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U.S. Department of the Interior

INTERIOR'S PLAN FOR A COORDINATED, SCIENCE-BASED RESPONSE TO CLIMATE CHANGE IMPACTS ON OUR LAND, WATER, and WILDLIFE RESOURCES

SUMMARY

Climate change is driving rapid and broad changes in the global ecosystem, which are documented in extensive scientific literature. These include increasing temperatures; varying precipitation; rising sea levels; and acidifying oceans. These changes, in turn, are impacting local environments and economies. Sea level rise puts landscapes important to humans and wildlife at risk; variations in precipitation affect water resource availability for humans and natural systems; temperature changes affect terrestrial and aquatic systems, species distributions and interactions; these same forces will also pose threats to our nation's cultural traditions and resources. Accomplishing conservation goals in a changing climate will be more challenging and complex than ever before. Success will require building integrated capacities, forging shared goals, and people working together to define and implement conservation strategies large and bold enough to meet these challenges.

As the primary land, water and wildlife manager for the nation, the U.S. Department of the Interior has an obligation to address the impacts that climate change is having on America's resources by developing integrated adaptation and mitigation strategies. In recognition of this responsibility, Secretary Salazar signed a Secretarial Order (No. 3289) on September 14, 2009, entitled, "Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources." **That Order established a *Climate Change Response Council*, chaired by the Secretary, which is coordinating activities within and across the bureaus to develop and implement an integrated strategy for climate change response by the Department.** Working at the landscape, regional, and national scales through the establishment of ***DOI Climate Science Centers (CSCs)*** **and** ***Landscape Conservation Cooperatives (LCCs),*** the Department is defining and implementing a vision that integrates DOI science and management expertise with that of our partners, providing information and best management practices available to support strategic adaptation and mitigation efforts on both public and private lands across the U.S. and internationally.

This vision supports individual bureau missions while, at the same time, creating synergies with other DOI agencies and both governmental and non-governmental partners to implement integrated climate change science, adaptation, and mitigation strategies across broad landscapes. DOI bureaus will be pooling resources to support and leverage the joint work of CSCs and LCCs. Project-level funding and implementation, and regulatory, management, and policy decisions will continue to be the responsibility of each bureau and partner, in accordance with their mission-related responsibilities.

In implementing this vision we will bring significant new capabilities to the table for DOI land, fish, wildlife, water, marine, tribal, and cultural heritage managers, as well as for our federal, state, local, Tribal, NGO, and private landowner partners. These new resources include:

- *Climate Change Impact Science*: Regional Climate Science Centers and Landscape Conservation Cooperatives will conduct and communicate research and monitoring, improving our understanding and forecasting of climate change impacts and vulnerabilities. They will support strategic decisions in response to those vulnerabilities, with CSCs providing centers for basic climate change science associated with broad regions of the country and LCCs focusing more on applied science at the landscape level.

- *Data Integration and Dissemination:* This effort will support the integration of our nation's scientific database, improving availability and dissemination of climate change impact and vulnerability information, and access and decision-support to scientists, resource managers, decision makers, and the general public through www.data.gov and other appropriate mechanisms.

- *Enabling Science-Based Adaptation Strategies:* By providing integrated scientific and technical capacities to support cultural and natural resource managers, they will be able to design and implement strategic and adaptive responses to changing climate.

As explained in more detail below, these new approaches form the foundational elements for the Climate Science Centers that DOI is establishing on a regional basis around the country, and for Landscape Conservation Cooperatives -- geographically-based cooperatives in which DOI bureaus will work with other agencies and outside partners to expand the understanding of climate change and how it is interacting with other forces to alter natural and cultural resources, and to facilitate strategic responses.

DOI Climate Science Centers (CSCs): "Delivering Fundamental Climate Impact Science to Resource Managers on a Regional Basis"

The Department of the Interior operates a National Climate Change and Wildlife Center at the headquarters of the United States Geological Service. In accordance with Secretarial Order No. 3289, the Department is expanding the scope and geographic reach of its climate science efforts by establishing, in addition, eight regional Climate Science Centers that will provide scientific information, tools and techniques that land, water, wildlife and cultural resource managers and other interested parties can apply to anticipate, monitor and adapt to climate and ecologically-driven responses at regional-to-local scales.

CSCs will deliver basic climate change impact science to Landscape Conservation Cooperatives within their respective regions, including physical and biological research, ecological forecasting, and multi-scale modeling. These Climate Science Centers will prioritize fundamental science, data and decision-support activities based principally on the needs of the LCCs, including climate change impacts on natural and cultural resources and adaptive management and other decision support tools for managers. By way of example, the regional CSCs will work with (and sometimes generate) downscaled climate models, providing derivative models and tools that link physical forcing factors with biological,

hydrological, physical, ecological, and cultural resource response variables. Centers also will develop response models and projections for priority ecosystems, species, habitats, and other natural and cultural resources; this will generally be done at regional levels and then collaboratively developed with LCCs for specific applications.

The science priorities and activities at Climate Science Centers will be driven principally by input from the associated LCCs, but also other partnerships. Working closely with LCC staff, the CSCs will help develop adaptive management approaches, develop statistically sound sampling programs and processes to monitor and manage climate change effects. Centers also will work with LCCs to define measurable resource outcomes and endpoints for adaptive management applications which, in turn, will help CSCs refine models and outputs. CSCs will also facilitate and fund research advancing the science of climate impact and resource modeling, and investigating underlying mechanisms that drive the responses of specific resources.

Climate Science Centers will be based at host institutions with substantial climate change science expertise and partnerships. Centers will include staff from multiple partners, perhaps including LCC staff and will include a cadre of scientists as well as information specialists.

Landscape Conservation Cooperatives (LCCs): The On-the-Ground Applied Science and Adaptive Management Arm

Landscape Conservation Cooperatives are management-science partnerships that inform integrated resource management actions addressing climate change and other stressors within and across landscapes. They will link science and conservation delivery. Each LCC functions within a specific landscape, but it also will be part of a national, and ultimately, international network. LCCs are true cooperatives, formed and directed by land, water, wildlife and cultural resource managers and interested public and private organizations. Federal, state, tribal, local government and non-governmental management organizations are all invited as partners in their development. Each LCC will be directed by a steering committee representing partners working in that region.

The Secretary's Climate Change Response Council will promote collaboration among LCCs and develop mechanisms for data and information management, the setting of national priorities, and ensuring consistency and prevent duplication of effort among the national network of LCCs.

Organization and Focus of LCCs. LCCs are self-directed partnerships. They provide a structure to define objectives, develop spatially-explicit strategies, and provide scientific and technical decision support to inform natural and cultural resource management across terrestrial, aquatic, coastal and marine ecosystems. The core of an LCC will be a scientific and technical staff with an applied resource management focus. That staff and capacity will be directed by a Steering Committee, consisting of resource management representatives from governmental entities (federal, state, tribal and local) and non-governmental organizations who are prepared to contribute to the joint effort.

Role of the Department of the Interior and its Federal Partners: Interior bureaus will seek to catalyze LCC development by contributing scientific and technical capacities, and inspiring a critical mass of partners to contribute their expertise and capacities and array around shared landscape-scale resource management objectives. Bureaus will support LCCs by providing a structure for integrating natural and cultural resource management and climate impact response, and pooling resources so that

LCCs will have the capability to address issues that extend across the missions of all supporting bureaus and agencies.

The Department's climate change vision and capacities, including LCCs and CSCs, will enable each of DOI's bureaus to work together, and with partners, to implement an integrated Department-wide climate change science, adaptation, and mitigation strategy that supports their individual mission responsibilities. Project-level funding and implementation, and management and regulatory decisions will continue to be the responsibility of each bureau and partner. Entities outside the Department (e.g., States, the U.S. Forest Service; EPA; NOAA) are encouraged to participate in LCCs as conservation partners and as providers of fundamental and applied scientific information and/or financial support. In this way, LCCs will aggregate capacity, creating synergies, and avoiding duplication and competition between organizations.

ADDITIONAL BACKGROUND

Landscape Conservation Cooperatives and Climate Science Centers: Interrelationship and Roles in Climate Change Science and Adaptation. The Department of the Interior considers the Climate Science Centers (CSCs) and Landscape Conservation Cooperatives (LCCs) as cornerstones to an integrated approach to climate change science and adaptation. CSCs and LCCs have distinct science and resource management roles, but also share complementary capacities and capabilities.

LCCs: As explained above, LCCs are management-science partnerships that will inform integrated resource management actions to address climate change and other stressors across landscapes. They link science and conservation delivery. One key function will be to help partners develop spatially-explicit resource management goals and, working with Climate Science Centers, provide scientific decision support, including information needed to identify adaptation strategies for dealing with anticipated climate change impacts. LCC staff will also assist partners in integrating status and trends data with effectiveness monitoring and applying science-based monitoring programs to determine if resource goals are being met, evaluate and adapt management goals and strategies, and work with CSC staff to reduce key uncertainties and improve the next round of forecasts. LCCs will coordinate data identification and synthesis closely with Climate Science Centers, the National Climate Change and Wildlife Science Center, and other scientific organizations. The Department of the Interior has committed to a unified monitoring and data management effort that will promote state of the art data integration procedures to facilitate data sharing.

LCCs will include staff from multiple partners. Core staffing will include an LCC Coordinator and LCC Science Coordinator. Depending on the availability of resources from Climate Science Centers and other organizations, other key LCC capacities may include landscape and population modelers, geographers and GIS specialists, terrestrial and aquatic ecologists, cultural resource specialists, quantitative fish and wildlife biologists, hydrologists, outreach specialists and other technical and decision-support staff to provide the scientific, technical and training capabilities to understand, apply, and adapt models and tools for specific landscapes, resources, and strategies. The USGS has committed to providing co-located scientists to supply some of these capacities and focus on LCC science needs. It is envisioned that core LCC staff will be located at an LCC partner facility, with other staff networked from remote locations. CSCs: As mentioned above, CSCs will deliver basic climate change impact science to all Landscape Conservation Cooperatives (LCCs) within their respective regions; they will prioritize fundamental science, data and decision-support activities based principally on the needs of the LCCs, including climate change impacts on natural and cultural resources and adaptive management and other decision support tools for managers. They will partner with and help facilitate the coordination of fundamental climate science capabilities and monitoring activities across their regions of responsibility, including federal (e.g., climate science being performed by the USGS, NPS, FWS, BoR, MMS, BLM, BIA, OSM, NOAA, and USDA), university, tribal, state, local government, and NGO partners. CSCs will synthesize, integrate, and communicate existing climate change impact data gathered by the Department and external partners, and identify gaps in this data. CSCs will provide education opportunities for the public and stakeholders about the impacts of climate change, adaptive management strategies, and sustainability and environmental leadership.

Each CSC will employ, or affiliate with, DOI scientists performing fundamental climate change research (e.g., research scientists, climate modelers and field biologists), data managers, and decision support analysts located within the region. These scientists, data managers, and decision support analysts will have a wide range of expertise in terms of climate change impacts and the adaptive management of DOI resources. They either will be physically located at a CSC or virtually co-located with a CSC. CSCs will

also rely upon or collaborate with partnerships with other federal scientists (e.g. NOAA, USDA, and EPA scientists) as well as state, university, NGO and tribal scientists.

Roles and Responsibilities Concept Table. This represents lead roles only, and does not imply exclusive involvement in any given activity. The list is not inclusive of every potential activity at an LCC or CSC.

	LCC Lead	Shared	CSC Lead
Partnerships			
Initiate science partnerships; bringing groups to the table			X
Initiate resource partnerships; bringing groups to the table	X		
Develop resource goals and desired resource outcomes	X		
Help define resource outcomes and endpoints that can be measured and used to refine future efforts		X	
Articulate priority science needs for specific resource goals/outcomes	X		
Support priority science needs		X	
Science Development and Delivery			
Determine specific model outputs and endpoints needed to address the specific science questions and priorities (determine feasibility)		X	
Evaluate whether needed forecast/model/information already exists			X
Work with or develop downscaled climate data and models to generate output variables for specific resource questions			X
Develop ecological and other resource models, linking underlying drivers with factors that can be forecast and modeled			X
Develop new data and tools for forecasting large-scale natural, physical, and ecological conditions under different climate scenarios			X
Provide large-scale information, forecasts, models, and tools to the LCCs			X
Science Application			
Apply down-scaled models and other information to generate spatially-explicit options and adaptation strategies	X		
Assess species and habitat vulnerabilities		X	

Determine where to conduct on-the-ground activities to accomplish specific goals	X		
Monitoring			
Develop science-based monitoring strategies that can link resulting data back to models, for refinement		X	
Help partners design and implement science-based monitoring programs to determine if resource goals are met, and to refine future modeling	X		
Use monitoring results to refine future model and forecasting efforts		X	

1/25/10

CLIMATE ADAPTATION – Final Allocations 1/12/10

(in thousands of dollars)	2010 Enacted	2010 Climate Science Centers	2010 Landscape Conservation Cooperatives	2010 Monitoring Activities	2010 Unified Monitoring & Data Collection	2010 Other Activities	2011 Request	2011 Climate Science Centers	2011 Landscape Conservation Cooperatives	2011 Monitoring Activities	2011 Unified Monitoring & Data Collection	2011 Other Activities
Bureau of Land Management												
Soil, Water and Air Management												
Ecosystem Assessments	4,500	-	+4,500	-	-	-	4,500	+1,000	+3,500	-	-	-
Seed Preservation	3,000	-	-	-	-	+3,000	3,000	-	-	-	-	+3,000
Adaptive Strategies and Restoration	7,500	-	-	-	-	+7,500	7,500	-	-	-	-	+7,500
Adaptation		-	-	-	-	-	2,500	-	+2,500	-	-	-
Subtotal, BLM	15,000	-	+4,500	-	-	+10,500	17,500	+1,000	+6,000	-	-	+10,500
Bureau of Reclamation												
Basin Studies	1,500	-	+1,500	-	-	-	3,000	-	+3,000	-	-	-
Science and Technology	2,000	+2,000	-	-	-	-	4,000	+4,000	-	-	-	-
Subtotal, Reclamation	3,500	+2,000	+1,500	-	-	-	7,000	+4,000	+3,000	-	-	-
U.S. Geological Survey												
Climate Effects Network/Science Application	10,500	-	-	+10,500	-	-	11,500	-	-	+11,500	-	-
National Climate Change & Wildlife Science Center (CSCs)	15,000	+15,000	-	-	-	-	23,000	+23,000	-	-	-	-
Geologic Carbon Sequestration	5,000	-	-	-	-	+5,000	5,000	-	-	-	-	+5,000
Biologic Carbon Sequestration	5,000	-	-	-	-	+5,000	7,000	-	-	-	-	+7,000
Research and Development	22,128	-	-	-	-	+22,128	22,073	-	-	-	-	+22,073
Other Climate Change Science Program Contributions	9,824	-	+5,000	-	-	+4,824	9,305	-	+5,000	-	-	+4,305
Subtotal, USGS	67,452	+15,000	+5,000	+10,500	-	+36,952	77,878	+23,000	+5,000	+11,500	-	+38,378
Fish and Wildlife Service												
Climate Change Planning (LCCs)	10,000	-	+10,000	-	-	-	13,000	-	+13,000	-	-	-
Climate Change Science Capacity at LCCs	10,000	-	+10,000	-	-	-	14,000	+2,000	+12,000	-	-	-
Gulf Coast LCC activities		-	-	-	-	-	750	-	+750	-	-	-
Gulf Coast Climate Science activities		-	-	-	-	-	1,000	-	+1,000	-	-	-
Partners - Private Lands	6,000	-	-	-	-	+6,000	8,000	-	-	-	-	+8,000
National Wildlife Refuge System - Monitoring	12,000	+250	-	+9,000	+2,750	-	20,000	+1,000	-	+14,750	+4,250	-
Fisheries - National Fish Habitat Action Plan	2,000	-	-	-	-	+2,000	2,000	-	-	-	-	+2,000
Subtotal, FWS	40,000	+250	+20,000	+9,000	+2,750	+8,000	58,750	+3,000	+26,750	+14,750	+4,250	+10,000
National Park Service												
Operation of the National Park Service												
Land, Water, and Wildlife Adaptation Strategies	5,500	+500	+5,000	-	-	-	5,500	+373	+5,127	-	-	-
Climate Change Monitoring System	3,000	+200	-	+2,800	-	-	3,000	-	-	+2,000	+1,000	-
Climate Change Response Office	1,500	+160	+1,340	-	-	-	1,500	+570	+930	-	-	-
Subtotal, NPS	10,000	+860	+6,340	+2,800	-	-	10,000	+943	+6,057	+2,000	+1,000	-
Bureau of Indian Affairs	-	-	-	-	-	-	200	-	+200	-	-	-
TOTAL, CLIMATE ADAPTATION	135,952	+18,110	+37,340	+22,300	+2,750	+55,452	171,328	31,943	47,007	28,250	+5,250	+58,878