



National Climate Change and Wildlife Science Center

A Partnership to Sustain Fish and Wildlife Communities



Proposed 5-Year Strategy (2009 – 2014)

Executive Summary

Global climate change will bring substantial changes to wildlife and fish species and communities, and the habitats and ecosystems upon which they depend. To meet this challenge, we must adapt and transform natural resource science and management. In part, this will require a strong foundation of new climate impacts science and tools, and an adaptive management framework. The USGS National Climate Change and Wildlife Science Center was established by Congress to provide the science and technical support needed to help fish and wildlife resource managers anticipate climate change impacts and evaluate options that will facilitate adaptation to changing landscapes. This 5-year strategy will serve to drive priorities, directions, and accomplishments for the Center's formative years.

The overall mission of the Center is to provide natural resource managers with the tools and information they need to develop and execute strategies for successfully adapting to and mitigating the impacts of climate change. The Center will pursue three basic goals: (1) work in close partnership with the natural resource management communities to understand high priority science needs, and what is needed to fill those knowledge gaps; (2) work with the scientific community to develop science information and tools that can inform management strategies for responding to climate change; (3) deliver these relevant tools and information in a timely way directly to resource managers. Center activities will focus on providing habitat and population modeling and forecasting information and tools, integrating physical climate models with ecological models, assessing vulnerabilities and forecasting changes, and developing standardized approaches.

The work of the Center will be closely integrated with and complement that of its science and resource partners. The Center will consist of both a national office and a network of dispersed Regional Climate Science Hubs. Each Hub will work collaboratively with regional application partnerships, which are research and resource management partnerships actively engaged in resource management geared toward measurable outcomes, within an adaptive management framework. Partner organizations will play a significant role in shaping Center priorities, directions, and activities through a National Advisory Board and Regional Advisory Councils.

Center activities and operation will vary over time depending on available resources; science priorities may also evolve as capabilities grow, partner needs change, and new research gaps and challenges are

encountered. Current funding levels will support the national office and three to four Hubs; a total of eight Hubs are recommended to provide a minimum base level of national coverage.

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Introduction

There is widespread consensus and recognition in the scientific and resource management communities that global climate change is already driving observable changes on the landscape, and will bring additional, large-scale changes in the coming decades. Many of these changes will have direct implications to wildlife and fish species and communities, and the habitats and ecosystems upon which they depend. For example, we are likely to see shifts in species' ranges; changes in timing of breeding seasons and animal migrations; disassembly of current ecosystems and biological communities, and formation of new ones; increased rates of species extinction; more frequent and severe forest fires and drought; and altered expression for wildlife disease pathogens and invasive species. Long-standing assumptions about how we view and manage natural resources are being tested, and concepts such as "recovery," "critical habitat," and "historical species range" may become less relevant as ecosystems move in new trajectories. Indeed, climate change and its attendant impacts may represent the greatest natural resource conservation challenge in modern history.

It is clear that our approach to the future can not be based simply on our experiences in the past, and natural resource science and management must adapt and transform. From the science perspective, we must expand our understanding of climate change impacts, increase capacity and refine our ability to forecast the coming changes at multiple scales, and deliver science in meaningful and useful ways to those who need it for resource management decisions. In the natural resource conservation and management arena, it will be important to use science as a foundation for proactive management, develop measureable goals for biological endpoints and outcomes, test hypotheses, monitor results of management actions, and use these results to inform future science efforts. No single agency or organization can accomplish this alone; it will only succeed by working across agency and administrative boundaries through strong collaborations among federal, state, tribal, academic and private partnerships.

As one of the premier natural resource science agencies in the nation and world, the U.S. Geological Survey (USGS) plays a key role in providing the science needed to forecast and understand climate change impacts, and to help guide and evaluate wildlife adaptation and management strategies. The USGS National Climate Change and Wildlife Science Center (NCCWSC) represents a significant increase in USGS capabilities and focus in climate change research. The Center was established by Congress and housed within USGS to provide the science and technical support needed to help the National Climate Change and Wildlife Science Center proposed 5-year Strategy - ver 7-13-09

managers of aquatic and terrestrial animal and plant species anticipate climate change impacts and evaluate options that will facilitate adaptation to changing landscapes. It is explicitly charged to work directly and collaboratively with government and nongovernment partners to provide value-added science capabilities and products that meet the priority needs of our nation's wildlife and natural resource agencies and organizations.

This 5-year strategy was developed to help guide the Center during its formative years. The creation and execution of a new Center of this type will require rapid learning from initial efforts, and flexibility to adapt in response to changing conditions. Therefore, we envision the need to refine this strategy annually, followed by the creation of a full strategic plan by 2014. This document articulates the history and goals of the Center, describes key partnerships, outlines the Center's national and regional structure, and addresses Center governance and evolution. This strategy was shaped by Congressional and Administration guidance, Department and Bureau input, and recommendations from key partner groups and numerous agency stakeholders who participated in an initial steering team and a series of regional and national workshops described below.

History of the NCCWSC

In Fiscal Year 2008, USGS was funded to start development of a Global Warming and Wildlife Center. This was in recognition of the pressing need to better understand the effects of climate change on the nation's fish and wildlife resources and to help agencies adapt their wildlife management strategies in the face of a changing climate. During 2008, USGS formed an Interim Steering Committee (Appendix 1), comprised of representatives from federal and state agencies involved in resource management and climate science. The committee developed initial recommendations on the guidelines and scope for the Center, identified initial priority research needs, and helped plan for the first national partner meeting. The Center also funded five research projects to address high priority climate change effects on fish and wildlife, as identified by federal and state fish and wildlife management agencies.

For Fiscal Year 2009, Congress appropriated a total of \$10M to support what it termed the National Climate Change and Wildlife Science Center. USGS applied the funds to three primary activities:

1. Partner meetings: To help develop the structure of the Center and its partnership mechanisms, and to provide impetus to its physical establishment, the Center convened a series of national and regional workshops that brought together a broad range of stakeholders including federal and state agencies, academic institutions, and NGOs (Appendix 2). The first national meeting was held in Lansdowne, VA on December 3-4, 2008. Regional meetings were held during 2009 in Laurel, MD (May 6-7), Seattle, WA (June 4-5), and Denver, CO (June 10-11). A final national partner meeting is planned for July 16, 2009 in Arlington, VA. Collectively, these involved over 200 participants who provided input on Center structure, activities, and priorities. Summaries and outcomes of each of these meetings are available at <http://nccw.usgs.gov/>.
2. Research funding: The Center made funds available to support additional research projects directly related to its primary science goals and its partners' priority science needs. This included a major pilot project involving several collaborative studies in the Southeastern U.S., as well as an array of array of integrated research projects across the nation.
3. Center operations: To coordinate the above activities, and move forward on establishment of the Center, funds were used to support activities of interim Center leadership and staff. This involved a variety of activities including planning and coordination, meetings and travel, liaison with partners, reporting and oversight, recruitment of permanent staff, and initial work on establishment of regional satellite offices.

Center Mission, Goal and Priorities

At this time, relatively little scientific information exists about the adaptation of either terrestrial or aquatic plant and animal communities and their habitats to climate change at scales relevant to natural resource management. A vast amount of science and technical support is needed to tackle the complexities inherent in understanding and projecting climate change responses and potential management scenarios. A comprehensive climate adaptation strategy for natural resource management (Figure 1) is centered around quantitative forecasts of specific changes, which are based on down-scaled information derived from broad General Circulation Models (GCMs). In turn, resource managers use these forecasts to develop adaptation strategies, and undertake actions intended to achieve measurable

adaptation outcomes. Through quantitative monitoring, they learn from successes and failures, and provide feedback to improve future strategies and forecasts.

No one entity has the capability to address all aspects of this adaptation process or to meet every science need. Therefore, organizations must work in partnership to maximize effectiveness and avoid duplication of effort. Within this collaborative framework, each organization will have particular areas of expertise and will conduct activities that are consistent with its mission, and that will provide added capabilities and benefits to the broader community.

As part of the broader climate change science and adaptation community, the overall mission of the Center is to provide natural resource managers with the tools and information they need to develop and execute strategies for successfully adapting to and mitigating the impacts of climate change. Based on consistent partner feedback from the national and regional workshops, the Center will be fulfilling this mission if it accomplishes three basic goals: (1) work in close partnership with the natural resource management communities to understand their highest priority science needs regarding climate change impacts, and determine what is needed to fill those knowledge gaps; (2) work with the scientific community to develop the science information and tools in such a way that they can be readily used to generate management strategies for responding to climate change; (3) deliver these relevant tools and information in a timely and useful way directly to resource managers.

In pursuit of its mission and goals, the Center will focus on the following priority science activities:

- Use and create high resolution climate modeling information and derivative products in order to produce key information that is needed to forecast ecological and population response at national, regional, and local levels.
- Integrate physical climate models with ecological, habitat, and population response models.
- Forecast fish and wildlife population and habitat changes in response to climate change.
- Assess the vulnerability and risk of species and habitats to climate change.
- Develop standardized approaches to modeling and monitoring techniques, to facilitate the linkage of existing monitoring efforts to climate models and ecological/biological response models.

In conducting these activities, the Center will work closely with fish and wildlife managers and natural resource partners within an adaptive management framework, in which science informs strategies and management, and the results of that management inform future science.

As a single entity within the broader science and resource partnership community, the Center must concentrate its resources on core priorities. Therefore, some activities related to climate change will be outside of its focal areas. For example, the Center will not itself develop General Circulation Models of current and future climate. In addition, it will not conduct long-term monitoring of responses to land management activities. Although it will provide scientific input and assistance to develop adaptation and conservation alternatives, the Center will not make resource management decisions based on the scientific output. Finally, it will not serve as a central data clearinghouse for storing or disseminating all information related to climate change and wildlife.

Partnerships

The work of the Center will be closely integrated with and compliment that of its partners. Partnerships will be many and varied, will range from informal to structured, and will occur at a variety of scales from local to international. Some will be formed around short-term specific issues, while others will be topically broad and long-lasting. There are two primary partner groups, with sometimes overlapping membership:

- Science partners: These are other organizations actively involved in developing the scientific foundation for understanding climate change and predicting its outcomes. Examples include external groups such as the U.S. Global Change Research Program, National Aeronautics and Space Administration, U.S. Department of Agriculture, U.S. Forest Service (USFS), National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency, Department of Energy, National Ecological Observatory Network, National Phenology Network, universities, and non-government organizations such as Ecological Society of America, The Wildlife Society, American Fisheries Society, and others. In addition to external partners, the Center will work closely with the other components of the USGS global change research effort, and with scientists throughout the Bureau who are engaged in research related to climate change.

- Natural resource partners. These are organizations that are working in the field for wildlife and habitat conservation through on-the-ground mitigation and adaptation activities. Examples of current and future partners include agencies such as the National Park Service (NPS), Fish and Wildlife Service (FWS), Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation, NOAA, Natural Resources Conservation Service, USFS, and numerous State organizations. Non-governmental organization (NGO) partners include groups such as Defenders of Wildlife, National Wildlife Federation, The Nature Conservancy, Association of Fish and Wildlife Agencies, American Fisheries Society, Theodore Roosevelt Conservation Partnership, and many others.

The Center will build on existing partnerships when possible, and help foster new partnerships as needed. These partners will have a voice in Center activities, decision-making, and priority setting, as described under “Governance” below.

Center Structure

Because the nature and degree of climate change impacts will be widespread and varied across the landscape, the adaptation and mitigation science needs of our partners will also vary geographically. Therefore, the Center will consist of both a national office and a network of dispersed Regional Climate Science Hubs. Each Hub will work collaboratively with multiple regional application partnerships. The nature of these Center and partner components and their primary functions are described below.

National Office - This office will be located at the USGS headquarters in Reston, VA, and composed of a small core of staff. Initial positions include a NCCWSC Chief, a Science Coordinator, a Policy and Partnership Coordinator, two to three climate change research and modeling experts, and one or two budget and administrative support staff.

The primary functions of the national office will be:

- Provide leadership and direction for the Center’s science, information management, and communication efforts.
- Coordinate within the Department of Interior and USGS, and with national partners, to set national and regional priorities for the Center.

- Support the Center’s National Advisory Board and process (described under Governance, below).
- Develop minimum guidance and national standards for the overall Center, including modeling and down-scaling.
- Facilitate and fund research that supplies national-level information on the effects of climate change on wildlife and aquatic resources, and on related model and tool developments.
- Promote information sharing and collaboration between Regional Climate Science Hubs, and make Hub products available at the national level.
- Synthesize and deliver relevant new climate change science results and techniques, and natural resource adaptation information, to the conservation community.

Regional Climate Science Hubs - Regional expression of the Center will occur via a network of Hubs distributed in geographic areas spread across the nation (Figure 2). The geographic scope of each Hub will have “fuzzy boundaries” such that Hubs can work together across boundaries, depending on the science issues to be addressed and the needs of regional and local partners. Initially, three to four hubs will be established based on current resources. The total number of Hubs will ultimately be determined by need and available resources over time.

Hubs will be based at universities and involve multiple active collaborators. The specific staffing and expertise at each Regional Climate Science Hub will depend upon the scientific priorities and focus of that Hub, and on the available partnerships. However, USGS staff at a Hub will generally include a Hub Leader, an administrative support person, and a small cadre of employees with research expertise in climate change, and ecological and population modeling. They will be co-located with university collaborators, and in some cases with teams of other federal and NGO researchers, post-docs, and staff - all of whom are actively engaged in science efforts consistent with the Hub’s priorities. Hub staffing may grow and change over time as partnerships develop, new needs are identified, and new resources become available.

Within each regional focal area, the primary functions of the Hubs will be:

- Work with downscaled GCMs to create derivative models and tools that link physical forcing factors (e.g. temperature and precipitation) with biological and ecological response variables.

- Develop regional ecological and biological response models and projections for priority species and habitats within the region.
- Work with Advisory Councils (detailed below) to set priorities for development of ecological response models and forecasts, to support adaptation and adaptive management strategies.
- Help partners define ecological outcomes and endpoints for their adaptation activities, in a way that can be measured and used to refine the next iteration of models and outputs.
- Facilitate and fund research that supplies regional-level information on the effects of climate change on wildlife and aquatic resources, and on related model and tool development.

Application partnerships - These partnerships are not USGS organizations. Instead, they are research and resource management partnerships that collaborate with the Regional Climate Science Hubs to identify priority science needs and inform science directions. A key requirement is that the partnerships must be engaged in on-the-ground resource management or conservation activities, geared toward a common set of measurable resource goals or outcomes, within an adaptive management framework that relies on science-based methods, forecasts, testing hypotheses, monitoring, and feedback.

Although not part of the USGS component of the Hubs, these groups are critical to creating the science-management interface of the Center. Application partnerships can be agency-based, or self-organizing collaboratives. The emerging FWS Landscape Conservation Cooperatives (LCC) and the planned NPS Planning and Adaptation Units (PAUs) are two examples of what could constitute an agency-centered application partnership group. Other examples might include partnerships among federal, state, academic, NGO and private wildlife managers; or state wildlife agencies working with partners and stakeholders to implement State Wildlife Action Plans. Hub staff will provide scientific expertise and services directly to individual application partnerships. In some cases, a portion of a Hub's staff may be co-located at an application partnership, such as a FWS LCC. Although a single Hub will typically work with multiple application partnerships within its broad geographic region, it will generally strive to work with a single consolidated partnership when undertaking local scale efforts.

In relation to the Center, the primary activities of the partnerships will be:

- Develop agreed-upon priority information needs for dealing with anticipated climate impacts on specific natural resources in their geographic areas, and relay these needs to Regional Climate Science Hubs.

- Use down-scaled climate models, derivative products, projections and other information and tools from the Center to develop local adaptation and management strategies.
- Implement and monitor management activities and strategies to learn which are most effective in mitigating or adapting to climate change.
- Relay monitoring findings to the local Regional Climate Science Hub and the conservation community at large. This will allow the science and user community to integrate what is learned into future national and regional climate change science advancements, and climate change adaptation and adaptive management strategies.

As a coordinated partnership system (Figure 3), the activities of the Center's national office, Regional Climate Science Hubs, and associated application partnerships complement each other and provide the key science-resource management interface that is critical for an effective adaptive management approach to dealing with climate change impacts. Establishing these linkages and ensuring effective and continued engagement will require leadership by both the Hubs and potential partnerships.

Center Governance

The National Climate Change and Wildlife Science Center is a USGS organization, and as such is formally overseen and administered by the USGS. However, partner organizations will play a significant role in shaping Center priorities, directions, and activities. This will occur at both national and regional levels (Figure 4).

The national office will establish a National Advisory Board, composed of 10-12 voting members, headed by a Board Chair. Members will be selected to represent a diversity of the Center's primary partner organizations, including both science and resource management organizations that are strongly engaged with Center activities. The Board will meet twice per year to review Center accomplishments, provide input on current and future Center priorities, and explore opportunities for additional partnerships and resources. The Board may establish ad hoc science review committees to provide input on technical issues. The Center will also develop mechanisms to get robust scientific review and input on national-level science methodologies, directions, and partnership opportunities.

Each Regional Climate Science Hub will establish a Regional Advisory Council that includes a representative from each of the application partnerships with which it is actively working or planning to work. Advisory Councils may include federal, state, NGO, and other resource organization members. Existing partnership organizations may form the nucleus of some Councils. These Council will meet yearly to review Hub activities and accomplishments, and to offer input on Hub priorities for the coming year, especially as it relates to the resource management issues and challenges that should serve as the driver of the science activities and products of the hub. This will also be an opportunity for partnerships to provide updates and feedback from their monitoring and research activities to further refine models and strategies. Because the Hubs will have a close working relationship with their Advisory Councils, we anticipate that there will be staff exchanges, workshops, and other activities throughout the year for information sharing and aligning of goals and efforts.

Evolution of the Center

This strategic plan was written to guide the Center through its initial implementation and the early stages of full operation. The strategy is designed to help the Center meet science needs of our natural resource

partners under its anticipated near-term funding (estimated at \$15M in Fiscal Year 2010). Many aspects of the Center's activities and operation necessarily depend on funding levels and the resources that potential partners can bring to bear, which will both vary over time. The science priorities and focal activities of the Center may also evolve over time, as climate change science advances, capabilities grow, partner needs shift, and new research gaps and challenges are encountered.

The number of Regional Climate Science Hubs, in particular, will be dictated by the level of annual budget appropriations. Based on the projected participation and science needs of the Center's academic and conservation partners, there is an estimated annual cost of \$4M for the national office and \$3-4M per Regional Climate Science Hub. This estimate is based on anticipated staffing and operational costs, and a target whereby 75% of all Center funding will be dedicated to research that is directly related to natural resource management needs. At this per unit cost, current funding levels will support the national office and three to four Hubs. Based on partner feedback, a total of eight Hubs are needed to provide a base level of national coverage; this would require substantial increases in annual funding. In addition, USGS has received requests for finer-scale coverage in some areas through establishment of multiple Hubs in some regions, therefore there is an anticipated need for four more Hubs within the next 5-10 years. Future evolution in climate change science and growth in application partnerships may affect the estimated cost per Hub and the number of Hubs needed. Similarly, Hub requirements could increase if the Center's work is broadened to include additional activities related to its current mission, or if its scope and mission are expanded into other climate change topics (e.g., biological carbon sequestration activities). For all of these reasons, it is not possible to predict at this time what the funding level or total number of Hubs will be at the end of this strategy's 2014 horizon.

Conclusion

Climate change is having and will continue to have profound impacts on the nation's wildlife, fish, plant communities, and terrestrial and aquatic habitats. Natural resource management and conservation agencies are faced with the daunting task of developing and implementing effective strategies to mitigate and adapt to these impacts, in the face of considerable complexity and uncertainty of outcomes.

The USGS has a long history of leading in global change science. Since the passage of the Global Change Research Act of 1990, the USGS has been engaged in scientific assessments of the past and potential future impacts of global change on terrestrial, aquatic, marine and coastal ecosystems, and

freshwater resources. The newly-formed National Climate Change and Wildlife Science Center brings new science capacity in this arena, and will work with and draw upon the core research elements that already exist within the Bureau's global change strategic direction and the Biology, Geology, Geography, and Water disciplines.

As a fundamental operating principle, the Center will be a collaborative partner in efforts to sustain fish and wildlife communities. It will engage with a broad array of climate science organizations, and work with natural resource management and conservation partners, to help agencies and managers articulate and prioritize their science needs. The Center will also respond to these priorities by providing models, tools, and other science products that are directly relevant to the adaptive management efforts of its natural resource partners.

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Figure 1. The basic components involved in crafting and conducting a comprehensive climate change adaptation strategy for natural resources. General Circulation Models provide the foundation for down-scaled models, which are used to forecast impacts and changes in resources of interest. Resource managers use those forecasts to create strategies for actions, which are implemented and monitored for specific outcomes. Lessons learned from this monitoring are used as feedback to refine future models, forecasts, and actions. Different organizations play specific roles in this approach; some examples are shown below, including the National Climate Change and Wildlife Science Center (NCCWSC) and its associated application partnerships (APs).

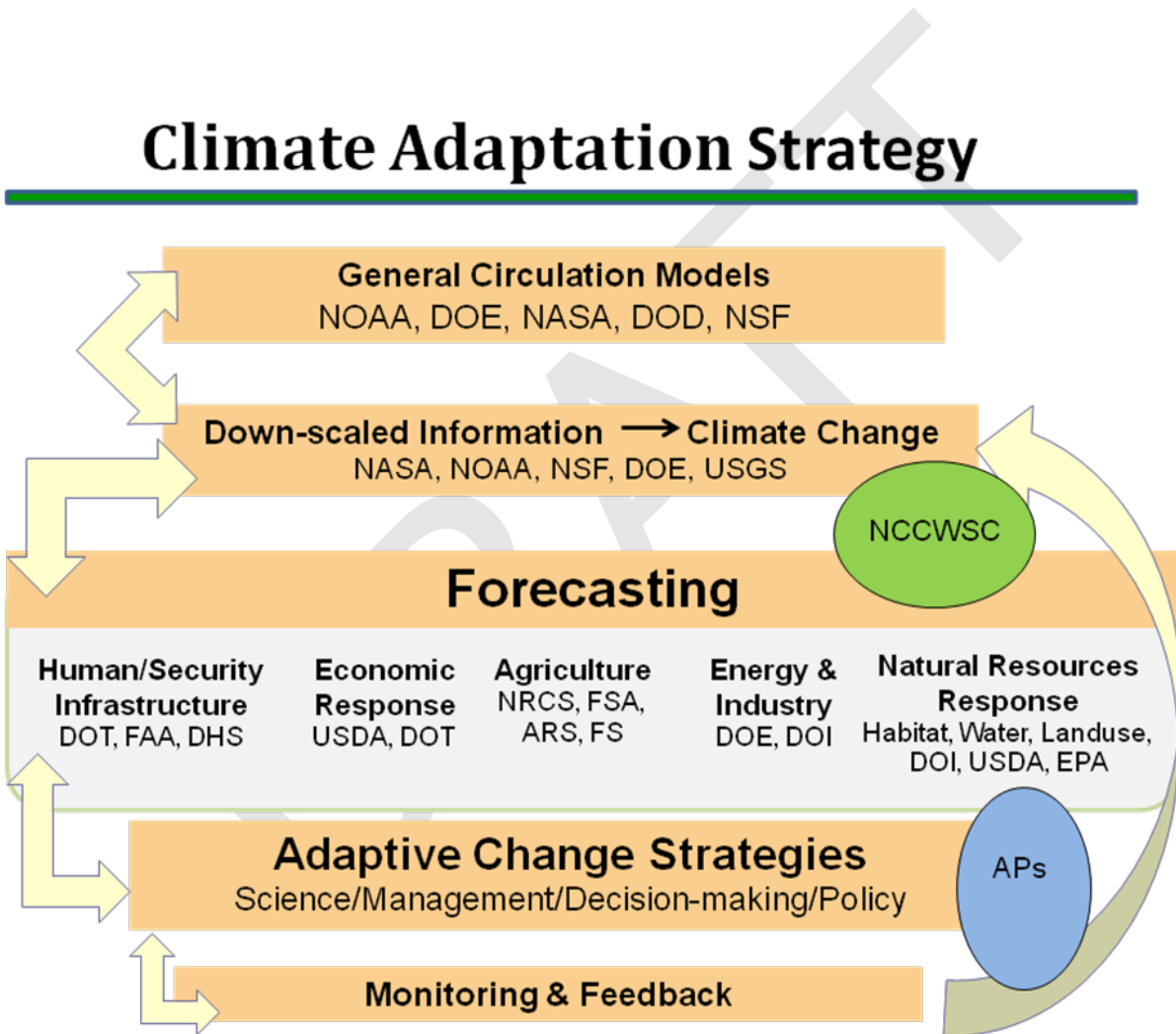


Figure 2. Geographical areas targeted for Regional Climate Science Hubs establishment. The intent is to establish a minimum of one hub in each broad region. The initial number of Hubs will be driven by resource availability; ultimate numbers and locations will be determined by need and available resources.

Regional Climate Science Hubs

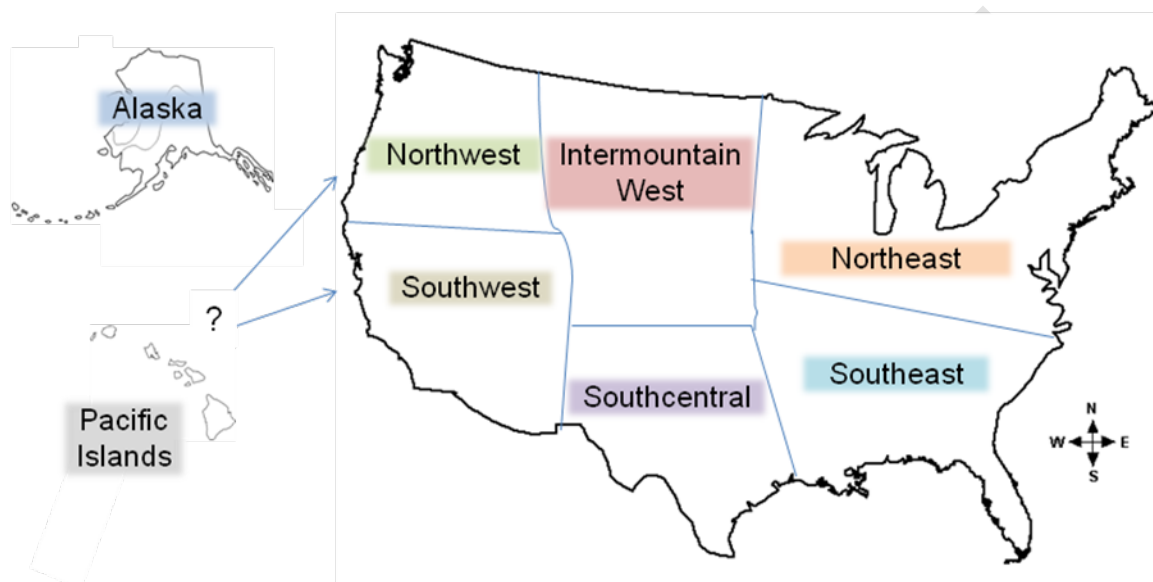


Figure 3. The relationship between the national and regional components of the National Climate Change and Wildlife Science Center, and its associated application partnerships. Their complementary and coordinated roles and activities work to create an adaptive management framework for addressing the challenges of climate change adaptation.

NCCWSC – Application Partnership Interface

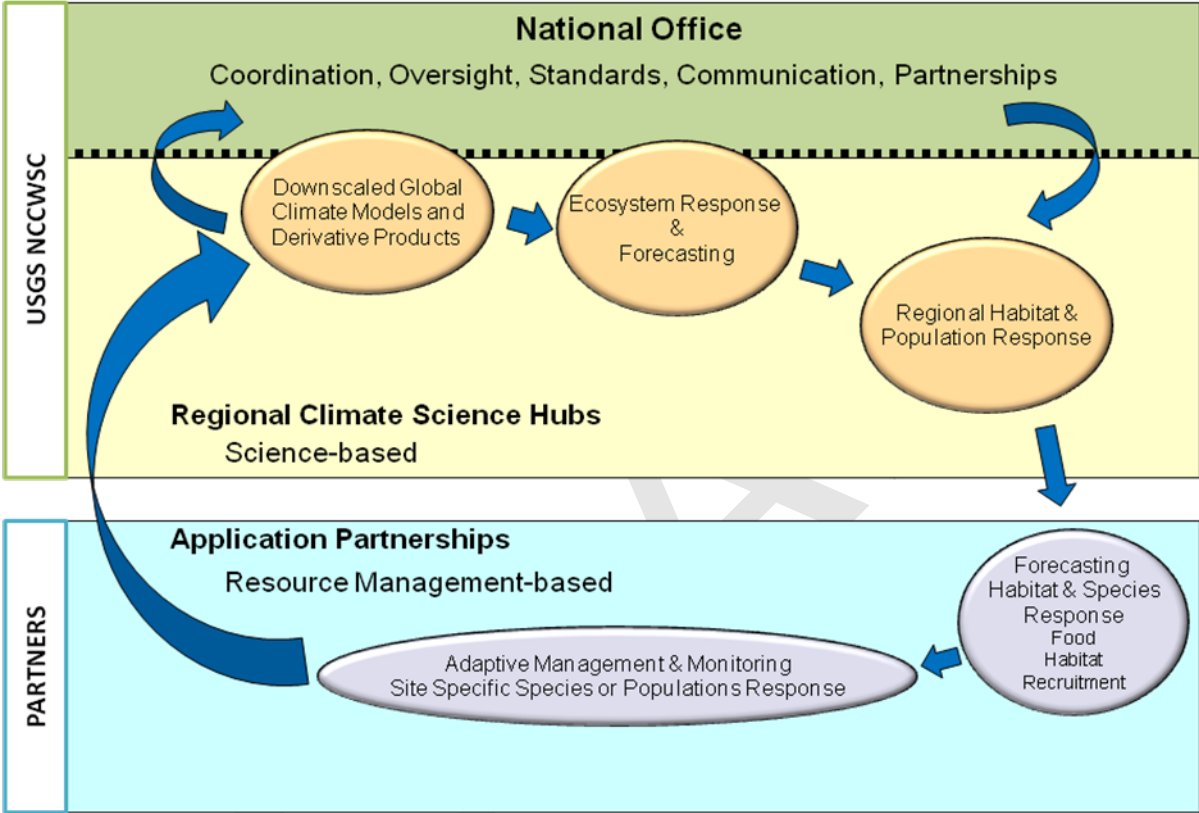
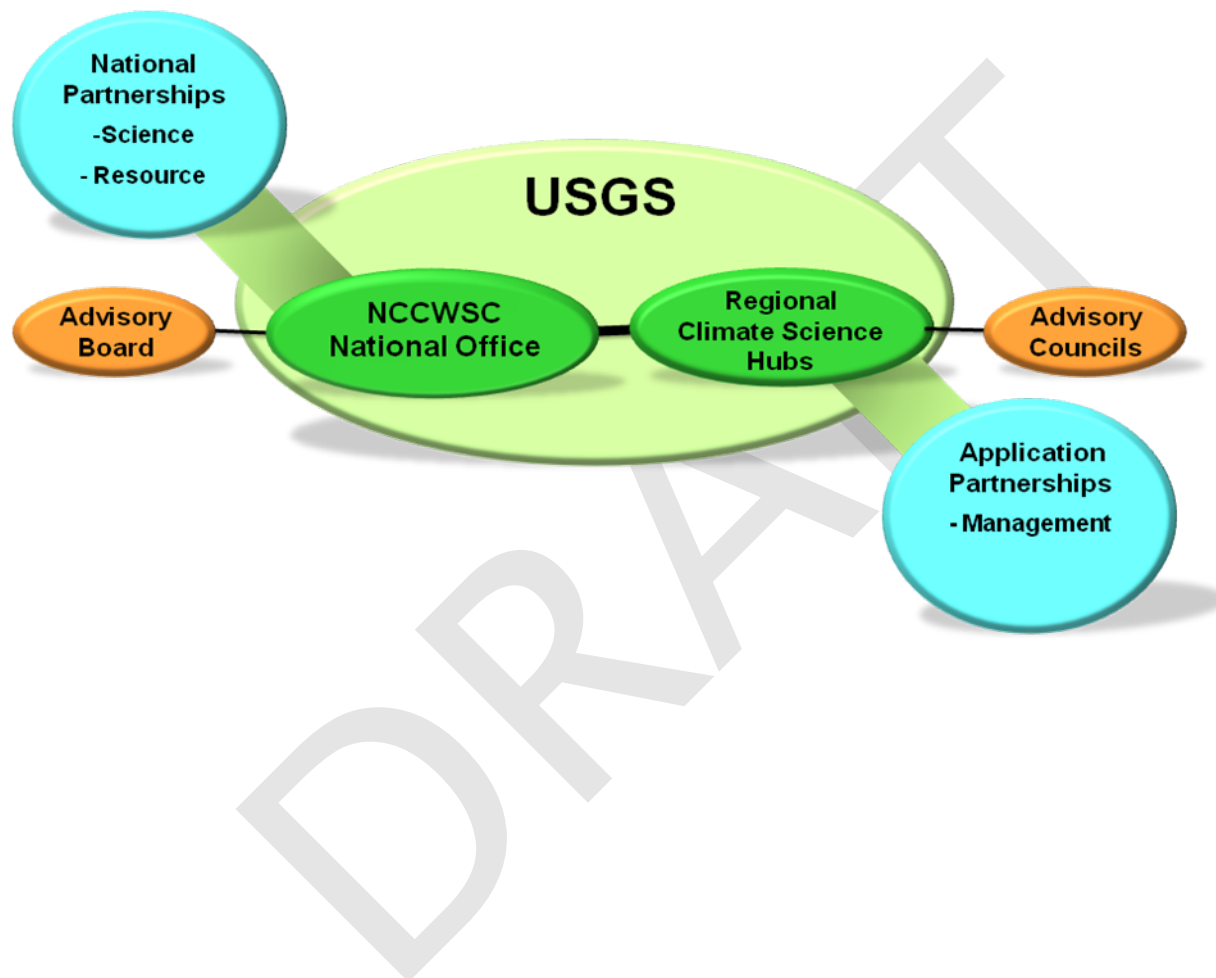


Figure 4. The relationship between the National Climate Change and Wildlife Science Center and its national and regional partnerships, including associated partner governance and advisory structure. Although the national partnerships and application partnerships are outside the administrative structure of the Center, close collaborative relationships with these groups are essential to the Center's mission.

NCCWSC and Partnership Linkages



Appendix 1. The organizations and primary representatives who served as members of the Interim Steering Committee for the National Climate Change and Wildlife Science Center.

Federal

DOI	BLM	Bureau of Land Management	Edward Roberson
	BOR	Bureau of Reclamation	Karl Wirkus
	FWS	Fish and Wildlife Service	Dan Ashe
	NPS	National Park Service	Bert Frost
DOD	ACE	Army Corps of Engineers	Peter Boice
EPA		Environmental Protection Agency	Joel Scheraga
NASA		National Aeronautics and Space Administration	Woody Turner
NOAA		National Oceanic and Atmospheric Administration	Chet Koblinsky
USDA		Forest Service	Ann Bartuska

State

AFWA		Association of Fish and Wildlife Agencies	David Schad
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Appendix 2. Organizations participating in the National Climate Change and Wildlife Science Center workshops held between December 2008 and June 2009.

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Alaska Dept. of Environmental Conservation
Alaska Ocean Observing System
American Fisheries Society
Arizona Dept. of Game and Fish
Association of Fish and Wildlife Agencies
Atmos Research and Consulting
Bipartisan Policy Center
CalFed
California Coastal Conservancy
Center for Wildlife Law - Univ. of NM Institute of
Public Law
Climate Institute
Columbia River Inter-Tribal Fish Commission
Cooperative Ecosystem Studies Units
Defenders of Wildlife
Department of Defense
 Army, ACE
 Army, HQ ISE
Department of Energy
 Office of Policy
Department of Interior
 Bureau of Land Management
 Bureau of Reclamation
 Fish and Wildlife Service
 National Park Service
Doris Duke Charitable Foundation
Ecological Society of America
Environmental Defense Fund
Federal Highway Administration (DOT)
Florida Fish and Wildlife Conservation Commission
Georgia Dept. of Natural Resources Wildlife Resources
Division
Hawai'i Conservation Alliance
Institute for Bird Populations
MA Division of Fish and Wildlife
Marine Mammal Commission
Minnesota Department of Natural Resources
National Aeronautics and Space Administration
 Earth Science Division
 Langley Research Center
National Audubon Society
National Wildlife Federation
NatureServe
NEON, Inc.
National Oceanic and Atmospheric Administration
 Climate Program Office
 National Climatic Data Center
 National Marine Fisheries Service
 National Marine Fisheries Service
Pennsylvania Fish and Boat Commission
Pew Center on Global Climate Change

Point Reyes Bird Observatory, PRBO Conservation
Science
Rocky Mountain Geographic Science Center
School of Biology, Georgia Inst. of Technology
Secretary of the Interior
Sierra Club, Wildlife & Endangered Species Comm.
Southeast Aquatic Resources Partnership
Tennessee Wildlife Resources Agency
The Heinz Center
The Nature Conservancy
The Wilderness Society
Trout Unlimited
University of Alaska
University of Arizona
University of California
University of Hawaii-International Pacific Research
Center
University of Maryland
University of Massachusetts, Boston
University of Washington
University of Wisconsin, Madison
Smithsonian Environmental Research
The Nature Conservancy
Theodore Roosevelt Conservation Partnership
US Climate Change Science Program Office
US Department of State
US Department of Agriculture
 Farm Services Administration
 Natural Resources Conservation Service
 Forest Service
US Environmental Protection Agency

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