LANDSCAPE CONSERVATION COOPERATIVES

Plains & Prairie Potholes Landscape Conservation Cooperative

2012

Advancing **science** *for the future of* **conservation**

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Cover: Black-footed ferret. Photo by U.S. Fish and Wildlife Service.

LANDSCAPE CONSERVATION COOPERATIVES

From our steering committee co-chairs

Our partnership at age two

More than two years ago, a steering committee for the Plains and Prairie Potholes Landscape Conservation Committee convened for the first time. We gathered to discuss our common landscape level challenges, our limited scientific capacity to understand these contemporary threats to conservation, and how this innovative partnership would add value to our individual conservation goals in the 21st century. We recognized a collective need and committed ourselves to addressing it.

Left: Tom Melius, Regional Director
U.S. Fish and Wildlife Service Midwest Region

Right: Terry Steinwand, Director
North Dakota Game and Fish Department

At the end of 2012, our partnership is beginning to see the fruits of its labor. This annual report, the first of its kind for the Plains and Prairie Potholes LCC, will address the progress made and road forward for our exciting enterprise. Like all partnerships, we've had a few growing pains along the way.

Our membership has evolved. We have all faced tight budgets, limiting our face-to-face travel opportunities. But we have still managed to bring together passionate and dedicated representatives from a diverse range of agencies and organizations across this large geography. We press on because our cause is great and the urgency of the situation demands it.

In the pages to follow you'll see a roadmap of our first two years, including those successes that all of you in this partnership have helped make happen – thank you! You'll see that we've supported some terrific scientific research addressing some of the most challenging natural resource threats faced in nearly a century- issues like climate change, shifts in land use, and the ever increasing footprint of energy development, just to name a few.

The purpose of this report is to provide a brief overview of our history, our growing community, and a snapshot of 27 research efforts and the connections between these research projects that knit the

science together. We also want to share our efforts to reach out into the broader conservation community to ensure an open dialogue about strategic habitat conservation, and to ensure landscape level approaches remain part of the conservation conversation. We also want to be accountable for every dollar spent, and showcase how our LCC is working to get the most return on our conservation investments.

Most importantly, we are committed to developing and providing rigorous scientific information that is relevant to land and water managers. This relevancy is achieved by engaging upfront and early on the end-users and on-the-ground natural resource managers who have dedicated their careers to ensuring a sustainable landscape for future generations of plants, animals and people.

You'll also see where we're headed in 2013 and beyond, as our partnership matures and we continue to focus our science needs. Our priorities will no doubt evolve as we remain a contemporary, dynamic partnership. We want to thank our LCC community, from our technical and steering committee members to our researchers and partners, for your commitment over these initial two years. And we look forward to working side by side to advance science for the future of conservation in years to come.

Terry Steinwand
Co-Chair, Plains & Prairie Potholes LCC

Tom Melius
Co-Chair, Plains & Prairie Potholes LCC

Greater sage grouse. Photo by Chris Hansen.

Our Community

Landscape Conservation Cooperatives

Landscape Conservation Cooperatives (LCCs) address natural resource challenges that transcend political and jurisdictional boundaries and require a networked approach to conservation—holistic, collaborative, and grounded in science – to ensure the sustainability of America's land, water, wildlife and cultural resources.

The Plains & Prairie Potholes LCC is among 22 similar partnerships that collectively form a national network of land, water, wildlife, and cultural resource managers, scientists, and interested public and private organizations—within the U.S. and across our international borders—that share a common need for scientific information in conservation.

The Plains & Prairie Potholes LCC boundary transcends existing regional boundaries and the international border with Canada. The geography includes three main sub-units, the prairie pothole region, northern Great Plains, and the riparian corridors of several major river systems including the Missouri, the Yellowstone and the Red River of the north.

LCC Network Vision

Landscape Conservation Cooperatives are the forum for the conservation community to define, design, and deliver landscapes that can sustain natural and cultural resources at levels desired by society.

Plains & Prairie Potholes LCC

The fundamental objective of Plains & Prairie Potholes LCC is to increase conservation delivery by reducing scientific uncertainty related to landscape level stressors which are important to our partnership.

Existing stressors such as energy development, conversion of native prairie, and wetland drainage may impact the health and productivity of shared natural resources in the PPP LCC landscape. Accelerating climate change will magnify the impacts of these stressors.

We will meet this fundamental objective by leveraging partner expertise to promote coordination, dissemination and development of applied science that will support landscape level conservation.

A landscape is a specific geographic area that includes the pattern and structure of the geography, the biological components, its physical environment, as well as the social and cultural setting.

Our People

We are leaders in the conservation community. But we are not just conservationists. We are also economists, social scientists, and communicators. We come from federal and state governments, not-for-profit and private organizations, tribal groups, and pre-existing partnerships. We see beyond agency lines and authorities, to identify what is in the best interest of our collective community, both within the LCC and outside of the LCC, to benefit fish, wildlife, habitat and people.

LANDSCAPE CONSERVATION COOPERATIVES

Since 2010, our steering and technical committee membership has grown to represent more than 30 agencies and organizations across state and international boundaries, committed to healthy ecosystems for current and future generations.

Our Governance

Steering committee responsibilities

- Serves as the executive body for decision making.
- Provides guidance on policy and develops operational and strategic plans.
- Promotes cooperation, coordination, consolidation of information, and collaboration among partner organizations to support the goals and objectives of the LCC.
- Prioritizes projects and related activities recommended by the technical committee for implementation and funding.
- Identifies funding opportunities and other available resources for supporting LCC priority projects and activities.

Technical committee responsibilities

- Facilitates a blind peer review process to rank proposals for steering committee decisions. Guidance on ranking factors is provided to peer reviewers by the technical committee after approval by the steering committee. The technical committee then uses a common set of final ranking factors to evaluate project proposals.
- Provides recommendations to the steering committee on coordination, planning, staffing and science activities for the LCC.
- Develops appropriate mechanisms for communicating with and receiving input from organizations not represented on the steering committee regarding science needs and capacity for science delivery.
- Establishes ad-hoc subcommittees to carry out the purpose and function of the LCC.
- Maintains regular, clear and transparent communication with and among existing conservation partnerships, other LCCs and the Department of Interior's Climate Science Centers.


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US Army Corps
of Engineers


U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION


DNR


NRCS Natural Resources
Conservation Service


Government
of Alberta


Environment
Canada


MRNRC
Missouri River Natural Resources Committee


UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY


NATIONAL
FISH HABITAT
PARTNERSHIP


Manitoba


Minnesota
DEPARTMENT OF
NATURAL RESOURCES


Montana Fish,
Wildlife & Parks


All Bird Conservation


NATIONAL
PARK
SERVICE


THE IZAAK WALTON LEAGUE OF AMERICA
DEFENDERS OF SOIL, AIR, WOODS, WATERS AND WILDLIFE


NORTH DAKOTA
GAME AND FISH


USDA


Prairie Pothole
JOINT VENTURE


The Nature
Conservancy


prairie habitat
joint venture


USGS
science for a changing world


FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE


WYOMING GAME & FISH DEPARTMENT


WWF


U.S. DEPARTMENT OF THE INTERIOR
1824
BUREAU OF INDIAN AFFAIRS

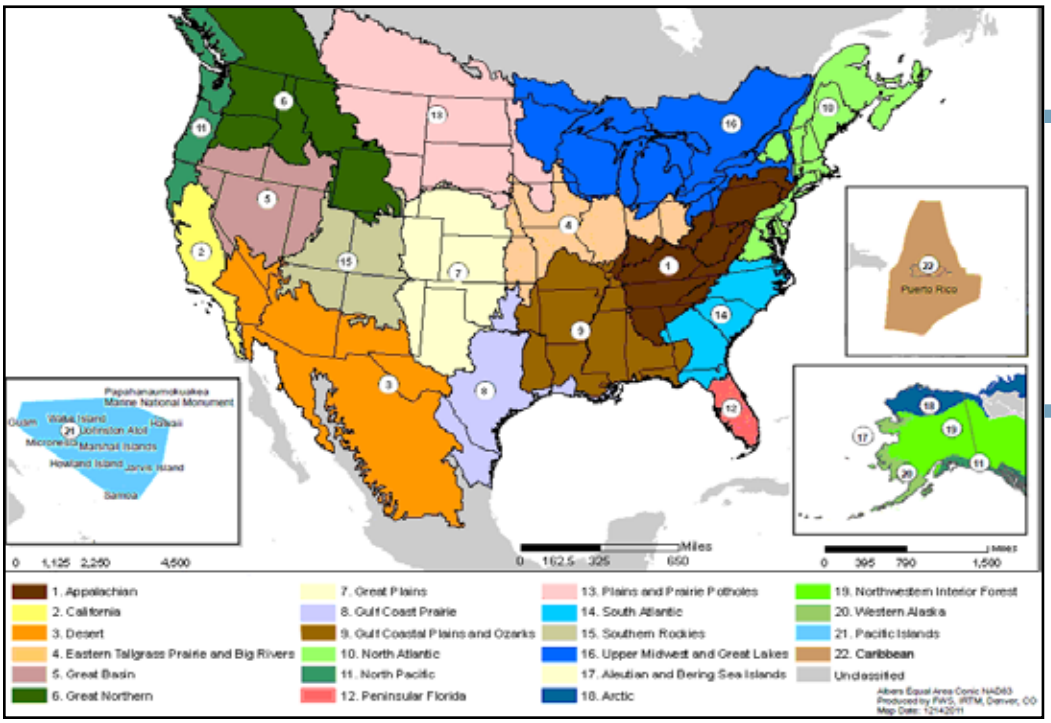

U.S.
FISH & WILDLIFE
SERVICE


U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT


CANADIAN WILDLIFE SERVICE
SERVICE CANADIEN DE LA FAUNE


SOUTH DAKOTA
Game, Fish
& Parks

Our History



From 2010 - 2012, the LCC established a governance, structure, principles and goals while funding 27 research projects that zero in on key science and collaboration needs within the plains and prairie potholes natural resources community.

2009

In 2009, the U.S. Department of Interior demonstrated its commitment to serving the public's interest in our nation's treasured landscapes by issuing Secretarial Order 3289 titled: Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources. Among the actions in that order, the Department of Interior committed to helping the conservation community develop a collaborative response to climate change.

2010

In 2010, Congress appropriated funds to support DOI's vision of establishing a national network of Landscape Conservation Cooperatives (LCCs). The Plains & Prairie Potholes LCC was formally established in spring 2010 as one of nine LCCs. Since 2010, 22 LCCs across the U.S. and shared international borders have been established.

A preliminary operations plan was established under the direction of Tom Melius and Steve Guertin. Guertin and Melius were selected due to their standing as Regional Directors for the Midwest Region and Mountain Prairie Regions of the U.S. Fish and Wildlife Service. Terry Steinwand, Director of North Dakota Fish and Game Department was elected steering committee co-chair alongside Tom Melius.

In 2010, the LCC established its structure and governance, identifying staff, steering committee and technical committee roles and responsibilities. Initial guidance was provided by U.S. Fish and Wildlife Service Midwest Regional Office staff including interim LCC coordinators Kelly Hogan and Pat Heglund.

2011

Rick Nelson and Mike Olson took over in permanent support roles as LCC coordinator and science coordinator in 2010 and 2011, based out of Bismarck, North Dakota. Nelson and Olson used the models set forth by Migratory Birds Joint Ventures to build their strategic operational plan, and used the framework for Strategic Habitat Conservation (SHC) to formulate a plan to build science capacity through the LCC.

LCC connections workshop in Bismarck, N. Dakota. Photo by U.S. Fish and WIldlife Service.

2012

Steering and technical committees continue to evolve and ensure broad representation of the conservation community, including federal, state, non-governmental, and tribal resource agencies and organizations.

In 2012, LCC partners focused key research needs focusing on land-use, land conversion and emerging threats related to invasive species impacting the landscape.

Our Geography

The LCC focuses on identifying scientific uncertainties across three distinct geographies within the LCC's scope. Those geographies include rivers and riparian corridors, the prairie pothole region, and the sage/steppe ecosystems of the northern great plains.

Prairie potholes aerial. Photo by U.S. Fish and Wildlife Service.

The prairie pothole region includes millions of wetlands that constitute one of the richest wetland and grassland systems in the world. These "prairie potholes" and their surrounding grasslands are highly productive and support an incredible diversity of wildlife. The area provides habitat for both breeding and migrating birds, as well as a host of other wetland and native grassland dependent species, including waterfowl, shorebirds, grassland birds, native stream fishes and big river fishes such as the pallid sturgeon, and paddlefish.

Black Hills, South Dakota. Photo by U.S. Fish and WIldlife Service.

Habitats vary from riparian wetlands to isolated forested mountain ridges, such as the Black Hills of South Dakota and the sagebrush steppe east of the Rockies. A combination of climate, grazing, and fire were ecological factors that influenced the development of the diverse landscape. To date, more than 1,500 species of plants like blue grama, sagebrush and coneflower; 300 species of birds, including the greater sage grouse, golden eagle and sandhill crane; and 220 species of butterfly have been recorded in this region. The Northern Great Plains harbors more than 90 species of mammals, including the American bison, the prairie dog and the black-footed ferret – the most endangered mammal in North America.

Missouri River bluffs. Photo by U.S. Fish and Wildlife Service.

Rivers in the area function as ecological "magnets" and corridors not only for wildlife but also people as well. Rivers in the Plains and Prairie Pothole LCC are notorious for their extensive flooding, meandering channels, and for their ability to transport massive amounts of sediment. The upper Missouri River system and its major tributaries, such as the Yellowstone River, provide vital habitat for many species including some that are threatened or endangered.

Our Successes

Governance, structure and goals

In July of 2010, a steering committee comprised of state, federal and NGO leadership within the plains and prairie potholes geography gathered for the first time at the Western Association of Fish and Wildlife Agencies summer meeting to identify shared natural resources challenges, acknowledge gaps in scientific research to address these challenges, and the discuss the purpose and mission of the broader LCC network.

At that time, the steering committee set forth a governance, structure, and goals for the LCC to:

- **support biological planning and conservation design,**
- **prioritize and coordinate applied research that informs conservation delivery,**
- **support the design of inventory and monitoring programs, and**
- **support the development of scientific analysis that informs and empowers land managers to link actions at project sites to outcomes on broader scales.**

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A charter was approved identifying the fundamental objective of the LCC to increase conservation delivery by reducing scientific uncertainty related to landscape level stressors, which are important to our partnership.

The LCC also set out to established guiding principles, vision statements and objectives in cooperation with partners.

Establishing our Niche

- **What we do that distinguishes this partnership from others and other organizations:**
- **The GEOGRAPHIC SCALE of our LCC extends beyond physical state and international boundaries and jurisdictions.**
- **The TAXONOMIC SCOPE of our LCC includes a broad range of fish and wildlife, inclusive of game species, migratory species, state managed species, and threatened or endangered species.**
- **Our LCC is FORWARD-LOOKING, examining the emerging threats to our natural resources along with current challenges.**
- **Our LCC is DECISION-FOCUSED, building reseaarch that will help on-the-ground decision makers.**
- **Our LCC is ADAPTIVE, and uses Strategic Habitat Conservation as a model for conservation planning and monitoring.**
- **Our LCC takes into account the HUMAN DIMENSIONS of conservation efforts, including social and economic considerations.**

Canadian prairies. Photo courtesy of CBC News.

Vision

- Develop science necessary for continued conservation of valued resources and biological diversity of the Northern Great Plains region, thus sustaining the benefits provided by healthy and resilient ecosystems, and helping natural systems adapt to large landscape-level stressors.
- Link and integrate science information providers with resource managers and science users; bring additional resources to bear on landscape-scale conservation issues and opportunities; and help to apply science and facilitate coordination on a wide range of efforts to respond to climate change, invasive species, human development and other drivers across the Northern Great Plains.
- Coordinate, facilitate, promote, and add value to large landscape conservation to build resource resilience in the face of climate change and other landscape-level stressors.
- Serve as an alliance in which the conservation partners operate as a networked, leveraged system to develop science-based guidance to inform decisions leading to sustainable populations of fish, wildlife and plants found on the northern great plains.
- Develop integrated partnerships that provide resource decision-makers with the science-based information needed to successfully manage for sustainable and diverse wildlife populations, cultural resources, and ecological services in the face of landscape-level, human-induced environmental stressors that negatively impact ecosystem resilience.

Guiding Principles

- Respect each participating organization's unique mandates and jurisdiction.
- Add value by capitalizing on scientific capacity of partners, avoiding redundancies, and leveraging resources.
- Focus on solving biological, physical and sociological problems that will provide management relevant information for the partnership to promote scientifically sound, outcome-based, adaptive management.
- Promote scientifically-sound, outcome-based adaptive management strategies to landscape level stressors that benefit the LCC conservation community.
- Respect social, political and legal limitations while promoting solutions to landscape-level stressors (climate and others) that benefit the LCC conservation community.
- Be transparent in operations and ensure access to the LCC process and products.

Mallards. Photo by U.S. Fish and Wildlife Service.

Our Successes

Zeroing in on research criteria


Wind farms. Photo by Kevin Heist

Existing stressors such as energy development, conversion of native prairie, and wetland drainage may impact the health and productivity of shared natural resources in the LCC landscape. Accelerating climate change will magnify the impacts of these stressors. The LCC set out to meet this fundamental objective by leveraging partner expertise to promote coordination, dissemination and development of applied science that will support landscape level conservation.

An initial informal request for proposals was developed in two phases in 2010. A total of 13 projects received funding. Also in 2010, the LCCs provided $10,000 to states of Iowa, Montana, South Dakota and Wyoming to update their State Wildlife Action Plans.

Fourteen projects were funded in 2011 and 2012, as the LCC technical and steering committees moved closer to identifying specific, short-term research needs. Projects funded met one or more of the following criteria:

- Develop information that reduces uncertainty related to habitat fragmentation and connectivity, species mobility and species tolerances. This could include development of landscape scaled decision support tools as well as information that can be ultimately linked between LCCs.
- Develop information that can assist in the conservation and restoration of landscapes capable of maintaining ecological services by 1) defining degrees of fragmentation 2) means of effectively managing fragmented landscapes and 3) understanding vital processes associated with integrated conservation design.
- Develop a synthesis of ongoing landscape-level efforts across the LCC including documents associated with ongoing landscape planning, monitoring, and research efforts. Develop a spatial analysis of existing regional data sets and decision support tools.
- Information that reduces uncertainty related to species life history. Specifically, how species are likely to respond to landscape-level stressors such as climate change that impact management across a species range. Additionally, information that LCC partners can use to improve models that predict species response to management actions at landscape scales.
- Information related to natural resource impacts associated with energy development. This includes, but is not limited to, information about population-level impacts of energy development across multiple taxonomic groups over large areas, impacts to aquatic systems and predictions of likely energy development scenarios.
- Information related to the identification of decision makers within the boundaries of the LCC, the types of decisions they make, and what kind of tools they need or use and their most pressing landscape-level concerns.
- Information related to land use policy and its impact on land use and land conversion. This includes information on factors that influences landowner decision making that will help the partnership understand how to incentivize conservation.
- Information on emerging landscape level threats to conservation that allows decision makers to be proactive in land and water management. This includes information on threats not being widely addressed, but likely to become widespread problems in the future, and how decision makers in the partnership should prepare for those threats.

The technical and steering committees used a decision analysis process to narrow down key research needs in 2012, and established a narrow set of criteria for funding in 2013:

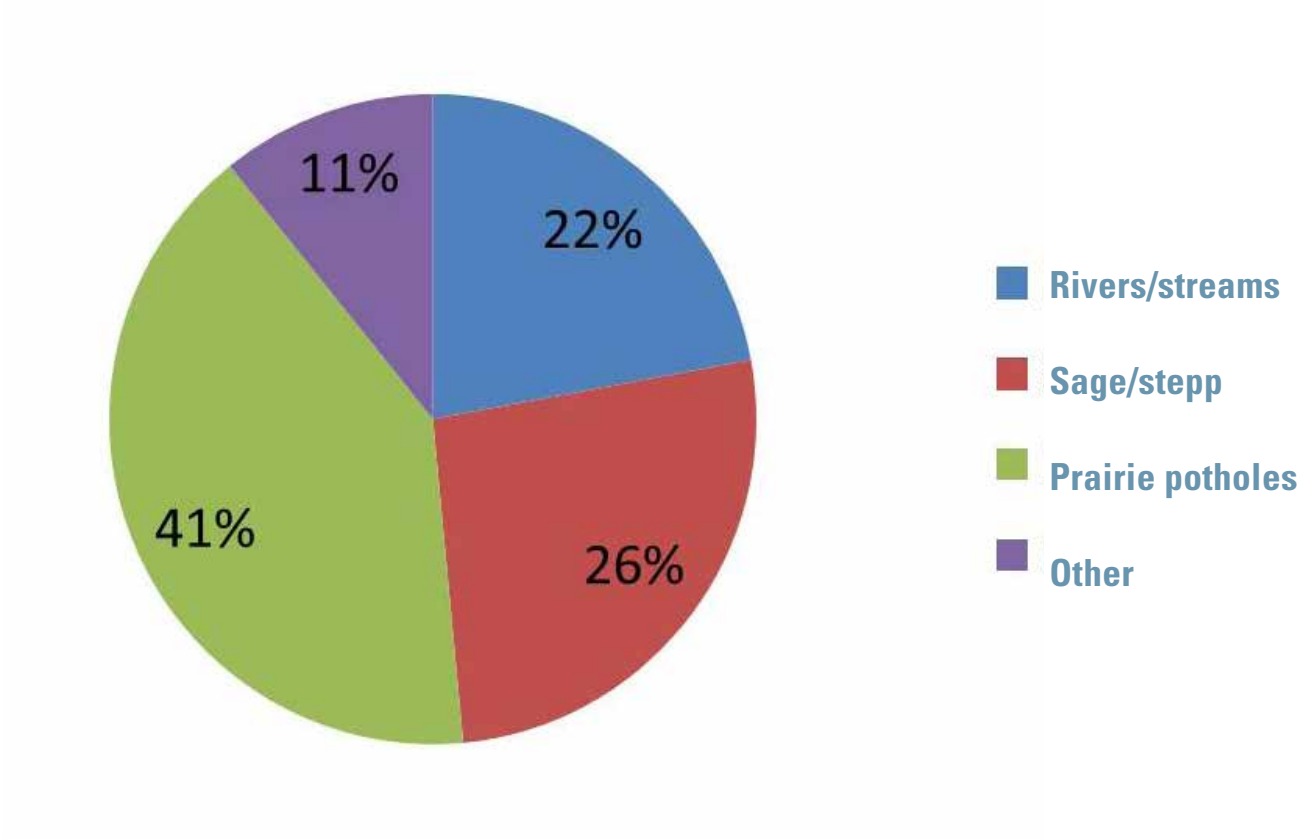
- Information related to land use, land use policy and factors influencing land use and land conversion. This includes gathering information on factors that influence land owner decision making that will help the partnership improve and/or incentivize conservation.
- Information on emerging landscape-level threats associated with invasive species. In particular, we are seeking information on invasive species threats not being widely addressed but likely to become widespread problems in the future, and how decision makers in our partnership should prepare for these threats.

In 2012, the LCC supported the development of a data management plan and strategic communications plan. These are allowing the LCC to serve a collaboration and information sharing function amongst partners and stakeholders.

Accountability

From initiation in 2010 until fall 2012, the LCC provided nearly $3.5 million to research institutions working on increasing the scientific foundation for management of natural resources and development of tools and frameworks to improve our ability to work as a conservation community. The graphic below depicts investments in research by the dominant ecoregion. "Other" categorizes research that crosses habitat boundaries, such as development of downscaled climate data, and research on impacts of oil and gas development.

Investment by eco-region



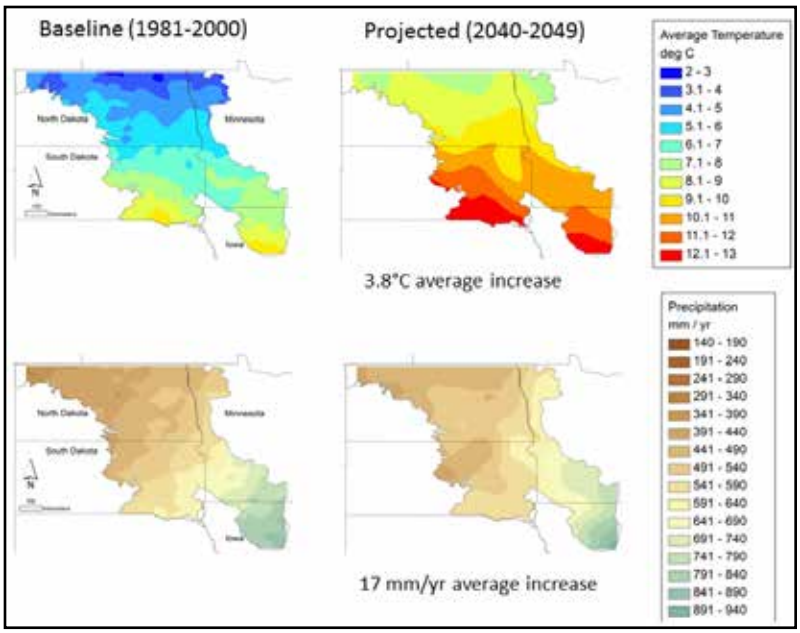
American Bison. Photo by U.S. Army.

Ongoing Research

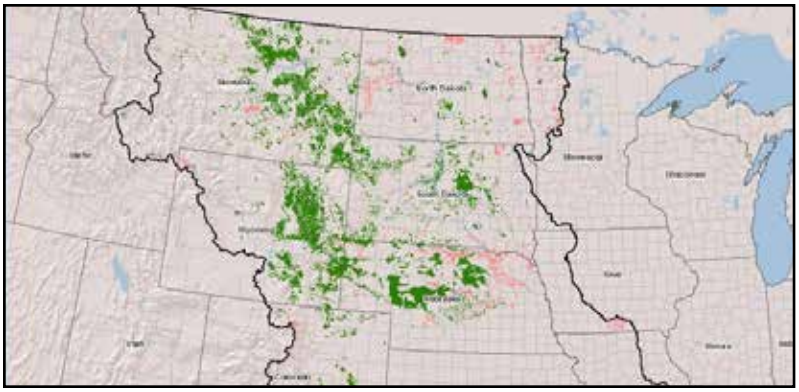
The following scientific research projects have received funding from the Plains & Prairie Potholes LCC. These projects continue to transcend boundary lines and capitalize on collaboration efforts among agencies to generate the most advanced and scientifically-solid data to guide natural resources management across the plains and prairie potholes landscape.

The partnerships and data produced are critical to informing the protection and conservation of these unique and valuable natural resources.

Prairie dogs. Photo by U.S. Fish and Wildlife Service.



Baseline and predicted temperature and precipitation in the U.S. prairie pothole region. Image courtesy of U.S. Geological Survey.



Sample map of the protection and restoration priorities derived from the modeling efforts for the northern headwater species guild. Image courtesy of Midwest and Great Plains FHP.

National Wetlands Inventory Mapper. Image courtesy of U.S. Fish and Wildlife Service.

Capture and interpretation of down-scaled climate change models to benefit avian conservation

In cooperation with the U.S. Geological Survey, the National Center for Atmospheric Research and the University Corporation for Atmospheric Research are providing down-scaled climate models to assist in planning and implementation for avian conservation. Researchers have completed the dynamical downscaling for the contiguous 48 states and southern Canada at a 36-kilometer resolution.

Between the baseline period of 1981-2000 and the decade 2040-2049, data projects temperatures in the prairie pothole region of North Dakota, South Dakota, Minnesota, and Iowa to increase on average by 3.9 degrees celsius and precipitation to increase by 17 millimeters per year, which is a three percent increase from the baseline period. Considerable post-processing and analyses of projected temperature, precipitation, and soil moisture are currently underway.

Regional assessment of fish habitat condition in northern Great Plains

The Midwest and Great Plains Fish Habitat Partnerships are collectively working to assess the status of all priority aquatic habitats in the region. The LCC is collaborating with the Midwest and Great Plains National Fish Habitat Partnerships to assemble and serve data layers that will allow biologists and researchers to conduct fish habitat assessments on streams and rivers of the Great Plains. This in turn will allow agencies to target restoration and protection efforts where they are needed most. Project coordinators anticipate the geodatabase and final report to be released in early 2013.

Completion of the National Wetland Inventory for the Northern Great Plains

To enhance our ability to develop conservation delivery guidelines, researchers partnered with the State of Montana and the U.S. Fish and Wildlife Service to complete digital maps of wetlands in eastern Montana along the Yellowstone River, providing wall-to-wall coverage of National Wetland Inventory data for the LCC. These wetland maps are essential for efficient conservation planning and delivery.

This project was designed to capture original National Wetland Inventory polygons and linear features in digital format for inclusion in the U.S. Fish and Wildlife Service's National Wetland Inventory master geodatabase. Wetland data for 453 U.S. Geological Survey 1:24,000 scale quadrangles was digitally captured from original National Wetland Inventory aerial photos, circa 1980.

Iowa wetland assessment and restorable wetland inventory: Improving wetland restoration planning through processing of recently collected LiDAR data for the prairie pothole region of Iowa

This effort has successfully mapped drained wetland basins in the prairie pothole region of Iowa following a recently completed effort in Minnesota, completing the data set for the eastern portion of the U.S. prairie pothole region. This data set, along with additional information derived from the detailed topographic flow networks, forms the foundation for the newly-launched initiative to develop an integrated conservation design strategy for the prairie pothole region of Minnesota and Iowa. This new initiative integrates wildlife habitat, water quality, and flood attenuation objectives with wetland restoration potential maps to develop multi-objective wetland restoration plans for landscape-scale watershed units (12 to 50 square miles). The process will provide spatially explicit mapping products that represent viable conservation designs for achieving migratory bird habitat, water quality, and flood attenuation objectives within the intensively farmed portion of the prairie pothole region.

In the second phase of this project, researchers are attempting to quantify the potential impacts to water quality, flooding, wildlife, and agricultural economy, from the restoration of drained prairie pothole wetlands. In order to accomplish this, expert panels will be tasked with defining the data and methods necessary to produce credible impact estimates. GIS professionals will apply those methods and/or model results to the restorable wetland GIS layer developed in the first project phase and web delivery tools will be built to distribute the information to natural resource managers and decision makers.

To date, the expert panels covering the topics of water quality and flood attenuation have met, and pilot project areas and baseline methodologies have been defined. Upcoming meetings are planned for late winter to define monitoring and modeling needs to improve confidence in our initial impact estimates.

Prairie pothole wetlands aerial. Photo by U.S. Fish and Wildlife Service.

Managing for resilience in prairie-wetland landscapes of the plains and prairie potholes– Sustaining habitats and services under accelerating climate change

This project addresses some of the most daunting threats to landscape level conservation of the 21st century including habitat loss, fragmentation and degradation, and global climate change. Large tracts (more than 1,000 hectares) of prairie are essential to the sustainability of grassland ecosystem services, yet in many ecoregions only small fragments remain. Glacial Ridge is among the largest prairie-wetland restorations ever attempted. Started in 2000, the 9,000-hectare project in northwest Minnesota was initiated to reconnect 14 small tallgrass prairie remnants. In all, 15,200 hectares of contiguous habitat comprise the project's direct accomplishment. Projects partners, representing more than 30 organizations, filled 177 kilometers of drainage ditch, restored 1,240 hectares of wetland, and replanted 8,100 hectares. Flooding has been mitigated, water quality improved, and native vegetation reestablished. Animals not documented for decades have again occupied the site.

Project parters at Glacial Ridge National Wildlife Refuge. Photo by Karla Suckling.

Fort Pierre grassland and pond in North Dakota. Photo by U.S. Forest Service.

Targeting grassland conservation: An estimate of land-use conversion risk in the northern Great Plains

The northern Great Plains – one of the most diverse, intact grasslands left on the planet – provides habitat for a variety of sagebrush and grassland birds, some of which are threatened or of special conservation status, including the long-billed curlew, piping plover, mountain plover and greater sage-grouse. The prairie pothole region at the eastern boundary of the northern great plains is the most productive water bird area in North America, producing up to 6.5 million ducks each year that migrate as far away as Arkansas. World Wildlife Fund, in partnership with the University of Wyoming and Ducks Unlimited, performed a land conversion risk analysis to help land managers identify conservation priorities across the landscape and develop tangible, on-the-ground adaptation options for wetland and grassland species in the U.S. portion of the northern Great Plains ecoregion, which includes parts of North Dakota, South Dakota, Montana, Nebraska and Wyoming. In a November 2012 interim report, researchers demonstrate how the empirical land use model can be used to predict grasslands at risk of conversion. Research predicts the impacts of crop prices, government payments and climate change on the probability of converting grassland to cropland across the Northern Great Plains. Recent results suggest that an increase in crop prices of 25% could lead to an additional one million acres of grassland being converted to cropland. This project will provide relevant data for decision-makers who must balance the need to produce food and fuel with the desire to protect habitat for important grassland and wetland species. During the final year of the project, researchers will be examining additional scenarios of grassland conversion and relating these potential changes to impacts on grassland and wetland bird species

Greater prairie chicken. Photo by U.S. Fish and Wildlife Service.

Grassland bird conservation on working landscapes: Spatial analysis linking populations to habitat

Climate change models suggest less summer precipitation in the plains and prairie potholes region of Montana. Effective precipitation for this region occurs primarily during the summer months and warmer temperatures can cause increased evaporation and will likely lead to drier conditions. Invasion of woody shrubs into grasslands may also increase with additional atmospheric carbon dioxide associated with climate change. Conservation and restoration of key patches of grasslands that represent the full spectrum of landscape heterogeneity are critical to the resilience of grassland bird populations in a changing climate. This project is conducting a multi-scaled, spatial analysis linking focal grassland bird populations to specific habitat conditions and management practices. This work will provide a GIS-based map depicting priority areas for conserving grassland birds in a geographic area critical to the conservation of multiple focal species. Results from this research will be used to prioritize landscapes where conservation actions that create desirable habitat structure will benefit the greatest number of target species and individuals. These types of decision support tools have been identified as high priority needs in numerous conservation plans. Land managers and other LCC partners, including Bureau of Land Management, Natural Resources Conservation Services, Montana Fish, Wildlife and Parks, and nongovernmental organizations such as The Nature Conservancy, will have access to the habitat selection models to priorities areas for conservation action and to inform grazing management strategies.

Maintaining migratory pathways of imperiled large river and small stream prairie fishes in the face of climate change and energy development

Land transformations occurring from energy development and agrarian use have altered the natural connectivity of fish communities inhabiting prairie waterways. The nation's prairie waterways are obstructed by thousands of barriers that include road culverts, irrigation diversions, and dams. Connectivity is essential for the long term viability of aquatic species. One of the most promising adaptive management strategies for addressing impacts to aquatic systems by climate change and other landscape stressors is increasing connectivity. The purpose of this research is to characterize swimming abilities of three northern plains fish species; the sauger, the longnose dace, and the fathead minnow. The results of the research will be used to assess barriers, prioritize removals, and design fish passage ways to restore connectivity for these and other species. The results of this study may be used to identify populations and habitats most at risk to climate change impacts and land-use stressors, and develop conservation delivery options in response to science informed predictions and realities.

Fathead minnow. Photo courtesy of U.S. Geological Survey.

Predicting bird and bat fatality risk at wind farms and proposed wind farm sites using acoustic-ultrasonic recorders

Estimates of bird and bat fatality rates at modern wind farms across North America have varied greatly among sites. With increasing wind energy development, there is a need for a reliable way to determine expected fatality rates at sites prior to construction, and to objectively compare wildlife risks between sites in different geographical and ecological settings. One way to do this is to survey activity that correlates with fatality rate regardless of setting. Recording low-altitude nocturnal calls of birds and bats during migration may be one way to measure such activity, and this study is evaluating the capability of a recorder that can simultaneously capture bird and bat calls for this purpose. The aim of this project is to develop a tool for general use to facilitate comparisons across multiple sites for use by land managers and wind industry personnel.

Data have been collected for six migration periods, and over 500,000 bird and bat passes have been counted. Data collection is complete, and data processing and analysis are currently underway. Preliminary results from the first four migration seasons showed a positive relationship between bat call rates and estimated fatality rates among wind farms. Also, landscape-dependent patterns have been detected at two river corridor arrays, with high bat activity near forested edges and decreasing activity with distance from edge.

Hibernating little brown and Indiana bats. Photo by U.S. Fish and Wildlife Service.

Develop a lakeshed delineation data layer for Midwest glacial lakes

The Midwest Glacial Lakes Partnership (MGLP), a Fish Habitat Partnership (FHP) recognized by the National Fish Habitat Action Plan (NFHAP) Board in March 2009, has been developing a dataset for the Midwest glacial lakes, equivalent to the NHD, since 2008. This project will complete development of a standardized lakeshed dataset that identifies the geographic extent of each lake, its local catchment, and tributary catchment.

Midwest Glacial Lakes Fish Habitat Partnership geographic scope.

The potential risk to wildlife from wind development depends strongly on where wind farms are sited. The Rapid Assessment Method brings together relevant information to facilitate their siting. Photo by Kevin Heist.

Agricutural fields in prairie pothole region. Photo by U.S. Geological Survey.

Male and female Greater sage-grouse with offspring in Carbon County, Wyoming. Photo by Chris Hansen.

Prairie flowers at Audubon National Wildlife Refuge in North Dakota. Photo by U.S. Fish and Wildlife Service.

Rapid assessment method for wildlife issues at potential wind power sites

A strategy has been suggested for developing regionally specific Rapid Assessment Methods (RAMs) to evaluate wildlife-related issues associated with wind development at specific sites. The RAMs are anticipated to be appropriate for use in situations identified as Tier 1 (preliminary evaluation or screening of potential sites) by the Federal Advisory Committee to the U.S. Fish and Wildlife Service.

A Rapid Assessment Methodology specifically for the U.S. portion of Bird Conservation Region 11, the Prairie Pothole Region, has been developed as a pilot test of the strategy. It has been reviewed by several individuals familiar with the wildlife issues of the region. Discussions are underway regarding integrating the RAM methodology into GIS-based decision support systems that are under development.

Assessing the impacts to rural communities of wildlife habitat protection and restoration: Rural development in the face of global economic and climate change

The environmental and economic landscape of the prairie potholes region of the United States is changing. Shifts in agricultural land use across rural communities are accompanied by increased oil and gas production. These changes present challenges to natural resources, including conservation of the nation's most productive breeding grounds for waterfowl and migratory birds. Hunting and wildlife viewing as recreational activities provide significant intrinsic and economic contributions to the region's economy. This research explores the relationship among agricultural production, ecological integrity and economic health of rural communities in the prairie potholes region. See feature story on page 26.

Greater sage-grouse response to wind energy development in Wyoming

The effects of wind energy development on Greater sage-grouse populations and habitat are largely unknown. Our objectives are to investigate and quantify construction and operational effects of wind energy development on sage-grouse through study of survival, movements, habitat use, and lek dynamics, on a 1,000 turbine, 2,000-3,000 megawatt wind facility in Carbon County, Wyoming using a Before-After Control-Impact design. Researchers are currently in the pre-construction phase of the project and will compare our findings from this period with those from construction and post-construction. Results from this project will be used to help mitigate the impacts, if any, of wind energy development on Greater sage-grouse.

Invasive grasses in prairie and wetlands habitats

The invasion of native communities by cool-season introduced grasses, especially smooth brome and Kentucky bluegrass in upland prairies and reed canary grass in wetlands, is an important management issue on federally-owned lands. This project is helping conservation managers support more effective restoration efforts on wetland management districts, national wildlife refuges and can be used by other federal, state and private landowners to effectively manage invasives. See feature story on page 30.

Gathering surface elevation data in James River watershed

Light Detection and Ranging, or LiDAR, is an optical remote sensing technology that can measure properties by illuminating the target with light. This project gathered LiDAR technology to gather surface elevation data in the James River watershed and parts of North and South Dakota. The information gathered will ultimately benefit conservation managers in floodplain mapping and hydrologic modeling, and in efforts for conservation planning and delivery.

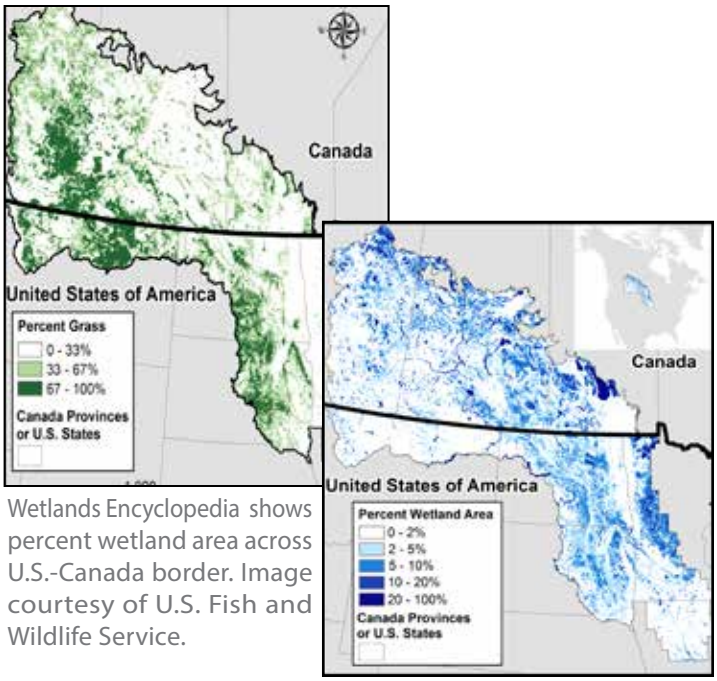
James River. Photo by U.S. Fish and Wildlife Service.

Building the foundation for international conservation planning for plains and prairie pothole ecosystems

This project will build a Geographic Information System (GIS) database for the Plains and Prairie Potholes LCC comprised of wetland abundance, land cover, primary productivity and wetness. Ultimately, the database will provide foundational information for future research and will facilitate management and conservation activities for multiple species across the entire LCC.

Researchers are removing barriers to regional conservation planning by developing a rigorously validated, coherent, and spatially explicit GIS database describing spatial and temporal variation in wetland abundance and condition, upland conditions, and primary productivity that spans the U.S.-Canada border.

Researchers used this database to develop predictive models of the distribution and abundance of waterfowl using non-linear statistical techniques. This project is a top priority for the Prairie Pothole and Prairie Habitat Joint Ventures because conservation and land managers need to understand waterfowl responses to climatic variation across the entire prairie pothole region to plan for climate change. Preliminary models explain up to 76 percent of the variation in waterfowl population estimates by year and indicate climatic variable are strong predictors of both distribution and abundance. Ultimately these models will be linked to down-scaled climate change models so natural resource managers and restoration efforts can incorporate climate into our conservation planning.



Wetlands Encyclopedia shows percent wetland area across U.S.-Canada border. Image courtesy of U.S. Fish and Wildlife Service.

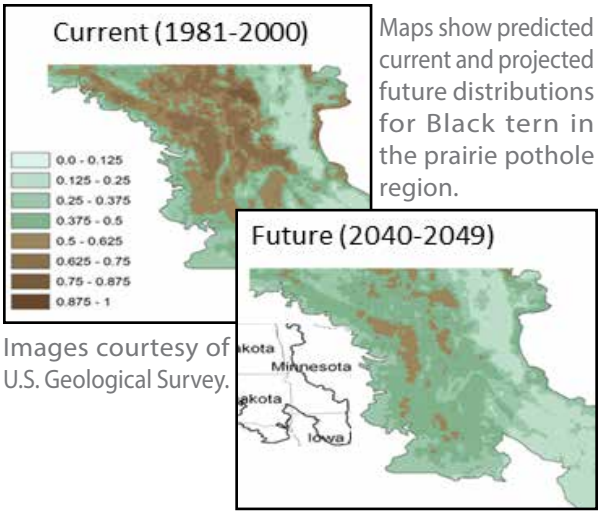
Assessment of pattern tile drainage on wetland hydrology and ecosystem services in the prairie pothole region

The rapid expansion of agricultural subsoil tile drainage in the prairie pothole region has potential to alter wetland ecosystem services by impacting the hydrology of wetlands and their catchments. To spatially assess hydrological alterations, researchers are developing a regional characterization of potential and existing tile areas in the Dakotas. This will be used to estimate the effects of tile on ecosystem services such as water storage and waterfowl habitat. waterfowl habitat. Additionally, tiled catchments will be used to model alterations to wetland hydrology. Currently, researchers are performing spatial analysis of potential and existing tile areas in the Dakotas. This analysis will be incorporated in to a peer-reviewed report on the spatial assessment of tile in the prairie pothole region. A draft of the report is planned for January 2013. Collection of field data was stated in August 2012 and has concluded for the season. Field data collection will resume in March 2013.

Localized tile system recently installed in South Dakota. Photographed during project's tile survey in 2012. Photo by C. Dahl, U.S. Geological Survey.

Sites like this one, a sandbar covered with young plains cottonwoods in South Dakota, are becoming increasingly rare as recruitment of new cottonwood forests dwindles. Photo by Mark Dixon.

Prairie pothole wetland. Photo by U.S. Fish and Wildlife Service.



Maps show predicted current and projected future distributions for Black tern in the prairie pothole region.

Images courtesy of U.S. Geological Survey.

Technician recording vegetation data associated with declining grassland bird research in north central Montana. Photo by Marisa Lipsey

Cottonwood forests and songbirds along the Missouri River

The cottonwood forests of the Missouri River floodplain, already greatly reduced due to agricultural expansion over the past century, are aging and suffering from chronic recruitment declines due to flood control from six major dams along the upper half of the river. This project is developing a model to project future trends in cottonwood forest area and age distribution along segments of the Missouri River based on changes in land use, cottonwood recruitment, and forest succession. The study will also examine bird-habitat relationships in floodplain forests and project the effects of forest changes on the abundance of selected forest bird species. Results will inform the decisions of natural resource managers attempting to balance the needs of various stakeholders along the Missouri River.

Water levels and climate cycles in the prairie pothole region

Wetland plant, invertebrate, and waterbird productivity are primarily driven by water levels in response to climate cycles in the prairie pothole region. Large proportions of wetlands have been drained in this area, often consolidating water from smaller to larger, interconnected wetlands. Researchers are examining the impacts of drained and undrained landscapes on densities of invertebrate forage for ducks and shorebirds, and on breeding habitat for piping plovers. Historic and current land use and water levels have been digitized for the study. Researchers have developed procedures for identifying drained wetlands and completed drained wetland assessments using LiDAR data. According to the hypothesis on consolidation drainage, land use changes have affected the way that wetlands respond to climate. Preliminary data suggests there has indeed been a change in how these wetlands react to climate. Further, from examining the data, wetlands do appear to be higher and more stable.

Climate change models for avian conservation

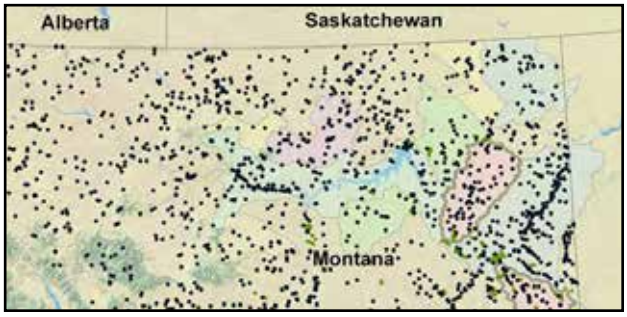
Using a Random Forest approach to species distribution modeling, researchers modeled the probability of occurrence of breeding wetland-dependent birds during contemporary (1981-2000) and future (2040-2049) time periods relative to several predictors of land use patterns, wetland distribution, and climate. Researchers based the models on Breeding Bird Survey data from 1971-2010, and projections were made using two climate models. Projected loss of breeding range of 31 wetland-dependent bird species within the prairie pothole region of North Dakota, South Dakota, Minnesota, and Iowa averaged 45.6 percent (± 26.9 standard deviation) and ranged from 100 percent loss to eight percent gain. In general, species distributions were most strongly influenced by wetland distribution and upland land use patterns, yet vulnerable species distributions were most strongly influenced by precipitation and temperature. In ongoing work, researchers will explore life history and microhabitat correlates of this suite of species to provide management insights into these vulnerability patterns.

Modeling to improve grassland bird conservation

The northern Great Plains provide critical breeding habitat for a suite of declining grassland birds. This research will create models that predict declining grassland bird responses to habitat characteristics and management in north central Montana at four hierarchical scales: range, region, ranch and pasture. Second year data on the distribution and abundance of grassland birds and response to management treatments was collected in 2012. Final outcomes of this effort will include identifying high priority landscapes and management techniques that have potential to provide measurable benefits for grassland birds of conservation concern.

Predicting effects of climate change on native fishes in northern Great Plains streams

Prairie streams are essential components of the Northern Great Plains because they provide critical "green lines" of habitat for both aquatic and terrestrial wildlife. The fish that inhabit the warm, turbid waters of these streams are indicators of change in these delicate ecosystems, where water quantity and water quality are often precariously close to ecological tolerance limits. In fact, changes in water quantity and quality associated with global climate change may transform prairie streams from essential refuges to habitats no longer capable of supporting fishes. This project is examining these changes and developing tools to assist managers in predicting the effects of climate change on prairie stream ecosystems of the northern Great Plains.



Study area includes streams across eastern Montana. Fish assemblages will be modeled from 1,600 fish sample date set (black dots) and Bureau of Reclamation data (green dots). Intensive hydrology study watersheds include Redwater River watershed and O'Fallon Creek watershed (pink shading). Image courtesy of U.S. Geological Survey.

Livestock grazing and climate change impacts to sagebrush ecosystems and migratory birds

Livestock grazing practices are managed by private landowners and federal and state agencies across the western U.S. Increasingly, grazing strategies by these entities are incorporating conservation objectives and developing goals that include livestock production that is compatible with wildlife conservation objectives. This project evaluates the impact of conservation-oriented, rest-rotation livestock grazing and climate changes on migratory bird species associated with sagebrush habitat to better inform grazing management practices. Rest-rotation grazing management is likely to enhance important components of sagebrush, shrubland, and grassland habitat for a wide range of species, but little work has been done to evaluate impacts of conservation-managed, rest-rotation grazing on migratory bird species; the scale and magnitude of benefits for avian species remains unclear. In 2012, researchers initiated a research project building off of the existing U.S. Department of Agriculture - Natural Resource Conservation Service's Sage-Grouse Initiative infrastructure in eastern Montana to evaluate the impact of rest-rotation livestock grazing and climate changes on migratory bird species. Results from the first year of this study indicate the highest presence of Brewer's sparrow (Spizella breweri), Vesper sparrow (Pooecetes gramineus), Western meadowlark (Sturnella neglecta), and McCown's longspur (Rhynchophanes mccownii). Using data from 2012, researchers are currently evaluating study design and other field logistics for the 2013 field season. The results from this project will inform natural resource managers and private landowners of the impacts of conservation-oriented livestock grazing practices on the persistence of multiple sagebrush-obligate bird species and assist in developing natural resource policies.

Brewer's sparrow. Photo by University of Montana.

Effects of oil and gas development on grassland birds

Oil and gas development in North Dakota is occurring at a rapid rate, and managers and biologists are ill-equipped to address and minimize damage from oil development and related activities on fish and wildlife habitat. This project aims to gather information on impacts to grassland birds from oil and gas development to better inform conservation managers.

The 2012 pilot season was a success. Bird surveys were conducted at 18 oil wells and four control sites. Preliminary findings showed reduced densities of grassland birds near wells compared with away from wells, but the effect varied among species. Continuing work will strengthen inferences as well as attempt to assess effects on uncommon species such as Baird's sparrow and Sprague's pipit.

An oil well in western North Dakota. The current boom in oil and gas development is projected to lead to densities as high as 2 to 3 wells per square mile. Photo by Sarah J. Thompson.

Approaching storm above Iowa croplands. Photo by U.S. Geological Survey.

Yellow perch. Photo by U.S. Fish and Wildlife Service.

Flood waters seep into farmlands which were once historic channels of the Missouri River. Photo by U.S. Fish and Wildlife Service.

User testing of aquatic habitat model. Photo by U.S. Fish and Wildlife Service.

Climate change impacts to water in wetlands

Wetland hydroperiod, the length of time water is available in wetlands, is particularly sensitive to changes in precipitation, temperature and timing due to climate variation. Truncated hydroperiod has major implications for wetland-dependent species and human water allocation. This study aims to link hydroperiod to current climatic variation and use this relationship to predict wetland hydroperiod across the sage steppe to grasslands landscape of the Plains and Prairie Pothole LCC.

Climate change and energy development impacts to large and small fish

This study will examine the swimming abilities of large river and small stream prairie fish to determine the potential impacts of changing water flow due to climate change in addition to the impacts of fish barriers associated with energy development. This information will assist fisheries biologists and managers in prioritizing fish passage and aquatic restoration work.

A hydrogeomorphic approach to evaluating ecosystem restoration and habitat management for the lower Missouri River

Hydrogeomorphic methodology (HGM) is being applied along 670 miles of the Missouri River from Decatur, Nebraska to St. Louis, Missouri. Using this method, engineers and ecologists will incorporate state-of-the-art scientific knowledge of ecological processes and key fish and wildlife species to identify options by which to emulate natural hydrologic and vegetation/ animal community dynamics. Results of this research will help guide land and water uses within the corridor aimed at maximizing ecological functionality while considering restoration potential, flood control, recreation, navigation and other interests.

The lower Missouri River contains countless conservation properties and efforts maintained by local, state and federal agencies, nonprofit groups and private entities. The project aims to work with these partners to provide a comprehensive ecological context for the region and a basis for developing common habitat objectives for conservation actions.

Partners convened in Omaha and Kansas City in 2012 and early 2013 to discuss the HGM process, gather perspectives and information needs from Missouri River conservation stakeholders and scientists, and identify data sets and efforts that may contribute to the HGM evaluation. See feature story on page 28.

Groundtruthing aquatic habitat models

This project will validate the accuracy of current aquatic habitat models developed by Midwest and Great Plains Fish Habitat Partnerships that set specific habitat restoration targets to achieve fish population objectives.

The Economics of Conservation

Agricultural lands in prairie pothole region. Photo by U.S. Geological Survey.

The environmental and economic landscape of the prairie potholes region of the United States is changing. Shifts in agricultural land use across rural communities are accompanied by increased oil and gas production. These changes present challenges to natural resources, including conservation of the nation's most productive breeding grounds for waterfowl and migratory birds. Hunting and wildlife viewing as recreational activities provide significant intrinsic and economic contributions to the region's economy. This research explores the relationship among agricultural production, ecological integrity and economic health of rural communities in the prairie potholes region.

William Gascoigne with the U.S. Geological Survey is investigating the economic contribution of conserved habitat lands to the economy. His research shines a light on the linkages between landscape conditions and conditions within surrounding rural communities; linkages that are not always that apparent. This research context has been relatively understudied in the natural resources field, but has emerged due to the current economic climate and competing land uses in the prairie pothole region. The question his research aims to address— how does investing in landscape conservation impact rural economies now and in the future?

The study, which received funding from the Plains and Prairie Pothole LCC in 2011, is breaking ground by illustrating the "socioeconomics" of wildlife conservation, particularly in rural communities heavily dominated by agriculture. It analyzes the dollar value of specific conservation actions by drawing parallels to the value of outdoor recreation, a storied pastime in the dwindling hunting and fishing communities of the prairie pothole region, while considering the value of agricultural interests.

Rural development in the face of global economic and climate change

Hunters and anglers traditionally have been poised to support habitat restoration and species management efforts because of their direct connection to the landscape. With fewer hunters and anglers relative to the growing human population, natural resource managers increasingly look to the agricultural community for collaboration and support to maximize habitat quality and achieve other landscape natural resources objectives, while keeping agricultural values intact.

Preliminary research indicates long-term community health should be considered as resources are devoted to short-term growth in prairie pothole communities. While short term strategies may satisfy specialized growth, the key for long-term health is to include diversity within those strategies.

Local tax revenues are a major concern of local county commissioners. Refuge Revenue Sharing Payments—money paid to municipalities in lieu of property taxes—have been declining steadily. However, conserved open lands typically require less municipal services. The future of conservation in the prairie pothole region will largely be tied to the direction of commodity prices and federally supported conservation programs targeting agricultural lands.

The results of Gascoigne's research will be shared with county commissions, natural resources groups, and agricultural communities in 2013. The research can ultimately be used at the local level by natural resource managers and local agricultural interests to inform on the ground conservation and land use activities to maximize landscape conservation objectives.

Crops. Photo by U.S. Geological Survey.

A River Runs Through It

Hydrogeomorphic restoration and public-private partnerships build a future for the Big Muddy

Voluntary landowners that are part of the Missouri/Mississippi Rivers Confluence Conservation Partnership replace native prairie cordgrass on private properties restoring historic wet prairies. Photo by U.S. Fish and Wildlife Service.

Cutting edge research funded by Landscape Conservation Cooperatives in the Midwest, coupled with on-the-ground conservation and management through public-private partnerships, is building a future for the lower Missouri River.

The Plains and Prairie Potholes LCC and Eastern Tallgrass Prairie and Big Rivers LCC, charged with identifying priority science needs to combat landscape scale natural resources threats, joined forces this year to support the Lower Missouri River Hydrogeomorphic Restoration and Management Project. This project will inform more effective conservation and management across 670 miles of the Missouri River from Decatur, Nebraska to St. Louis, Missouri.

The lower Missouri River encompasses nearly 1.5 million acres of bottomland habitat for fish, wildlife and plants, while providing commercial transportation and recreation opportunities. Since European settlement, the Missouri River has been highly altered due to upstream reservoirs, water control and flooding events.

"We are gathering the data in layers, piecing together the geology, soil structure, topography, and finally, the hydrology of the river. What was the nature of the river before it was altered, including its dynamics, and seasonal and long-term patterns?" said Mickey Heitmeyer, lead researcher for the LCC project. "Once we have that data, we map it, layer over layer, and compare it to current day conditions."

On-the-ground, private landowners and natural resource managers, like those representing the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program and Missouri River Recovery Program, national wildlife refuges, state parks, and many others, will be able to use the data generated by this research to inform strategic land acquisition, land protection and restoration.

"For landowners who participate in the Partners for Fish and Wildlife Program, we try to explain that we are trying to restore historic habitats which have been lost to benefit migratory

birds and resident wildlife," said Kelly Srigley-Werner, program coordinator in Missouri. "The hydrogeomorphic restoration project will really help us target strategic areas to get back what used to be on the landscape and will be a powerful tool we can use to effectively demonstrate and communicate with landowners."

The lower Missouri River contains countless conservation properties and efforts maintained by local, state and federal agencies, nonprofit groups and private entities. National wildlife refuges, state parks, conservation areas and other publicly owned properties can use the maps that are developed through the hydrogeomorphic analysis to guide land acquisitions, and restoration efforts in the face of evolving natural resources challenges like climate change, energy development and shifts in agricultural practices.

This year the Missouri/Mississippi Rivers Confluence Conservation Partnership - a Partners for Fish and Wildlife collaboration- was recognized by the Department of the Interior as a signature demonstration of partnering for America's Great Outdoors Rivers Initiative, bringing together private landowners, conservation organizations, and public natural resources agencies to promote a balance between fish and wildlife habitat and agriculture and community development. The hydrogeomorphic analysis can also assist with guiding future efforts recognized and supported by America's Great Outdoors.

Since 2004, the Missouri/Mississippi Rivers Confluence Conservation Partnership has restored and enhanced more than 21,000 acres of private land, and protected more than 8,000 acres of wetland habitat on private land across Pike, Lincoln, St. Charles and St. Louis counties.

"Our property has great interest in habitat conservation for waterfowl and other wildlife. We have been fortunate to have a trusting relationship with Ducks Unlimited, the U.S. Fish and Wildlife Service and other partners to help design and improve our lands through the Partners for Fish and Wildlife Program," said private landowner, Warren Hager. "The support this partnership provides has enabled our habitats to be more diverse, and our relationships have allowed us to rely on expertise when we need it."

Leaning on the results of this cutting edge LCC research will improve scientific understanding about the lower Missouri River and provide a tool for the conservation community to put the right conservation efforts in the right places, for the right reasons, ultimately allowing for maximum return on conservation investments.

Lower Missouri River and surrounding farmland.
Photo by U.S. Fish and Wildlife Service

Saving our native prairies: A landscape conservation approach

Monarch butterfly (Danaus plexippus) resting on a beautiful native prairie flower, Black-eyed Susan (Rudbeckia hirta) at Chase Lake National Wildlife Refuge in North Dakota. Photo by U.S. Fish and Wildlife Service.

The business of conservation is changing in the prairies. Conservationists recognize that collaborative, science-based management is necessary to ensure a future for our prairies and wetlands, and the unique wildlife these habitats support.

"North America's grasslands are arguably the continent's most endangered ecosystem due in part to the invasion of our native prairies and wetlands by Kentucky bluegrass, smooth brome grass, reed canary grass and other cool-season introduced species," said Michael Olson.

Olson is the science coordinator for the Plains and Prairie Potholes Landscape Conservation Cooperative (LCC), a partnership of federal, state and nongovernmental organizations vested in working together to improve conservation and management across jurisdictional boundaries in the prairie pothole region.

"Restoration and maintenance of prairies and wetland habitats requires an understanding of factors contributing to current ecosystem dysfunction and those necessary for restoring ecosystem health," Olson said.

Through the integration of an adaptive management approach, partners of the Plains and Prairie Potholes LCC are improving management by building science support tools to help land managers make the best decisions about when, where and how to treat invasive species. National wildlife refuge managers across the prairie pothole landscape are using these science support tools to make management decisions to protect and restore native prairie and wetland habitats.

U.S. Fish and Wildlife Service wildlife biologist Socheata Lor represents a multi-partner team leading the effort to save our native prairies by combining the expertise of scientists and land managers across agencies through the Native Prairie Adaptive Management Project. The team's work is made possible through financial and

Livestock grazing, under the right conditions, can encourage growth of warm-season grasses. Photo by U.S. Fish and WIldlife Service.

partnership support from the Plains and Prairie Potholes LCC and federal funding through U.S. Geological Survey (USGS) and the U.S. Fish and Wildlife Service (USFWS).

"We share the goal of saving our native prairies. By linking the scientific process to the decisions of land managers, we can better respond to the ever-present threat invasive species pose to our native ecosystems," Lor said.

Lor says the Native Prairie Adaptive Management Project is the gold standard in how adaptive management should be set up and carried out. "Our hope is that the protocols and recommendations for management decisions at national wildlife refuges and wetland management districts may be modified for use by lands beyond the National Wildlife Refuge System, to include privately and publicly managed lands throughout the prairie pothole region."

Cami Dixon, wildlife biologist with the USFWS in North Dakota, serves as the coordinator for the Native Prairie Adaptive Management Project. Dixon says nearly 115,000 data points are collected annually in a centralized database from 20 national wildlife refuges and wetland management districts across four states in the prairie pothole region. The database allows researchers to compile information on the composition of native and non-native vegetation across prairie units.

The database stores valuable monitoring data and keeps track of management

"Our hope is that the protocols and recommendations for management decisions at national wildlife refuges and wetland management districts may be modified for use by lands beyond the National Wildlife Refuge System, to include privately and publicly managed lands throughout the prairie pothole region."

U.S. Fish and Wildlife Service land managers and biologists learn standardized monitoring protocol. Photo by U.S. Fish and Wildlife Service.

actions taken on specific refuge and wetland management district units over time. The data can then be input into predictive models that generate specific management recommendations for refuge managers for the upcoming year. Specific management recommendations for controlling invasive vegetation and increasing native vegetation include grazing, burning or a combination of both.

Audubon National Wildlife Refuge in North Dakota is utilizing the modeling recommendations to manage invasive species at four waterfowl production areas (WPAs) within the Audubon Wetland Management District. Refuge deputy project leader Todd Frerichs has been making management decisions at those WPAs based on the modeling tool for the past four years.

Prairie flowers at Audubon National Wildlife Refuge in North Dakota. Photo by U.S. Fish and Wildlife Service.

"We know that models are never 100 percent correct, but the more data we feed into the models over time, the more accurate they will become," Frerichs said. "The beauty of participating in this project is that we are all learning together, working our way toward the answer to a question that was too big for any one of us tackle on our own."

When native prairie sits idle, brome and Kentucky bluegrass can take over, providing little to no sustainable habitat for grassland and wetland wildlife. "You can reach a point of no return," Frerichs said. "By teaming up and combining our data across refuges in the prairie pothole region, we are heading in the right direction to save our prairies."

Many grassland birds including the Sprague's Pipit, a candidate for listing as threatened under the Endangered Species Act, require large blocks of prairie to survive. Habitat fragmentation caused by urbanization and agricultural expansion continues to threaten remaining prairies and wetlands, making national wildlife refuges and other federally protected lands critical to ecosystem health. Invasive species like Kentucky bluegrass and brome add fuel to the fire by invading native prairie habitat and limiting prairie productivity. Less productive prairie means less habitat available to sustain resident and migratory wildlife populations.

Prescribed burning is a management technique used to control invasive grasses on refuge lands. Photo by U.S. Fish and Wildlife Service.

"Although it sounds cliché, our prairies really are a national treasure. A good portion of North America used to be covered by prairie ecosystems, which support a unique group of birds and other wildlife," Dixon said. "When we break these habitats up, we don't get them back."

Butterflies and other pollinators also rely on many native prairie plants for both nectar and reproduction. The Powershiek Skipperling, also a candidate for listing under ESA, uses native prairie plants like the little bluestem and purple coneflower as nutrient or nectar sources. High quality prairie is critical for the long-term survival of these declining grassland species.

Prairies and wetlands also offer significant benefits to humans by contributing to water quality and storing carbon. "Prairie plants have large root systems, making what's below ground much like an inverted rainforest," Dixon said. Big bluestem roots can extend more than 12 feet below the surface.

Ryan Frohling, project leader at Detroit Lakes Wetland Management District in western Minnesota, is one of many USFWS project leaders participating in the Native Adaptive Management Project. He says the adaptive management approach supports his mission to preserve the small pieces of remnant prairie left on refuge lands.

Purple coneflower, a native prairie plant, provides a source of nectar for many invertebrates, including the Powershiek Skipperling butterfly, a candidate for listing under ESA. Photo by U.S. Fish and Wildlife Service.

"The historic tallgrass prairie was very diverse. When you consider the potential threats posed by climate change and other stressors across the landscape, it's important to have the diversity provided by native prairies to sustain species over the long term. Prairies support everything from birds to butterflies, from meadowlarks to mallards," said Frohling. He explains that although invasive grasses can provide habitat for some native species in the short-term, they can't sustain healthy populations over time.

Frohling says contributing to the data collected through the Native Prairie Adaptive Management Project helps fuel a discussion across regions and management districts about invasive species management.

"By working with our neighbors across the prairies and across state and other jurisdictional lines, we can slowly begin to paint a fuller picture of what works, what doesn't and what we may be up against in the future given new environmental stressors."

Every year, Frohling, Frerichs and other managers at national wildlife refuges and wetland management districts across the prairie pothole region implement the recommendations made through the Native Prairie Adaptive Management Project.

"By inputting monitoring data and following through on our management decisions, we participate in a feedback loop," Frohling said. "We monitor and model with data collected from the previous year, and decide how to manage based on our knowledge about how different invasive grasses respond to different management techniques."

For example, Kentucky bluegrass is more likely to be controlled through burning, as overgrazing has been documented to increase the invasive species' spread.

Dixon explains how management decision-making is continuing to evolve to benefit the prairies by putting the scientific research and monitoring components of adaptive management to practical use. "Historically, a land manager would commonly make management decisions based on a subjective process or on small-scale monitoring efforts," she said. "By implementing such an expansive and collaborative effort using a standardized monitoring protocol, natural resource managers have the opportunity to use information from a landscape-level dataset to drive management decisions."

Biologists and land managers across the prairie pothole region agree that the Native Prairie Adaptive Management Project will improve predictive modeling efforts and promote scientifically-based management actions over the long term.

Frohling and Frerichs both say they will continue to utilize the database and modeling tools to guide management of prairie units on their wetland management districts. They say each year of additional data gets them closer to ensuring they are making management decisions to save the prairies based on sound science.

Dixon says the enthusiasm shown by both USFWS and USGS staff, combined with the financial support and guidance provided by the Plains and Prairie Pothole LCC, has built a solid foundation for this large-scale effort to save our prairies and the unique and diverse wildlife they support.

"The scale and synergy facilitated by all of our partners has been essential to making this effort realizable."

Enhancing fish passage for native and sensitive fish populations

Land transformation presents significant challenges to the health of our nation's fish communities as these land changes have greatly altered the connectivity of riparian areas. The effects of aquatic barriers in the form of culverts, irrigation, diversions and dams can also be augmented by climate change impacts and other landscape stressors which contribute to unsustainable fish populations. Understanding how to better manage aquatic systems is critical to maintaining healthy populations. This is exactly why cutting-edge fish passage research is being headed up by a partnership between the Western Transportation Institute at Montana State University (MSU) and the Bozeman Fish Technology Center (BFTC) of the U.S. Fish and Wildlife Service (Service). This research is especially critical as it may have important implications for imperiled species including the pallid sturgeon, a federally endangered species, and the sauger, which is a species of concern in Montana, as well as native fish populations in general.

David Dockery ,a research assistant at the Bozeman Fish Technology Center, observes swimming behavior of sauger in a pilot study. Photo by U.S. Fish and Wildlife Service.

"The goal of this research is to better improve fish passage and landscape connectivity for native and sensitive species. Some of the ground work for this study has been done, but nothing to this extent," said David Dockery, a graduate student at Montana State University studying fisheries and wildlife. Dockery is a Montana native which inspires his dedication to this project, "I love Montana, and I've been here my whole life. I'm very invested in Montana and restoring this area's aquatic populations."

Under the direction of Service fish biologist Kevin Kappenman, Dockery works as a research assistant where he plays a key role in developing studies to improve our understanding of native fish species. Leading this research effort in collaboration with Kappenman are Professor Thomas E. McMahon of MSU, and Matt Blank of the Western Transportation Institute and Civil Engineering Department.

Dockery's research focuses on the swimming abilities of sauger,."The hope of this study is to better understand fish swimming capabilities. Some of these species are threatened because they can't get through fish barriers. This research has important implications for managers in terms of improving fish habitat connectivity," Dockery said of the project. Understanding how fish swim in various conditions can help managers improve fish passage design when building or retrofitting fish passages to improve habitat conditions for swimming saugers and other native species. "Professor McMahon has been critical in developing the ideas behind this research because he specializes in fish habitat and fragmentation," Dockery said. "We then identified studies to fill the gaps in fish swimming capabilities in order to improve the design and building of fish passages to fill the gaps."

Working alongside Dockery at the Bozeman Fish Technology Center are two interns , Chris Forrest and Michael Stein, with unique perspectives on fisheries and wildlife conservation. Forrest and Stein are veterans of the U.S. military. Forrest was a U.S. Navy Seal for seven years and Stein was a Black Hawk pilot for the U.S. Army for ten years. After their time with the U.S. Armed Forces, both Forrest and Stein have dramatically shifted the focus of their careers to pursue their interests in fisheries and the environmental conservation.

Sauger swimming in open-channel flume. Photo by U.S. Fish and Wildlife Service.

Forrest worked as a biological technician this past summer assisting Dockery with his research project. Forrest's experience in the U.S. Navy allows him to have a unique outlook on wildlife conservation. After his time in the U.S. Navy, Forrest decided to reconnect with his love of fishing and interest in the aquatic world.

"Having the opportunity to go back to school and study fish and wildlife management and work with the Service has given me a sense of reward because I am part of the solution to protect land and water for future generations and minimize anthropogenic effects that we have upon the land," Forrest said about his experience.

Forrest said of Dockery's research project, "This data is cutting edge science and it's exciting to be on a project with a management and stewardship goal. I want to express my gratitude because of the opportunity to start a new career. I want to thank the federal government and Kevin Kappenman for giving me a second chance" said Forrest. Forrest believes that being in the U.S. Navy gave him a unique sense of appreciation and the ability to have a 100 percent follow-through with projects.

Stein has spent the last two summers working as a research assistant with Kappenman's "spawning sturgeon in an artificial river" project at the BFTC. The sturgeon project takes place in an artificial river that is set up inside the BFTC. The stream mimics natural stream conditions, and these conditions can be manipulated within reason. The species of focus is the shovelnose sturgeon. Along with Stein, Kappenman are co-principle investigators Dr. Molly Webb (USFWS) and Dr. Chris Guy (U.S. Geological Survey Cooperative Research Unit at MSU) who are studying the sturgeon behavior and habitat associated with spawning. Stein has been interested in fish his whole life, "I've always had two passions in life, flying and fishing". He conquered the first passion while in the U.S. Armed Forces, but after 10 years was ready to pursue his other passion, fishing. Stein is now a student in the Fish and Wildlife Management Program at MSU.

Stein's distinctive background as a Black Hawk pilot has provided him with an interesting perspective on conservations issues and the Service. "Working on broader issues like this is a no brainer. I've always been environmentally aware and have moved all over and experienced a broader sense of how connected everything is," he said. As a pilot, Stein spent in time in Alaska and Korea. He brings a different set of skills and life experience to the table, and now has acquired a new set of skills in fisheries research and conservation. "I have a deep sense of responsibility and I am able to accomplish a mission and get it done. At the research center, it is interesting to see how things come to together, it requires many talents. This experience has provided me with a firsthand look at broad teamwork and exposure to fisheries management. It's the whole package," Stein said.

Stein works on just about anything related to the living stream while his main responsibilities include collecting fish on the Missouri River, data analysis, video review and fish spawning analysis. As part of his duties, Stein regularly observes the sturgeon behavior. "The hope is the observations of the shovelnose sturgeon can assist with the management of the endangered pallid sturgeon." According to the Service, the decline of this species is attributed to the negative effects of anthropogenic activities on riverine habitat. Much of the pallid sturgeon's historic habitat has been altered through stream resulting in deep, uniform channels which are unfavorable for the species. In addition, downstream dams have altered the river's hydrograph, temperature, and turbidity. The goal of this study is to better understand what challenges the sturgeons face and what conditions are needed to promote spawning and recruitment. "I hope that this research sparks further research because there is a huge potential with this project to have a broad impact on sturgeons, and in particular the pallid sturgeon. This research has been effective at piecing out the puzzles," Stein said of the project.

The results of these studies will help to improve our overall understanding of fish swimming capabilities and the preferred habitat conditions of native fish species by filling in the missing information gaps, which can then be tangibly translated into effective conservation strategies. Funding for this groundbreaking research is supported by the Mountain-Prairie Region's Fish Passage Program, the U.S. Geological Survey Science Support Partnership and the Plains and Prairie Pothole Landscape Conservation Cooperative (LCC).

Our Reach

Snow geese, Nebraska. Photo by U.S. Fish and Wildlife Service.

The Plains and Prairie Potholes LCC is poised to provide science needs from the perspective of land, resource and conservation decision making, and provide support to partners to carry out impactful conservation actions. Communication and collaboration are top priorities for the Plains and Prairie Potholes LCC to achieve these goals.

The LCC facilitates monthly webinars to keep technical committee members and other stakeholders engaged in LCC activities. Many of these webinars highlight ongoing research funded by the LCC. In addition to maintaining consistent communication with internal LCC members, LCC staff has also engaged with external partners from state and non-governmental agencies, conservation working groups and associations. Principle LCC staff members have engaged in more than 20 in-person meetings, presentations, workshops and conferences with cross-jurisdictional stakeholders to share the LCC mission, vision and activities and maintain an open, two-way forum for communication. A full list of engagements is listed on the following page.

In 2012, the Plains and Prairie Potholes welcomed the addition of a public affairs specialist to assist with strategic communications for the partnership. As a result, the LCC developed a comprehensive strategic communications plan, initiated communications requirements for research proposals funded by the LCC, and developed a partnership Web site. Standardized templates for outreach products including banners, news releases, posters and fact sheets were developed. Effective communications will continue to be a high priority for the LCC and its partners, as the LCC builds its outreach capacity and strategizes ways to share research results with decision makers, land managers, policy makers and other on-the-ground conservation interests.

In addition to facilitating 10 monthly technical committee webinars in 2012, the LCC also hosted an in-person Connections Workshop in April 2012 in Bismarck, North Dakota. Technical committee members responsible for identifying and prioritizing the scientific uncertainties and needs within the ecosystems of the plains and prairie pothole region joined forces with researchers from academic, federal, state and non-governmental entities in this two day work session at North Dakota Fish and Game Department headquarters. The purpose of the workshop was to begin to weave together science at a landscape scale and showcase how researchers and project investigators could benefit from and build off of each other's work.

Researchers presented projects directed at maximizing habitat quality and meeting landscape-level objectives within six key ecosystem features identified by the LCC. Those included 1) palustrine wetlands, native grasslands and restored grasslands of the potholes region, 2) sage/steppe ecosystems of the plains region, and 3) woody draws, riparian habitat and hydrologic systems of rivers.

In September 2012, the LCC hosted another in-person workshop coordinated by USGS researcher Max Post van der Berg on structured decision making for invasive species management. This workshop was a continuation of a previous decision analysis workshop held in 2011 and is part of project funded by the North Central Climate Science Center. The intent of the workshop was to focus on specific and relevant decisions that are made across the partnership and determine information needs using a decision analysis approach. Our focus this year was on how to invest in managing multiple invasive species across the landscape. We are currently in the process of developing a prototype model that we can use to determine the value of resolving different uncertainties, such as species responses to climate change. Our hope is that working through problems like this will help our partnership engage in resolving uncertainties that are directly relevant to management decision-makers in this geography.

LCC Engagements

2012 Plains and Prairie Potholes LCC Webinars

January - Request for proposals review/ranking presented by Mike Olson/Rick Nelson
February - Laying the foundation for connections workshop presented by Mike Olson/Rick Nelson
March - Fish habitat modeling presented by Steve Krentz and Maureen Gallagher
May - Process for updating science portfolio presented by Mike Olson/Rick Nelson
June - Lower Missouri Hydrogeomorphic project, Minnesota project, and communications presented by Josh Eash, Mike Olson and Ashley Spratt
July - Objectives and accountability in conservation presented by Rex Johnson
August - North Central Climate Science Center Sage Grouse project presented by Rick Sodja
September - Ferruginous hawk project presented by Dan Svingen
October - North Central Climate Science Center woody encroachment project presented by Amy Symstad
November - Oil/gas and songbird project presented by Doug Johnson
December - Wetlands and grasslands in U.S. and Canada presented by Kevin Doherty

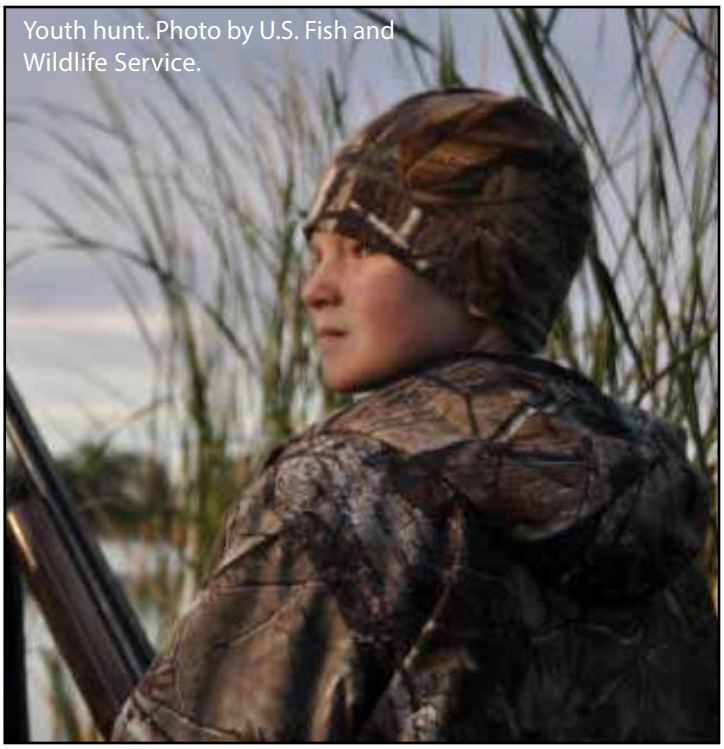
LCC and Science Coordinators facilitated in-person presentations and discussions on LCC activities at the following venues in 2012

Great Lakes LCC connections workshop in East Lansing, Mich.
The Wildlife Society (North Dakota) meeting in Fargo, N. Dakota
Dakota Chapter of American Fisheries Society meeting in Chamberlain, S. Dakota
North Dakota Water Quality meeting in Bismarck, N. Dakota
Missouri River Natural Resources meeting in Pierre, S. Dakota
National LCC meeting in Denver, Co.
Plains and Prairie Potholes LCC connections workshop in Bismarck, N. Dakota
Sediment in Refuges structured decision making workshop in Thief River Falls, Minn.
Native Prairie Adaptive Management meetings in Jamestown, S. Dakota
South Dakota Partners meetings with Izaak Walkton League, South Dakota Department of Game, Fish, and Parks, and U.S. Fish and Wildlife Service in Pierre, S. Dakota
Climate Change on Tribal Lands workshop in Lower Brule, S. Dakota
U.S Fish and WIldlife Service fisheries project leader meeting in Denver, Co.
National American Fisheries Society meeting in St. Paul, Minn
America's Great Outdoors meeting in Bismarck, N. Dakota
Central Mountains and Plains Section of The Wildlife Society meeting in Bismarck, S. Dakota
Structured decision making workshop on invasive species in Bismarck, S. Dakota
Surrogate species workshops in Minneapolis, Minn. and St. Louis, Mo.
National LCC meeting in Lafayette, La.
Lower Missouri hydrogeomorphic project coordination meeting in Kansas City, Mo.
Montana partners meetings with U.S. Fish and WIldlife Service, Montana Department of Fish, Wildlife and Parks, Word Wildlife Fund, and University of Montana
Midwest Association of Fish and Wildlife Agencies meetings (multiple locations)
North Central Climate Science Center meetings in Fort Collins, Co. and Bozeman, Montana
Missouri River Association of States and Tribes meeting in Bismarck, N. Dakota
West River Action Group meetings in Bismarck, N. Dakota
North Dakota Game and Fish quarterly coordination meetings in Bismarck, N. Dakota
Prairie Pothole Joint Venture and Northern Great Plains Joint Venture technical and board meetings (multiple locations)

Sign up to stay in the know at www.plainsandprairiepotholeslcc.org

Our Future

The conservation challenges we face in the 21st century are unlike any the conservation community has experienced, and they are coming at us more rapidly than at any time in our history. The future of conservation will be determined by our ability to build on past and present successes and realistically implement the principles of adaptive management. The future of the LCC lies in our collective vision that the incredible challenges before us present untold opportunities for effective conservation. What have we learned during our three years in existence and how will that shape our future?


Youth hunt. Photo by U.S. Fish and Wildlife Service.

We have learned that a landscape conservation partnership such as the LCC must build on the successes of existing partnerships and must expand on what has made these successful. The LCC model is a grand experiment that challenges all of us to continually ask "why?" and continually look outside our existing spheres of experience and influence. These are huge challenges. Many factors such as legal authorities, political considerations and budgets often make it difficult to look beyond our own boundaries and ask the shared "why" questions.

The LCC partnership recognizes these challenges and has worked successfully to define our collective needs and define an effective scientific agenda for 21st century conservation. LCC members are seeing the value-added of implementing this partnership model and defining cross-programmatic, management-relevant science that is possible because of the strengths, commitment and resources of the LCC partners.

The future of the Plains & Prairie Potholes LCC is bright. But the future must be tied to a strong vision that sets a clear path forward for partner-driven conservation. Our first three years have laid a strong foundation for building this path.

This vision is for a partnership unique to the challenges of the 21st century that takes the best of what we have learned and improves upon those lessons. This vision is for a partnership that collectively understands each member's unique strengths, weaknesses, challenges and limiting factors and works together to find innovative ways to answer scientific questions common to all members. This vision is for a partnership that can say with one voice, "We will break the mold and we will let nothing stand in the way of our conservation efforts."

LANDSCAPE CONSERVATION COOPERATIVES

www.PlainsandPrairiePotholesLCC.org

Swift fox in Kansas. Photo by U.S. Fish and Wildlife Service.

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