



# Landscape Conservation Cooperatives

A SCIENCE-BASED NETWORK IN SUPPORT OF CONSERVATION

By Douglas J. Austen



Courtesy of  
Douglas J. Austen

Douglas J. Austen, Ph.D., is Coordinator of Landscape Conservation Cooperatives in the U.S. Fish and Wildlife Service.

In just two short years, the Department of the Interior's effort to establish a network of 22 regional Landscape Conservation Cooperatives (LCCs) and their partner network of eight university-based Climate Science Centers (CSCs) has begun to transform the nation's approach to addressing a wide range of landscape-level threats to the nation's natural resources, including climate change. Evidence of these efforts are in the air—and on the ground.

In July of this year, for example, the new Western Alaska Landscape Conservation Cooperative committed to invest \$1.3 million in 12 climate-related research projects (WALCC 2011). These projects involve a range of scientific studies about issues such as thermal dynamics of lakes, freeze-thaw cycles, vegetation coverage, caribou habitat, the spread of invasives, and climate impacts on coastal communities. Such work can't come a moment too soon.

"We're right at the threshold edge of climate change," says Western Alaska's LCC Coordinator Karen Murphy, who cites rapidly melting permafrost and eroding coastlines among the many visible challenges to Alaska's wildlife and habitat. Until recently, individual agencies have had to take a somewhat "piecemeal" approach to addressing such climate impacts, says Murphy. "But there's a lot of overlap in the need for scientific information," she says, "and we can have much more power as a collective than as individuals."

Landscape Conservation Cooperatives provide that collective punch. Established in 2009 by Interior Secretary Ken Salazar, LCCs and CSCs will provide cutting-edge science to help managers sustain the continent's natural and cultural resources. These new entities will work with DOI agencies, federal, state, tribal, and local governments, and private landowners and NGOs to "develop landscape-level strategies for understanding and responding to climate change impacts" (Secretarial Order 3289). Because of the nature of the challenge—large in scale, multi-jurisdictional, and immense in impact—this landscape approach offers the most-promising solutions.

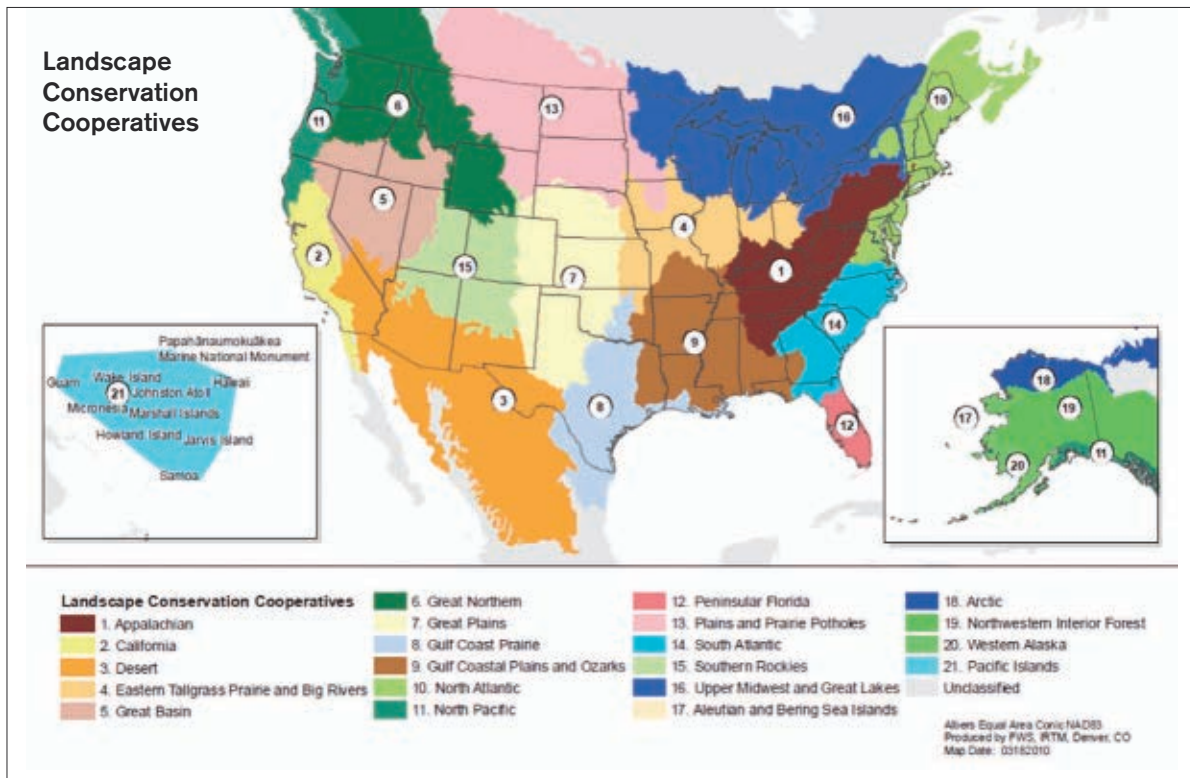
A critical component of LCCs has been the inclusion at a leadership level of other agencies such as the Bureau of Land Management and Bureau of Reclamation, each with responsibility for establishing LCCs in the western U.S., where they have key land holdings. Similarly, the National Park Service has invested heavily in placing staff within several LCCs, and states have worked with LCCs in several situations to either co-support staff or provide office space and other key logistical contributions. Other key federal conservation agencies such as the U.S. Forest Service, Natural Resources Conservation Service, the Environmental Protection Agency, Corps of Engineers, and Department of Defense have also been engaged at various levels.

## Laying the Groundwork

The philosophical foundation of LCCs began in 2006, when the U.S. Fish and Wildlife Service (FWS) and U.S. Geological Survey (USGS) initiated a new framework for achieving biological goals called Strategic Habitat Conservation (SHC). Based on principles of adaptive resource management and successes in cooperative conservation by Migratory Bird Joint Ventures, SHC involves applying technical procedures at ecological scales to help resource managers prioritize, design, implement, and evaluate their conservation efforts.

To be successful, SHC requires not just scientific and technical expertise, but organizational commitment. In pursuing that goal, FWS leaders at the field and executive levels had to recognize the need to connect conservation at individual or project sites to larger biological outcomes on an ecoregion scale.

In 2009, FWS published *Conservation in Transition* (USFWS 2009), which outlines how SHC can be implemented to achieve Service priorities. The document recommends greater use of predictive models, emphasis on inter-organizational collaboration, and focus on sharing science across project sites and regions. The SHC framework—and the years of research it represents—forms the foundation for LCCs as the operational entities of a new



**United Effort.** The nation’s LCCs recently expanded to 22 with a new unit in the Caribbean, established under the U.S. Forest Service’s International Institute of Tropical Forestry. Delineated by a blend of regional wildlife and habitat criteria, these multi-jurisdictional LCCs will bring a broad-scale approach to a host of conservation issues.

conservation model. “LCCs build capacity for the Service,” says FWS Director Dan Ashe, “capacity to reach out to the conservation community at an unprecedented level and achieve biological outcomes using the best available science.”

Though LCCs are new, the concept of landscape-scale conservation as embodied by LCCs has actually evolved over the past 150 years. From the late 1800s through mid-20th century, federal and state conservation efforts focused on large-scale land acquisition, such as the development of the National Park System, the National Wildlife Refuge System, and state wildlife management areas. Beginning in the 1960s, a strong wave of environmentalism (with roots in the 1930s) led to important legislation such as the Wilderness Act and Endangered Species Act, setting the stage for many of today’s conservation and environmental protection efforts.

Increasingly, however, the stresses impacting our natural resources need to be addressed consistently at a large scale across administrative boundaries if we are to retain key ecological processes, communities, and species. Ongoing work in the Chesapeake Bay, Florida Everglades, San Francisco Bay, and Yellowstone ecosystems illustrate such large-scale efforts. Similarly, national efforts to address key

species and systems are being implemented through existing programs such as the National Fish Habitat Action Plan (NFHAP) and FWS’ Joint Ventures (JV) programs, both of which range nationwide.

Non-profit conservation organizations such as The Nature Conservancy (TNC) have also been providing leadership and innovation in collaborative conservation. Its “Conservation by Design” initiative includes analytical methods for conducting large-scale assessments that have helped create a national framework for TNC programs to address biodiversity conservation at a landscape level (Groves 2003). These critical efforts have provided both individual case studies and national models to act as a template for expanded collaboration.

There are many roadblocks to the success of a collaborative landscape-level approach. Pitfalls include a lack of information about actions and programs already underway, a lack of capacity, inadequate coordination among various agencies, policies that are not commensurate with the challenges, and lack of integration among various funding sources (McKinney et al. 2010). Such barriers are not unique to landscape conservation. The challenge is to create a structure—a set of processes, effective relationships, and solid commitment—to ensure that we can



Credit: Steve Hillebrand/USFWS

Ducks drift and fly in relative peace at the Chincoteague National Wildlife Refuge in Virginia, located within the North Atlantic LCC. Scientists are concerned that sea levels will rise as temperatures warm, putting such coastal wetland habitats at risk—and requiring a landscape-scale approach to find solutions.

overcome the barriers. LCCs will help do this by overseeing a shared vision for handling widespread and pervasive change on the landscape.

### More than Lines on a Map

The 22 LCCs are designed to be a seamless national, ultimately international, network supporting protection, restoration, and management efforts to help natural systems across the continent. They work to identify science and management priorities, coordinating with partner agencies working within existing jurisdictions.

The LCC geographical framework was defined by the FWS and USGS (USFWS 2010) to achieve four goals: (1) address terrestrial and aquatic species' needs as well as multiple ecosystems, (2) be accessible and transparent, (3) facilitate approaches to complex conservation challenges such as climate change, and (4) provide a spatial framework to address activities in the context of higher-level conservation goals.

After evaluating a series of options, a team of FWS and USGS biologists selected Bird Conservation Regions (BCRs) as the principal delineators for LCC regions. However, some features of Omernick's Level II ecoregions (Omernick 1987), FWS Joint Venture boundaries, and areas described as Freshwater Ecoregions (Abell *et al.* 2008) were also incorporated to define the LCCs within the coterminous U.S. The intent was to maintain as much fidelity as possible to BCRs and terrestrial and aquatic homogeneity as well as to existing national conservation partnerships.

The resulting LCCs (see map on page 33) include all U.S. states and territories and significant areas of Canada and Mexico. This map is not meant to be

static, and may require modifications due to new scientific knowledge or the pragmatic demands of conservation planning. Clearly LCCs do not delineate all ecosystem boundaries and they do not follow any administrative or geopolitical boundary. Rather, the lines are a vehicle for program management and a starting point for addressing landscape conservation—with the understanding that wildlife and ecological process have little respect for borders.

### Form and Function

Three features describe the major attributes of LCCs. First, they use applied conservation science in partnerships that include federal and state agencies, tribes, conservation organizations, and universities within a geographically defined area. Second, they will function as a fundamental unit of planning and adaptive science that will inform conservation actions on the ground. Finally, they'll provide a national (and international) network of land, water, wildlife and cultural resource managers, and interested public and private organizations.

For each LCC, a steering committee will provide oversight, establish conservation priorities, prioritize science needs, and coordinate conservation actions that address the mutual goals of the partnership. The steering committee is supported by staff provided primarily by the federal agencies but also includes significant contributions from states and other partners, all with an eye on leveraging resources for the most effective conservation effort.

Each LCC will have one overall coordinator and a science coordinator, with additional staff based on partnership needs. For example, in the Pacific Islands Climate Change Cooperative, the National Park Service has hired staff to address complicated cultural resource issues that are greatly impacted by climate change and resulting sea level rise. In other LCCs, staff may focus on other issues such as GIS technology or data and information management.

### Sharing the Science

A primary goal of LCCs is to develop the capacity to share science in order to improve conservation planning, delivery, and assessment among partners. Importantly, LCCs work with the USGS Climate Science Centers, a component of the USGS National Climate Change and Wildlife Science Center (see page 26) to identify and prioritize CSC scientific research. The university-based CSCs work with partners to conduct the research and help the LCCs to translate and deliver it to

## A Budding Partnership

By Carolyn Enquist

By its nature, the USA National Phenology Network (USA-NPN) supports collaborative conservation related to climate change. It is therefore well-positioned to assist Landscape Conservation Cooperatives (LCCs) in four key areas:

### Phenological Monitoring

USA-NPN's focus is phenology, or shifts in the timing of biological activities, and we offer scientifically vetted and standardized monitoring protocols for nearly 500 animal and plant species to date. Information from monitoring can help LCCs develop climate-impact monitoring programs applicable to nearly all landscapes. LCCs can use phenological data to help address essential science and management questions, such as whether earlier bloom time creates susceptibility to frost damage, or how prescribed burns can be timed to benefit ground-nesting birds.

Several LCCs are already engaged in phenology-related activities. For example, the Great Plains LCC is contributing to a study of the nesting phenology of the lesser prairie-chicken in relation to climate change, and the Great Northern LCC is supporting the development of a geospatial data portal to implement a spatial toolkit and phenology server.

### Data Management

LCC-associated research will generate vast quantities of data that must be stored, processed, and shared. USA-NPN has a secure and flexible information management system for the organization and analysis of phenology data. The system is already serving as a resource for organizations such as the National Park Service (NPS) Inventory and Monitoring program and U.S. Geological Survey Climate Science Centers. Key components of the system include:

- Standardized monitoring protocols and methodologies
- Online data entry, storage, and visualization tools
- A National Phenology Database that will accommodate large volumes of internal and external data documented by Federal Geographic Data Committee-compliant metadata
- Web services to allow controlled access to the database
- Development of mobile applications for Android and iPhone platforms

These features will provide a robust platform for seamless data sharing between USA-NPN, LCCs, and other partner organizations and institutions.

### Partnership Coordination

By identifying synergies among citizen science organizations, resource management agencies, education programs, Native American tribes, non-governmental organizations, and academic institutions, USA-NPN can facilitate the development of partnerships for LCCs. At a recent stakeholder's meeting for the California (CA) LCC, for example, USA-NPN helped connect the LCC with the National Park Service's newly implemented California Phenology Project, which currently spans 19 park units and, in the near future, will include the University of California's Natural Reserve System. Through this nascent partnership, the CA-LCC will have access to the latest phenology methods and analyses customized to that region. With this information in hand, scientists and managers can work together more efficiently to develop climate adaptation strategies.

### Education and Outreach

For LCCs to achieve their goals, stakeholder groups and the public must be engaged and educated. An educated public with a strong stewardship ethic will ultimately support sustainable management of the nation's natural resources for future generations. USA-NPN offers tools that cultivate hands-on scientific discovery and inquiry, such as lesson plans and interactive data maps. Such tools can assist LCCs in their outreach efforts. Already, USA-NPN has helped establish phenology trails for NPS units and is currently developing guidance on how to incorporate citizen science into the nation's National Wildlife Refuge System using USA-NPN's user-friendly phenology monitoring program, *Nature's Notebook*.

The myriad existing and potential connections between USA-NPN and the LCC Network bodes well for a long-term and productive partnership, and for the improved health of the nation's lands and wildlife.



Credit: TWS

*Carolyn Enquist, Ph.D., is the Science Coordinator for USA-National Phenology Network and The Wildlife Society.*



A moose takes a dip in remote waters at the Innoko National Wildlife Refuge in Alaska, part of the Northwest Interior Forest LCC. Some climate studies project hotter, wetter weather here and elsewhere in Alaska in the decades ahead, with significant implications for fire and vegetation patterns.



Credit: Kate Banish/USFWS

conservation partners for application in planning and assessment. LCCs also serve to expand the effectiveness and influence of many existing conservation planning and implementation tools—such as State Wildlife Action Plans (SWAPs)—by spatially connecting objectives, demonstrating common effort and accomplishment, and addressing key uncertainties through applied research.

This shared science capacity embraces other large-scale, ongoing efforts such as the Migratory Bird Joint Ventures and the National Fish Habitat partnerships.

Across the country, LCC partnerships are already identifying priority species and habitats and launching projects that will inform conservation decisions and actions on the ground. The Great Plains LCC, for example, recently identified the lesser prairie-chicken as a priority species for

conservation, given that the population has plunged from millions to perhaps as few as 80,000 birds. To address the crisis, the GPLCC has approved a project to develop a new protocol using helicopters to monitor lesser prairie-chicken populations and habitat across Texas, Oklahoma, New Mexico, Colorado, and Kansas—the only existing range for the species. With grants from the Western Association of Fish and Wildlife

## The Great Northern: An LCC in Action

By Yvette Converse, Tom Olliff, and Gary Tabor

The North Fork of the Flathead River runs about 153 miles from British Columbia south into Montana, where it marks the western boundary of Glacier National Park. Undammed and ecologically pristine, the river and its valley have been managed for logging, recreation, hunting, and other uses by a mix of federal, state, provincial, tribal, and private interests in both the United States and Canada.

Coal-bed methane extraction, oil and gas development, and proposed mountaintop removal coal mining all have the potential to impact the river's water quality, threatening terrestrial and aquatic resources. These include valuable forest, riparian, and riverine habitats for bull and cutthroat trout, grizzly bear, lynx, wolverine, bighorn sheep, and badger. For decades, local partnerships have worked to promote the importance of protecting this watershed from potential mining impacts.

That goal got a major boost in February 2010, when Montana Governor Brian Schweitzer and British Columbia Premier Gordon Campbell signed a Memorandum of Understanding on environmental cooperation. The MOU committed British Columbia and Montana, working with the U.S. government as necessary, to ban the exploration and development of coal, minerals, oil, and gas in the North Fork Flathead River Basin.



Credit: Garth Lenz/International League of Conservation Photographers

A border cut slices across the Flathead River Valley, separating Montana (right) from British Columbia. The two jurisdictions are working together to ban mining and gas development near the North Fork of the Flathead River in Canada.

This event marked a victory for collaborative cross-border conservation. But the MOU was about more than mining in the Flathead. Broadly, it was about putting in place a new framework for transboundary cooperation and partnerships, not only between state and provincial governments, but also federal governments, tribal and First Nation governments, leaders from business, environmental advocates, and scientists to help address climate change and management of fish and wildlife.

“A new partnership with Montana will sustain the environmental values in the Flathead River Basin in a manner consistent with current forestry, recreation, guide outfitting, and trapping uses,” said British Columbia's Lieutenant Governor Steven Point during a speech about the agreement (ENS 2010). It “will identify permissible land uses and establish new collaborative approaches to transboundary issues.”

In February 2011, Secretary of the Interior Ken Salazar asked the Great Northern Landscape Conservation Cooperative (GNLCC) to take on this new commitment to transboundary cooperation. Working across jurisdictions for more-effective landscape conservation is a major tenet of the new LCC system, and the Great Northern exemplifies how this challenge and opportunity can work.

One of the largest LCCs in terms of surface area, the Great Northern geographic area spans 447,000 square miles in the U.S. and Canada. Of that, 57 percent

Agencies and the Lesser Prairie-Chicken Interstate Working Group, this collaborative effort will yield more-accurate data on population numbers and habitat areas. “The data will help inform our conservation action,” says GPLCC Coordinator Mike Carter, “such as where to put new Conservation Reserve Program acres.”

## The Climate Conundrum

LCCs are a fundamental element of the DOI’s strategic response to climate change, which will impact species and habitats directly and also amplify current management challenges such as habitat fragmentation, invasive species, and water scarcity. Successful conservation will therefore require conserving large landscapes, which will give species the opportunity to shift their distributions in response to a changing climate and will help ensure that a broad spectrum of terrestrial and aquatic species is conserved.

The challenge will be to translate climate projections into objective predictions of how wildlife

populations and habitats will change in response to climate change. The shared science capacity embodied in LCCs will address the key questions associated with this issue, such as how species will move, how habitats will change, how we can maintain target populations, and where we should make our conservation investments.

As conservation leaders, we must acknowledge the challenge and consequences that we face and collectively embrace the change that is needed to achieve our goals in a world impacted by accelerating human development and climate change. The infrastructure that addressed such challenges in the past—individually or at local or regional scales—is not sufficient to meet the current magnitude of threats to our natural resources. While recognizing existing jurisdictional roles, the conservation community needs to work collaboratively to share resources and expertise. LCCs provide a national framework for this effort, which must succeed if wildlife and habitats are to survive. ■

falls in the U.S. (about one-third of which is privately owned) and 43 percent in Canada. Taken as a whole, the LCC includes some of the most intact and functional ecosystems in the contiguous U.S. and Canada, home to vast communities of free-roaming bison, elk, and deer as well as wolves, bears, sage-grouse, other grassland birds, and diverse salmon and trout populations—all hallmark species of the region’s landscapes. People also depend on these ecosystems and the area’s other natural resources for healthy and economically viable communities and their cultural traditions and lifestyles, such as ranching, logging, recreational and subsistence hunting and fishing, and enjoyment of living in and near wild areas.

Management authority within the GNLCC is a mosaic of governmental and other interests. On the U.S. side, this includes the Forest Service, National Park Service, Bureau of Land Management, and the states of Idaho, Montana, Oregon, Washington, and Wyoming. In Canada, the Canadian federal government has an important role, though natural resources and public lands (called “Crown” land) are largely provincial responsibilities (British Columbia and Alberta in the Flathead region). As many as 100 First Nations also consider parts of the area their traditional territory. Private land ownership, which is extensive in the U.S., and other user interests add more key constituents to the crowded arena.

This diverse ownership and management matrix within an area where geography, ecosystems, and human infrastructure largely run north-south creates significant institutional and organizational challenges that demand collaboration on sustainable resource management. The challenge is compounded by the complexity of ecosystems within the GNLCC that are ecologically, economically, and culturally valuable, ranging from the interior Columbia Basin and mid-continental Rocky Mountain montane to arid sage-steppe ecotypes. The North Fork of the Flathead River watershed is

therefore a prime example of how LCCs can help coordinate conservation efforts within a complex multi-jurisdictional landscape.

The British Columbia-Montana MOU and subsequent actions to withdraw mining, oil, and gas rights is a major step toward international landscape conservation in the transboundary Flathead. Continued successful management to maintain the healthy and diverse ecosystem will depend on coordination and follow-through from U.S. federal agencies and British Columbia as well as Environment Canada and the State of Montana. Significant coordination within this transboundary watershed is absolutely necessary to ensure that conservation measures are pursued through an inclusive process to achieve mutually agreed outcomes.

The Great Northern—along with other LCCs—is filling the gap in governance that may arise from the multiplicity of jurisdictions within landscapes and ecosystems, enabling more effective information sharing, inter-agency coordination, and increased accountability so that each agency can do its part to ensure the North Fork of the Flathead retains its ecological and societal value and can support future generations of residents through sustainable management of its wealth of natural resources.

Courtesy of Yvette Converse



*Yvette Converse is Coordinator for the Great Northern Landscape Conservation Cooperative.*

### Coauthor Affiliations

*Tom Olliff is Co-Coordinator for the Great Northern Landscape Conservation Cooperative.*

*Gary Tabor is Executive Director of the Center for Large Landscape Conservation in Bozeman, Montana.*