stewardship Program. Today, about 22 million acres of private forest lands are already managed under a current forest stewardship plan and there continues to be enormous demand for the program. The Forest Legacy Program recognizes the public benefits provided by private lands; conservation easements on vulnerable forest lands guarantee that they will not be subdivided or developed, and that they will be able to store carbon in their trees and soils. To date, the Forest Legacy program has protected over 1.8 million acres of vulnerable private forest lands from development.

Conclusion

Secretary Vilsack is asking the Forest Service and our sister agency, the Natural Resources Conservation Service (NRCS), to adopt an all-lands approach working with willing land owners across boundaries when addressing restoration. The Forest Service's Strategic Framework provides a guide to addressing climate change and the challenges at spatial and temporal scales unimaginable in the past. Coming to grips with climate change will require landscape-scale conservation, working together across borders and boundaries, and focusing on a common restoration vision for the greater good. The future of America's lands and waters, and the future of generations who will rely on them, depend on nothing less.

Thank you for the opportunity to discuss these issues with the Subcommittee. I would be happy to answer any questions you may have.