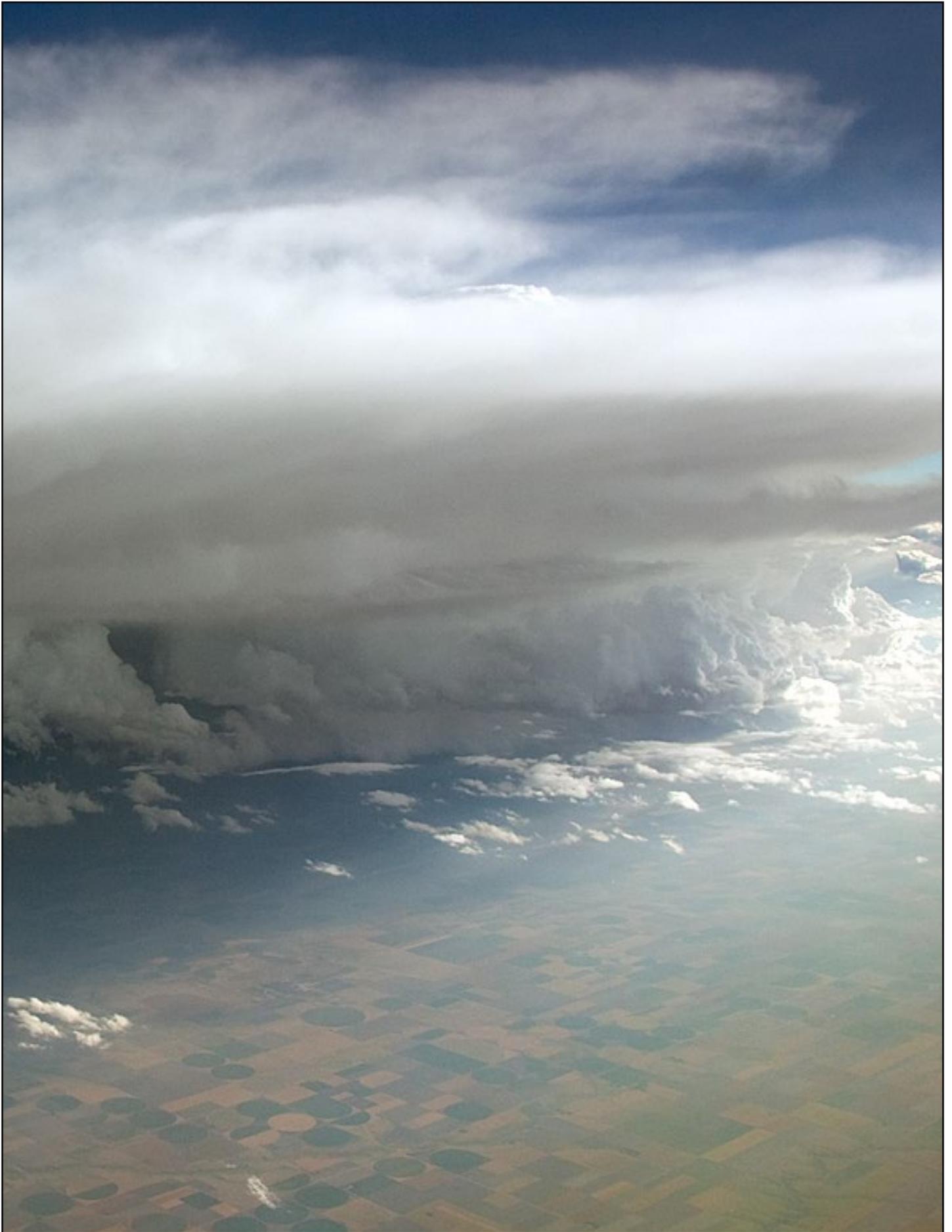


Effective conservation through collaboration and sound science

2013 YEAR IN REVIEW



UPPER MIDWEST & GREAT LAKES
LANDSCAPE CONSERVATION COOPERATIVE



Approaching storm clouds over Midwest farmland. Photo courtesy of Jeff Pang/Creative Commons..



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LANDSCAPE CONSERVATION COOPERATIVES

Landscapes capable of sustaining natural resources *for current and future generations*

Natural resources are essential to sustaining our health and quality of life. We, along with fish and wildlife, rely on these resources. However, the stressors that impact these resources have become too complex for any single agency or organization to effectively address.

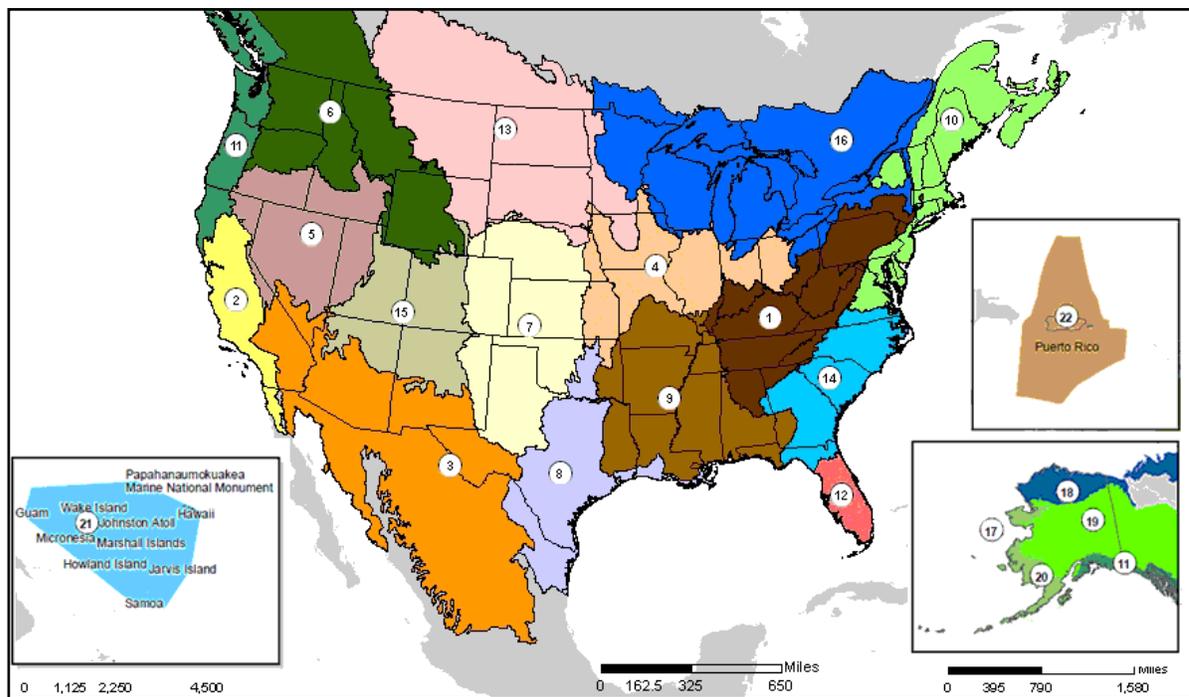
With the signing of Secretarial Order No. 3289, the Department of the Interior launched a network of 22 Landscape Conservation Cooperatives (LCCs) to better integrate science and management

to address broad-scale and complex natural resource challenges. By building a network that is holistic, collaborative, adaptive, and grounded in science, LCCs are working to ensure the sustainability of our economy, land, water, wildlife, and cultural resources.

The 22 LCCs collectively form a network of resource managers and scientists who share a common need for scientific information and interest in conservation. Each LCC brings together federal,

state and local governments, non-governmental organizations, universities, and interested public and private organizations.

Our partners work collaboratively to identify best practices, connect efforts, identify science gaps, and avoid duplication through conservation planning and design. Learn more about the LCC network at <http://lccnetwork.org>.



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The Upper Midwest and Great Lakes LCC is one of 22 partnerships across the country dedicated to addressing broad-reaching natural resource challenges through collaboration and sound science. Graphic courtesy of Department of Interior.

YEAR IN REVIEW

Message from our Steering Committee Chair

Sometimes in life, good things come to those who wait. I believe this statement can be applied to the Upper Midwest and Great Lakes LCC. Initiated in 2010 with much potential, we spent our first years articulating our vision and mission, developing our organizational structure and building relationships. We also launched several waves of project studies, and moved closer towards identifying our niche as part of the conservation community.

Now completing our fourth year, “good things” are beginning to come into view and we are realizing our conservation potential. Many of the cutting-edge research projects supported through the LCC partnership are already showing both relevance and practical benefits to conservation managers in the Midwest and Great Lakes region.

Consider how the LCC has addressed aquatic connectivity. We now know the number of barriers, including dams and road crossings, for the entire Great Lakes basin (there are over 275,000!). We also know their relative “passability” and can maximize habitat gains through barrier removal for any given budget and location. We just approved next steps for this project, which include building conservation objectives into the equation both in terms of sea lamprey control, but also for the recovery of sturgeon and coaster brook trout. This will be a powerful tool for overall connectivity planning across the

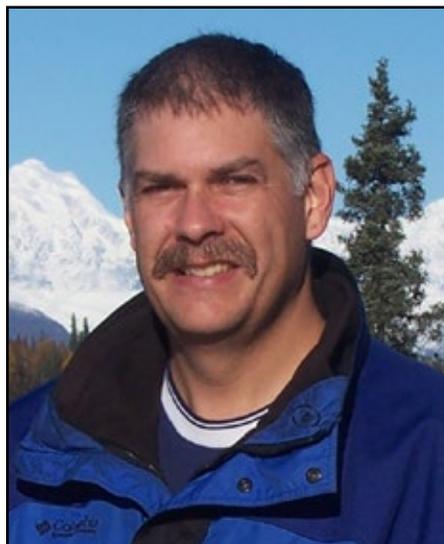
entire basin. You can read more about this and other recent project results in these pages.

We launched several new efforts this year, including assistance to state natural resource agencies as they revise their State Wildlife Action Plans; laying some groundwork for comprehensive northern forest conservation planning; and assessing climate change effects on waterfowl, waterfowl habitat and, importantly, waterfowl hunters and managers. Our relevance to our own natural resource managers, external stakeholders, and the general public will grow as we continue to produce practical tools that can be used by decision-makers and policy-makers across jurisdictions. The future of the LCC looks bright.

This year was bittersweet as we said farewell to our co-chair

Becky Humphries, who accepted a leadership position with the National Wild Turkey Federation. On behalf of the entire steering committee, I’d like to extend my sincerest appreciation for her leadership, outstanding service and friendship. We wish her all the best in her future conservation work.

Dave Scott, Assistant Regional Director, U.S. Fish and Wildlife Service - Midwest Region





The LCC Difference

Our LCC is dedicated to supporting effective conservation through collaboration, communication and sound science

The Upper Midwest and Great Lakes LCC is a network of agencies and organizations that recognize the importance of collaborating on shared conservation interests.

Much like the complex natural systems that we are striving to conserve, our network is dependent on and garners strength from being well connected.

Our resources come in the form of our people, advances in technology and sound science. We organized our technical experts into work groups to address five areas of focus. These five areas include augmenting and coordinating aquatic habitat connectivity efforts, contributing to the evolution of State Wildlife Action Plans, and conservation and management for our northern forests, and coastal and urban areas.

On the technology front, we are supporting cutting-edge efforts to manage large data sets while optimizing solutions to complex natural resource issues.

We continue to support the development of an online system for conservation professionals to facilitate the flow of information and to track our progress as we address major conservation challenges.



Great Lakes as seen from space. Photo courtesy of National Oceanic and Atmospheric Administration.

We continue to fund scientific investigations that reduce the uncertainty in management decisions for local, regional and national policies and managers who implement on-the-ground conservation actions.

We recognize that successful conservation requires us to extend beyond our current community of conservation-oriented organizations. Our greatest successes may be achieved by working with others across a variety of sectors and disciplines.

Of utmost priority to our partnership is ensuring our efforts, and the efforts of the entire conservation community, remain relevant to our stakeholders and the publics we serve. Through our support of a strong land ethic, we encourage community leaders and individuals to take action and engage in the conservation and management of their natural resources, by connecting people to fish, wildlife and their habitats.

Our Dynamic Growth and **Progress**



Natural resource managers can use research findings to inform conservation decisions at their sites. Photo courtesy of U.S. Fish and Wildlife Service.

We are decision-focused, building research that will help on-the-ground decision makers

We are growing! This past year, we strengthened our network through the addition of new organizations to our steering committee. We welcomed both the Great Lakes Commission and the Great Lakes and St. Lawrence Cities Initiative.

Our operations and organizational structure have evolved with the development of five focus area work groups, organizing technical expertise around specific conservation issues or areas. These include aquatic habitat connectivity, State Wildlife Actions Plans, coastal conservation, northern forest conservation and urban conservation.

A coordinating committee was established to draw connections across the activities of these work

groups to ensure our efforts remain holistic and multi-disciplinary.

Many scientific investigations made possible through LCC funding were completed in 2013. We are now connecting research findings with conservation and management practitioners in the field.

For example, our efforts to assess the impacts of climate change on riverine fish and fish habitat is influencing the planning and on-the-ground conservation actions in the Driftless region of Wisconsin. Learn more about this research on page 21.

Similarly, our investigation on management scenarios for forest resiliency to projected climate change impacts is guiding planning

efforts and demonstration projects for adaptive forest management in locations across the northern forests. Learn more about this research on page 19.

The LCC invested funding this year to support four ongoing and five new stakeholder-driven research projects targeting broad-scale natural resources issues across the upper Midwest and Great Lakes landscape. This year, LCC partners identified waterfowl conservation, climate impacts to fish habitat, State Wildlife Action Plan coordination and stakeholder values to be among the top shared priority areas for science research.

Learn about all of our projects at <http://greatlakeslcc.org/research-projects/>.



We are **invested in partnership**

The LCC continues to work in tandem with the Great Lakes Restoration Initiative. This initiative is supported by the Great Lakes Regional Collaboration and has kick-started a new era of Great Lakes stewardship.

Partners involved in the Great Lakes Regional Collaboration, from the U.S. Environmental Protection Agency to the Great Lakes Fishery Commission, set the foundation for success in Great Lakes conservation through financial, in-kind, technical and human resource support. This contribution, along with an allocation of funds from the U.S. Fish and Wildlife Service, have provided our financial backbone.

But without the combined contributions of all the member

agencies and organizations, whether human or financial resources, we would not be able to address the conservation challenges of the 21st century.

The collaborative nature of projects funded through the LCC exemplify our collective success in pooling resources and identifying shared priorities for research that benefits the day-to-day work of federal, state, non-profit and private agencies and organizations engaged in natural resource management.

Leadership shown by the Great Lakes Fishery Commission and The Nature Conservancy has paved the way to effectively address fragmentation of our aquatic resources. This is shown in the LCC's exemplary efforts to coordinate aquatic connectivity

efforts across the upper Midwest and Great Lakes landscape.

The deepening commitment of our individual partners exemplifies the LCC's goal of a coordinated and collaborative approach to our most pressing natural resources issues.



Birding coastal habitat in Michigan. Photo courtesy of Michael DL Jordan.

Building communities of **SCIENCE**

Urban Conservation

The vast majority of the citizens of the upper Midwest and Great Lakes landscape live in metropolitan areas built around the region's lakes and rivers.

Many of these cities are important stopover sites for migratory birds, and all of these cities represent opportunities for re-greening and re-designing sustainable and nature-connected cities of the future.

Cities are increasingly showing leadership in developing innovative solutions to environmental problems. Many cities are adopting green infrastructure approaches to water management that benefit both economic and environmental sustainability.

Working in urban areas is an opportunity for the LCC to engage urban citizens in implementing

and monitoring science-based restoration projects.

Coordinated by the Upper Midwest and Great Lakes LCC, an Urban Conservation Work Group was established to support actions that:

- Fully address all components of Strategic Habitat Conservation: Planning, science, implementation, results monitoring, and the use of results in ongoing project improvement
- Engage large numbers of urban residents in phases of project design, implementation, or results monitoring
- Develop policy based on research findings; provide LCC-wide support to more local regional planning efforts
- Develop innovative partnerships for urban habitat restoration projects by identifying shared desired outcomes with nontraditional funding and implementation partners focused on health, economy, and education in cities
- Replicate successful urban restoration and monitoring models by exporting to suitable new cities
- Support climate adaptation and preparedness efforts by cities
- Communicate results – disseminate information to other urban areas in ways that results can be reproduced



The Chicago Metropolitan Agency for Planning has integrated the Chicago Wilderness Green Infrastructure Vision into their GO TO 2040 plan, which proposes a green infrastructure network that follows waterway corridors, expands existing preserves, and creates new preserves in the region. Photo courtesy of Chicago Metropolitan Agency for Planning.



State Wildlife Action Plan Revisions

State Wildlife Action Plans are blueprints for wildlife conservation within individual states. These plans are being refined and revised to incorporate the latest knowledge, with updates scheduled for 2015.

A wealth of regionally-focused information, such as downscaled climate data and species distribution models, could be incorporated into the revision process if synthesized and made accessible.

Recognizing that the range and habitat of a species is not limited by geographic and jurisdictional boundaries, identifying shared priorities for species conservation and management will lead to greater efficacy of conservation actions.

Coordinated through the Upper Midwest and Great Lakes LCC, a State Wildlife Action Plan Work Group was established to support actions that:

- Disseminate and synthesize regional science products to incorporate regionally based information and decision tools into planning
- Identify shared conservation priorities related to common species, implementation strategies and actions, and threats
- Demonstrate collaborative efforts to achieve desired biological outcomes

Additionally, the LCC initiated two research investigations related to State Wildlife Actions Plans in 2013.

The first project aims to enhance the regional effectiveness of State Wildlife Actions Plans and the ability of the LCC to identify regional priorities. Titled *Facilitating the Effectiveness of State Wildlife Action Plans at Multiple Scales in the Upper Midwest and Great Lakes LCC*, researchers are engaging State Wildlife Action Plan coordinators and LCC staff in the creation of detailed best practices and learning resources tailored to the needs that they help identify.

The second ongoing project titled, *Identifying Regional Priority Areas*

for Focusing Conservation Actions in Streams and Grasslands aims to develop the needed regional tools to identify suitable habitat for selected species of greatest conservation need across Illinois, Indiana, Michigan and Wisconsin and develop regional conservation focal areas for grasslands and streams. The results of this project will be incorporated into the Action Plan revision process for partner states.



Piping plover chicks in Wisconsin. Photo courtesy of U.S. Fish and Wildlife Service.

Aquatic Habitat Connectivity

Dams and other man-made barriers like roads and bridges in the Great Lakes basin are generally detrimental to aquatic ecosystems. These barriers block seasonal and daily movements of fish and other aquatic organisms, movements that are necessary for feeding, growth and reproduction.

Conversely, some barriers provide ecological benefits by assisting with the control of aquatic invasive species, protecting threatened and endangered species from predators and competitors and preventing the spread of contaminants.

Coordinated through the Upper Midwest and Great Lakes LCC, the Aquatic Habitat Connectivity Work Group, working with others,

will identify shared conservation goals and objectives for restoring connections in the Great Lakes' waterways.

The work group will support actions that:

- Identify key partners – engage and work with stakeholders (e.g., aquatic resource managers, municipalities, departments of transportation)
- Identify priorities and performance measures – species objectives and other metrics of restoring connectivity
- Inform decisions – support research and development of decision support tools

- Communicate results and leadership – disseminate information to decision-makers and lead a coordinated response to restoring connectivity through management and policies

In addition to the ongoing efforts of the Aquatic Habitat Connectivity Focal Area Work Group, the LCC supported multiple scientific investigations that are ongoing or recently completed that relate to aquatic habitat fragmentation and are already contributing valuable science to the field of aquatic conservation and management.

The first ongoing project is titled *Optimizing Connectivity in the Great Lakes Basin to Restore Native Fish Migrations While*



The Driftless Area, a popular fishing destination in Wisconsin. Photo courtesy of Dan Braun.

Controlling Invasive Species. The scientific findings from this study have already advanced our understanding of the number and spatial distribution of barriers in Great Lakes tributaries. The mapping portion of the project identified 275,909 potential barriers.

Predictive models were developed to assign a passability rating to every road crossing in the basin. Using the barrier database, researchers developed an initial optimization model that considers barrier location, passability, estimated cost of barrier removal and river miles connected. Read more about this project on page 23.

The second project, completed in 2013, is titled *Regional Decision-*

support Tool for Identifying Vulnerabilities of Riverine Habitat and Fishes to Climate Change. Researchers identified vulnerabilities of fish species and river segments to climate change in the U.S. portion of the upper Midwest and Great Lakes region.

By collaborating with and integrating results from six existing projects, researchers can predict potential changes in thermal and flow regimes and keystone fish species/groups under modeled downscaled climate change scenarios to identify vulnerabilities of systems. The state of Wisconsin is using information from this project to plan land management strategies in the Driftless region. Read more about this project on page 21.

The third project related to aquatic conservation efforts is titled *Predicting Climate Change Effects on Riverine Aquatic Insects Using Museum Data and Niche Modeling.* Environmental data from the Great Lakes Aquatic Gap Program, the National Hydrography Dataset, and climate change projections from University of Wisconsin, are being used to model the occurrence of aquatic insects and assess how climate change will affect their distributions and connectivity between populations.

Coastal Conservation

Coastal areas and shorelines of the Great Lakes support globally unique terrestrial and aquatic ecosystems. Coastal areas are also home to large human populations.

Climate change and habitat fragmentation, coupled with population growth, necessitate coordinated action to protect and restore these areas that are important to both wildlife and people. Long-term sustainability of coastal resources requires coordinated management and protection across an array of land ownership and management regimes.

The LCC Coastal Conservation Work Group, working with others, will identify opportunities for aligning priorities across the Great Lakes coastal realm. The work group will also support the development and dissemination of data and knowledge to fill gaps in science and build strategies to incentivize action.



Clough Island near Duluth, Minn. Photo courtesy of Richard Hamilton Smith.

The work group will support actions that:

- Identify key partners – engage and work with stakeholders in coastal areas
- Identify priorities – which valued benefits (e.g. maintaining shoreline systems and processes, maintaining shoreline water quality, wetland conservation and others) should be the

focus of regional science and decision tool development

- Inform decisions – support research and development of decision support tools
- Communicate results – disseminate information to decision-makers for coordinated response to coastal conservation, threats and policies

“The LCC provides a venue for high level discussion of natural resource issues among multiple jurisdictions, interests and authorities. Discussions challenge paradigms and often engender those ‘aha’ flashes of enlightenment or inspiration. The Commission has consistently participated in the LCC from inception and has worked with a team of others to bring the aquatic habitat connectivity issue to the table. The aquatic habitat connectivity issue has galvanized action and demonstrated early promise of progress. The Commission is inclusive by nature, but focused in the aquatic dimension of the habitat universe. Connections and linkages always shatter paradigms and engender broader thinking and action. The focus area work groups will discover myriad ways to collaborate and address complex issues and the steering committee can ensure that the collaborative efforts of the ‘ground troops’ are understood and supported at administrative and policy levels among jurisdictions.”

Dale Burkett, Great Lakes Fishery Commission



Conservation volunteers on banks of Detroit River. Photo courtesy of U.S. Fish and Wildlife Service.



Northern Forest Conservation



The great north woods. Photo courtesy of U.S. Fish and Wildlife Service.

The northern forests of the Great Lakes region are a diverse and relatively intact landscape and provide multiple benefits to wildlife and human quality of life. Long-term sustainability of these benefits requires coordinated management and protection of the area across an array of land ownership.

Coordinated through the Upper Midwest and Great Lakes LCC, a Northern Forest Conservation Work Group has been established to identify opportunities for aligning priorities across the northern forest landscape.

The work group will support actions that:

- Identify key partners – engage and work with stakeholders and landowners in the northern forests
- Identify priorities – which valued benefits (e.g., Great Lakes water quality, wildlife habitat, sustainable timber harvest and others) should be the focus of regional science and decision tool development
- Inform decisions – support research and development of decision support tools

- Communicate results – disseminate information to decision-makers for coordinated response to northern forest management, threats, and policies

In addition to the ongoing work of the Northern Forest Conservation Work Group, the LCC has funded scientific investigations related to conservation of this important landscape.

Initiated in 2013, the project titled *Toward Outcome-oriented Forest Conservation: Building Capacity and Momentum for Collaborative Management in the Northwoods* aims to identify ecosystem service benefits from forested systems for a variety of stakeholder groups.

Researchers are employing workshops, webinars, and interviews to develop a comprehensive assessment of goals, resources, and constraints to collaborative management linked to currently available data and data needs. Results will include the identification of management decisions, strategies and programs relevant to each stakeholder, and the development of goals and outcomes such as desired future conditions for the landscape.

A second project titled *Scenarios for Forest Reserve Expansion and Adaptive Management under Alternative Climate Change Scenarios in the Northern Great Lakes* was recently completed.

Researchers assessed how increased forest reserves and climate-adaptive management may improve ecological connectivity and resilience under different climate scenarios. Connectivity is one of the primary climate change adaptation strategies available to land managers, in addition to silvicultural practices. This study is integrated in an ongoing regional Climate Change Response Framework, linking the results to land management throughout the north woods. Read more about this project on page 19.

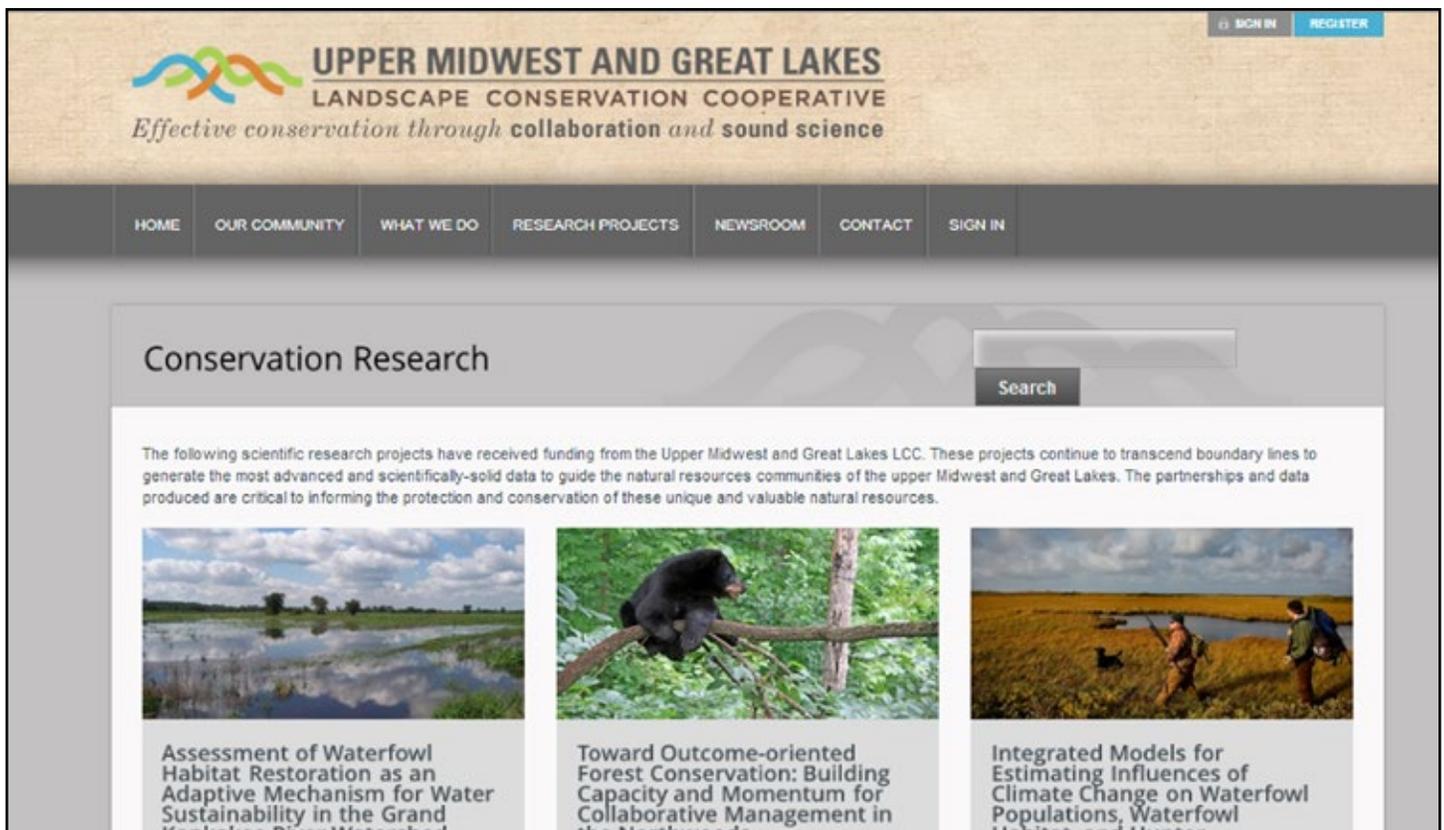
“I see the LCC as a significant forum for collaboration across all the disciplines involved in conservation, many of whom have not and would not normally intersect as often as we should within the context of ecosystem management. I found the work just being initiated through the Northern Forest Work Group and their considerations regarding riparian areas of particular interest and a good example of the benefits we can derive from this multi-disciplined approach to resource management. We remain committed to the LCC and look forward to working with colleagues to help it reach its full potential.”

Bob Lambe, Great Lakes Fishery Commission



Black bear spotted in the north woods. Photo courtesy of U.S. Forest Service.

Expanding Our REACH



LCC home page: <http://GreatLakesLCC.org>.

The Upper Midwest and Great Lakes Landscape Conservation Cooperative (LCC) launched its newly designed public Web site <http://GreatLakesLCC.org> in summer of 2013 to provide natural resources professionals and the public with access to shared conservation priorities, ongoing scientific research, funding opportunities, and educational resources, while offering continued transparency on behalf of the LCC community.

Since launch, site visits have exceeded 9,500 individual views, with more than 150 new members

receiving regular updates through our LCC list-serv.

Communications staff from partner agencies worked to develop publicly-accessible feature stories on the application of completed and ongoing LCC funded research, including the development of FishVis, a modeling tool that predicts climate change impacts on freshwater streams that are part of the Great Lakes system. Learn more about this project on page 21.

In partnership with the University of Wisconsin, the LCC announced

completion of a research project documenting more than 260,000 road crossings in the Great Lakes drainage basin, 64 percent of which may be blocking fish movement. Learn more about this project on page 23.

*Communication is a **critical function of our partnership***

The LCC also participated in a social media challenge alongside other Midwest LCCs, launching a “Learn Your Landscape” social media campaign on Facebook and Twitter to educate more than 5,000 people about natural resources challenges and opportunities in the upper Midwest and Great Lakes.

Planning for the first Midwest LCC Communications Network meeting this winter is underway.

Communications Network members will be introduced to the purpose and value-added of LCCs across the Midwest landscape.

The group aims to identify the roles and responsibilities of the communications network to capitalize on shared resources to communicate about landscape scale natural resources issues.

Partnership representatives also participated in multiple stakeholder workshops and conferences alongside other LCC coordinators to provide presentations on LCC activities.

VISIT US: WWW.GREATLAKESLCC.ORG



Great Lakes contribute billions to economies, how are natural resources agencies dealing with urban population growth, climate change, and energy development impacts on America's largest freshwater resource? GreatLakesLCC.org #learnyourlandscape

Research HIGHLIGHTS

FOR THE BIRDS

Migratory Bird Stopover Sites are Important for Economic and Ecological Diversity in the Great Lakes

The Nature Conservancy, in partnership with the Upper Midwest and Great Lakes LCC, recently launched the Great Lakes Migratory Bird Stopover Portal, an online database available to natural resource managers across the Great Lakes that identifies and projects important migratory bird stopover habitat for landbirds, shorebirds and waterfowl.

The portal was developed through a comprehensive study identifying and scoring attributes of areas that serve as and project important stopover sites within 15 of the shorelines of Lakes Michigan, Huron, Erie, and Ontario, and connecting water bodies in the U.S. and Canada.

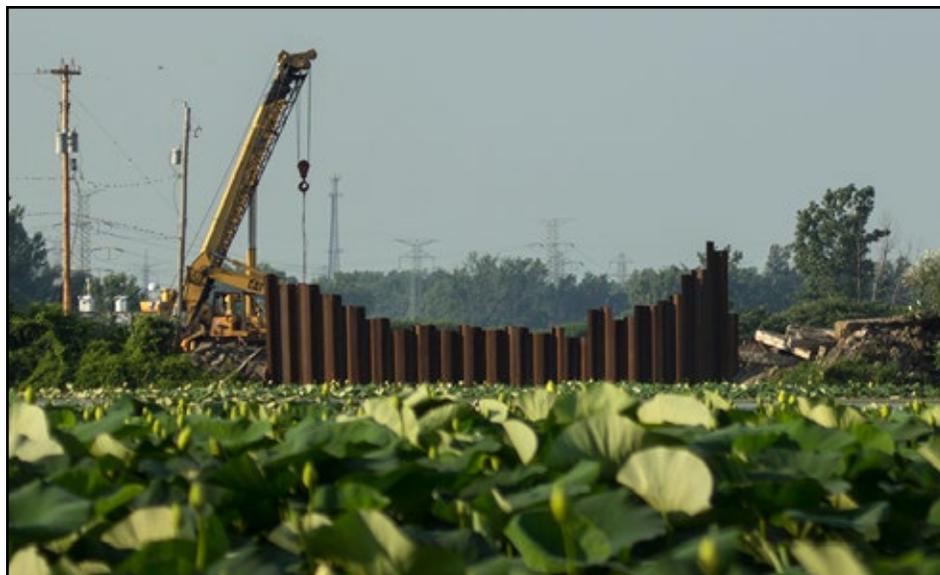
The Great Lakes, particularly coastal and near-shore areas, provide globally important stopover sites for waterfowl, shorebirds, songbirds, hawks, owls and water birds, such as loons.

Much of the Great Lakes coastal aquatic and terrestrial landscapes that once supported migrating birds has been lost or degraded, yet the region supports hundreds of millions of migrants during both spring and fall migration. In Ohio alone, the migrants attract more than 68,000 bird watchers from around the world each spring,

where they contribute nearly \$40 million annually to local economies. Birders also flock to Point Pelee, Ontario; Whitefish Point, Michigan; and Tawas Point, Michigan among many other locations.

In the words of Jon Dunn, a leading North American birder, author and ecotourism leader, “my favorite place to bird in all of North America, is Tawas Point... on Lake Huron. This is one of the best-kept secrets in North America, but no doubt there are dozens of other spots along the lakeshores which must be nearly as good [for migration].”

The online portal is available to land-use planners, policy makers, land managers, conservationists and ecotourism entrepreneurs to call attention to and protect the hundreds of bird species that migrate through the Great Lakes region. Learn how corporations, non-governmental organizations and governmental agencies are already helping protect these important stopover sites by reading the case studies highlighted on the Great Lakes Migratory Bird Stopover Portal Web site (<http://glmigratorybirds.org>).



Coastal wetland restoration in Erie Marsh. Photo courtesy of Jason Whalen.

THE FUTURE OF THE NORTHERN FORESTS

How Do We Manage Forests for Climate Change?



Expanding forest reserves such as those found along river corridors may provide refuge to threatened species. Photo courtesy of Matthew Duveneck.

How will forests change as the climate warms and what can we do about it? Is biodiversity an important component for managing climate change? What options are available to land managers?

These are some of the questions that Upper Midwest and Great Lakes LCC grantees from Portland State University set out to answer. Their research has made a substantial contribution to both the science of climate change effects and the management of northern Great Lake forests.

Using a forest simulation model to assess climate change and management effects in Minnesota and Michigan, the researchers explored a range of carbon emission scenarios, examining how climate change might

affect the relationship between diversity and forest productivity. At the same time, the researchers examined a variety of management options under potential climate change scenarios.

Although the high emission climate change scenario largely outweighed management effects, researchers found positive effects to climate-adapted management approaches.

For example, expanding forest reserves increased at-risk tree species such as balsam fir while planting climate suitable species increased productivity and diversity under climate change.

The Nature Conservancy (TNC) recently began a new initiative using these research recommendations

in portions of northern Minnesota. Species expected to respond well to a changing climate were planted.

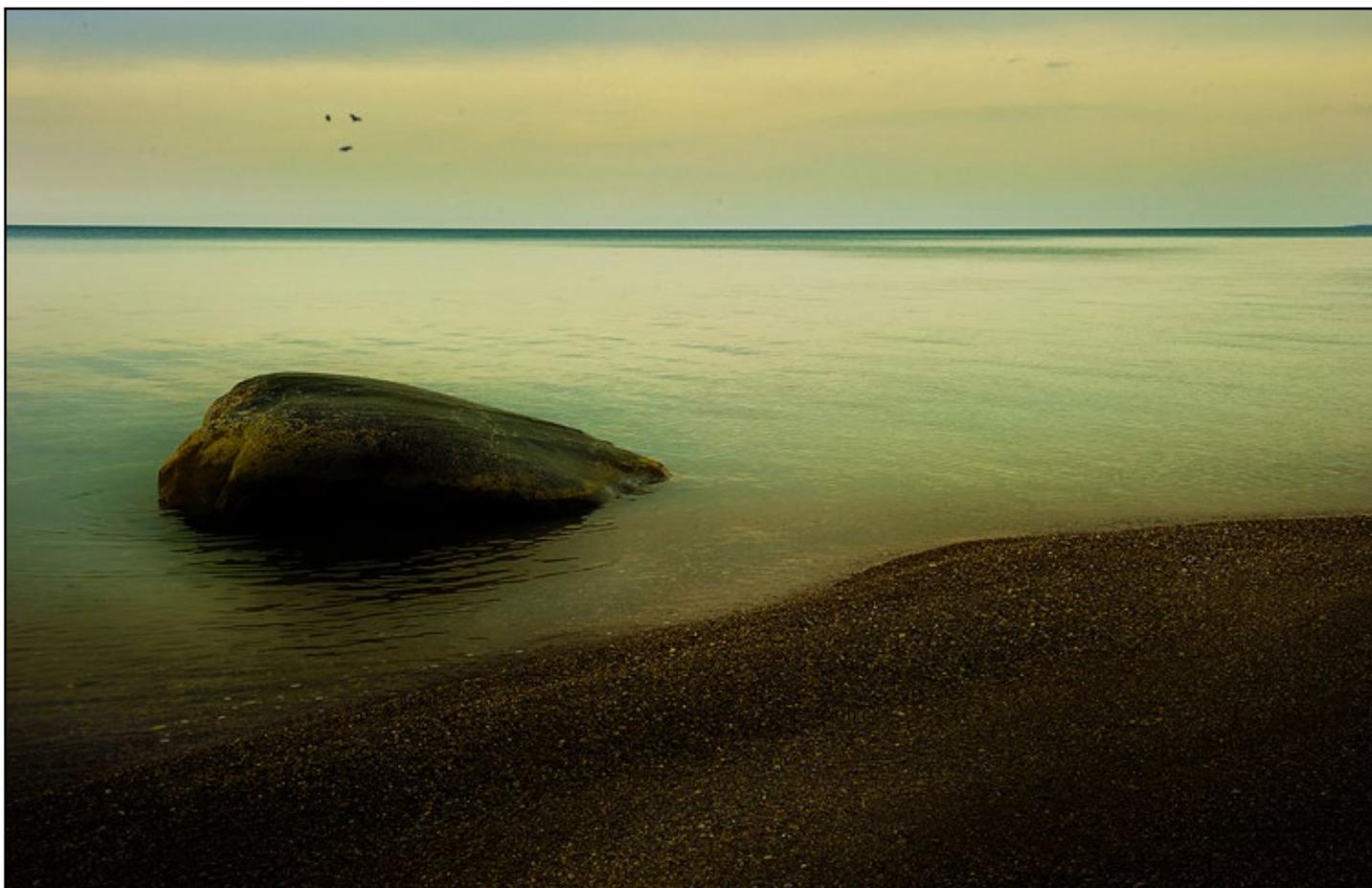
Mark White from TNC notes that, “Linking insights from simulation models into on-the-ground planning decisions is essential to successful conservation.”

More information about this project can be found on the project web page (<https://sites.google.com/a/pdx.edu/dynamic-ecosystems-landscape-lab/research/forests-management-and-climate-change-in-mn-wi>).



“NOAA recognizes the need to communicate our climate science to natural resource managers at all levels, in all regions of the United States. The LCC provides an additional entry point for our agency to disseminate scientific information, assess needs at regional scales, and address needs in partnership with other LCC member organizations. As a mission driven science provider, we understand the value of interagency collaboration and information sharing forums. Leveraging available funding, enhancing opportunities for frequent and open communication, as well as establishing non-traditional partnerships leads to informed decision making, where natural resource managers understand vulnerabilities to a changing climate and they have additional resources, tools, and/or information to mitigate potential impacts.”

Heather Stirratt, National Oceanic and Atmospheric Administration



Calm Lake Huron. Photo courtesy of Jimmy Brown/Creative Commons.

HOOK, LINE AND SINKER

A Landscape Approach to Fish Conservation in the Face of Climate Change Impacts



Angler fishing Black Earth Creek, a popular trout stream in Dane County, Wisconsin. Agricultural practices and invasive species (like reed canary grass) are just a few of the management challenges impacting stream health in portions of Wisconsin. Photo courtesy of Dennis Franke.

The Great Lakes basin includes numerous rivers and freshwater streams attracting fishermen from across the globe. Popular sport fish including brook trout and small-mouth bass spend portions of their life cycle migrating to and from the Great Lakes to these freshwater streams to spawn, feed and grow.

Through the coordinated efforts of the Upper Midwest and Great LCC, federal, state and academic partners are working side-by-side to determine how projected warmer air temperatures and changes in precipitation in the coming century may impact fish habitat.

Researchers with U.S. Geological Survey are working alongside Wisconsin Department of Natural Resources (DNR), Michigan Institute of Fisheries Research and Michigan State University to model the potential impacts of increasing air temperatures and changes in precipitation on water temperature and flow in freshwater streams that are part of the Great Lakes system.

The models project future distributions for 14 fish species based on known fish locations, their habitat preferences, their adaptability to different water temperatures, existing and future

stream conditions, and projected climatic changes.

The models show that the distribution of brook trout, which requires cold water for survival, is projected to shrink by 60 percent in some Wisconsin streams by mid-century, an impact attributed to warmer waters as a result of a changing climate. Loss of suitable freshwater habitat for this and other popular sport fish species due to climate change has economic implications as well, as recreational fishing opportunities across the Great Lakes system contribute to a multi-billion dollar tourism and recreation industry.



Aquatic resource managers are using model results to help prioritize on-the-ground conservation and restoration efforts while considering the potential impacts for the broader Great Lakes landscape. For example, the Wisconsin DNR is using the results to help make informed management decisions on easement properties that boast more than 35,000 acres of trout and small mouth bass streams.

“We can identify streams where fish populations may have a higher or lower likelihood of changing as a result of projected climate change impacts. This means we can make better investments in groundwater and storm water protection measures or implementation of agricultural best management practices in higher priority areas,” said Paul

Cunningham, Wisconsin DNR fisheries biologist.

By examining current and future fish distributions, existing opportunities for public access and weighing demands for recreational fishing, natural resources managers across the upper Midwest and Great Lakes will be equipped with the tools needed to make strategic conservation decisions, such as how habitat is managed and when and where additional land should be acquired.

Scientists are working with natural resources managers across the region to ensure they have access to this valuable scientific data that will help guide future management decisions in the face of a changing climate.



Angler releases a brook trout, a popular sport fish throughout the upper Midwest and Great Lakes. New models predict brook trout distribution to decrease by as much as 60 percent in parts of Wisconsin. Photo courtesy of Matt Mitro, Wisconsin DNR.

ROAD BLOCK

Fixing Connections Between the Great Lakes and its Tributaries Doesn't End with Dams

Over the last several years, federal and state agencies and environmental nonprofit organizations have targeted dam removal as a way to quickly improve the health of Great Lakes tributaries.

Dams keep migratory fish, such as lake sturgeon, northern pike, and salmon, from swimming upriver to spawn, block movement of vital nutrients, and change the way water flows. For many, taking down a dam and returning a river to a more natural flow seems like a no-brainer.

In the study, published in the current issue of the journal *Frontiers in Ecology and the Environment*, researchers mapped every obstacle — from large hydroelectric dams to tiny road culverts — in the entire Great Lakes drainage basin. What

the maps show is that, while there are more than 7,000 dams on the rivers, creeks and streams flowing into the Great Lakes, there are 38 times that number of road crossings — 268,818 were documented in the study.

“Improving the connection between the Great Lakes and its tributaries is a high priority for a broad range of conservation partners across the Great Lakes region,” said Brad Potter, science coordinator for the Upper Midwest and Great Lakes LCC.

“Different agencies and organizations have different roles to play, whether it’s in-stream fish habitat restoration, dam removal or modifying road crossing to be more passable,” says Potter.

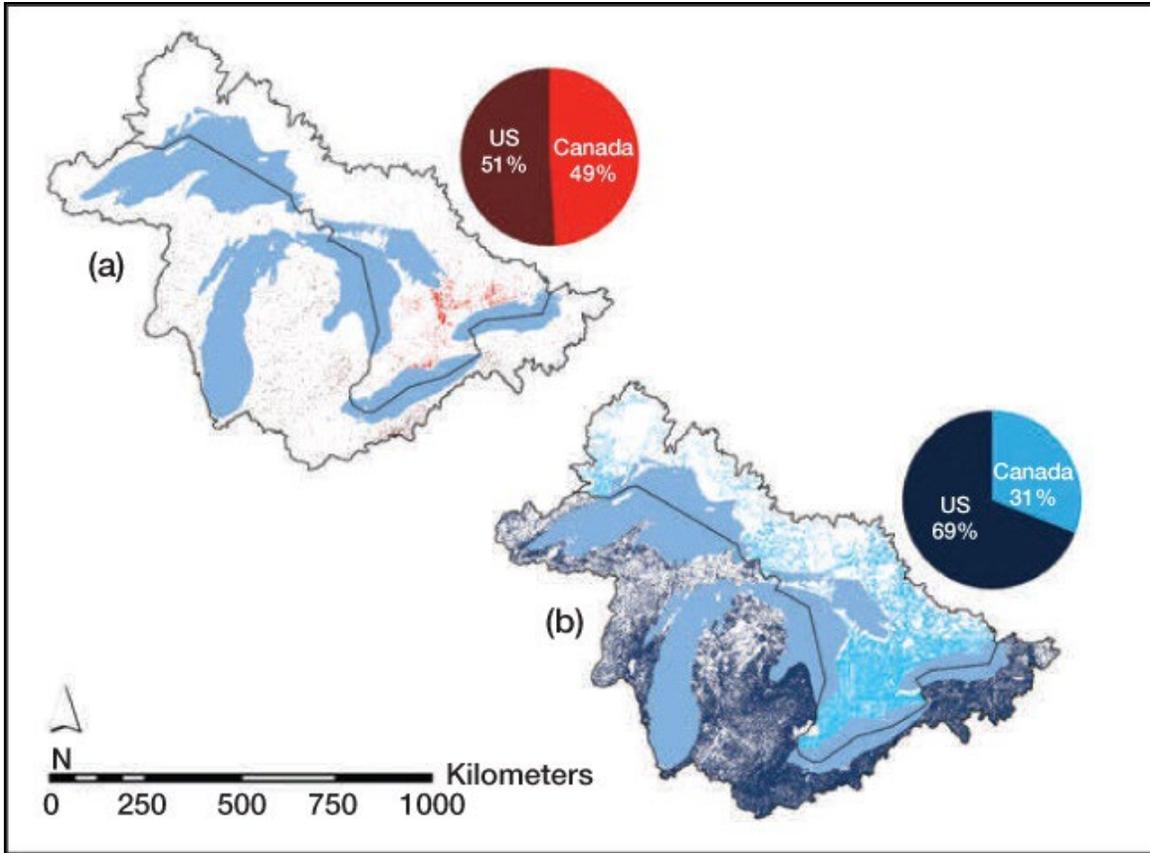
The LCC community, which is providing funding for the University of Wisconsin-led study on aquatic connectivity, supports cross-jurisdictional, stakeholder-driven research that helps natural resources managers improve conservation efforts across broad landscapes.

Stephanie Januchowski-Hartley, lead author of the study with the University of Wisconsin-Madison Center for Limnology, says many road crossings are bridges with minimal impact on stream flow but field studies in the Great Lakes region suggest that 64 percent of the more than 260,000 road crossings could at least partially block fish movement.

“If you’re a state agency or a nonprofit group and you want to invest in river restoration and



Aquatic connectivity can be enhanced by remediating road crossings and dams. Photo courtesy of Great Lakes Commission.



Location of potential barriers (a) dams and (b) road crossings in the North American Great Lakes basin. Graphic courtesy of University of Wisconsin.

remove a dam, but you didn't consider that, upstream, there are thirty road crossings and half of them are impassable, then you have a problem," says Januchowski-Hartley. "You did do some good [by removing a dam], but to be most effective, you should think about all barriers."

"Many species of fish and wildlife require large areas to support their daily and annual activities," Potter said. "Maintaining large connected natural areas, and restoring severed connections is one of the primary priorities for our LCC community. This research is helping us identify the significant challenges related to

fragmentation in our Great Lakes rivers and streams, and providing us the information necessary to identify the most cost-effective solutions to restoration."

Many fish want to head as far upstream as possible to spawn in small tributaries during the spring. Taking a dam out of the main-stem river gives fish more habitat to spend their adult lives in, but may not allow them to access preferred spawning habitat crisscrossed by roads.

Water often shoots through the narrow corrugated metal tunnels of a road culvert so fast that fish can not swim through. In steeper

terrain, perched culverts act like mini-dams, where water spills over a ledge into the stream below. Unless fish are high-jumping salmon, any little ledge may be an obstacle.

Januchowski-Hartley hopes having these maps available for state agencies and nonprofit groups will offer a big picture perspective on improving river access for migratory fish species. Besides, she says, it's less expensive to replace a road culvert than remove a dam.

"In this region of the world, it seems like just about every road gets re-done in the spring," she says, noting that there is ample



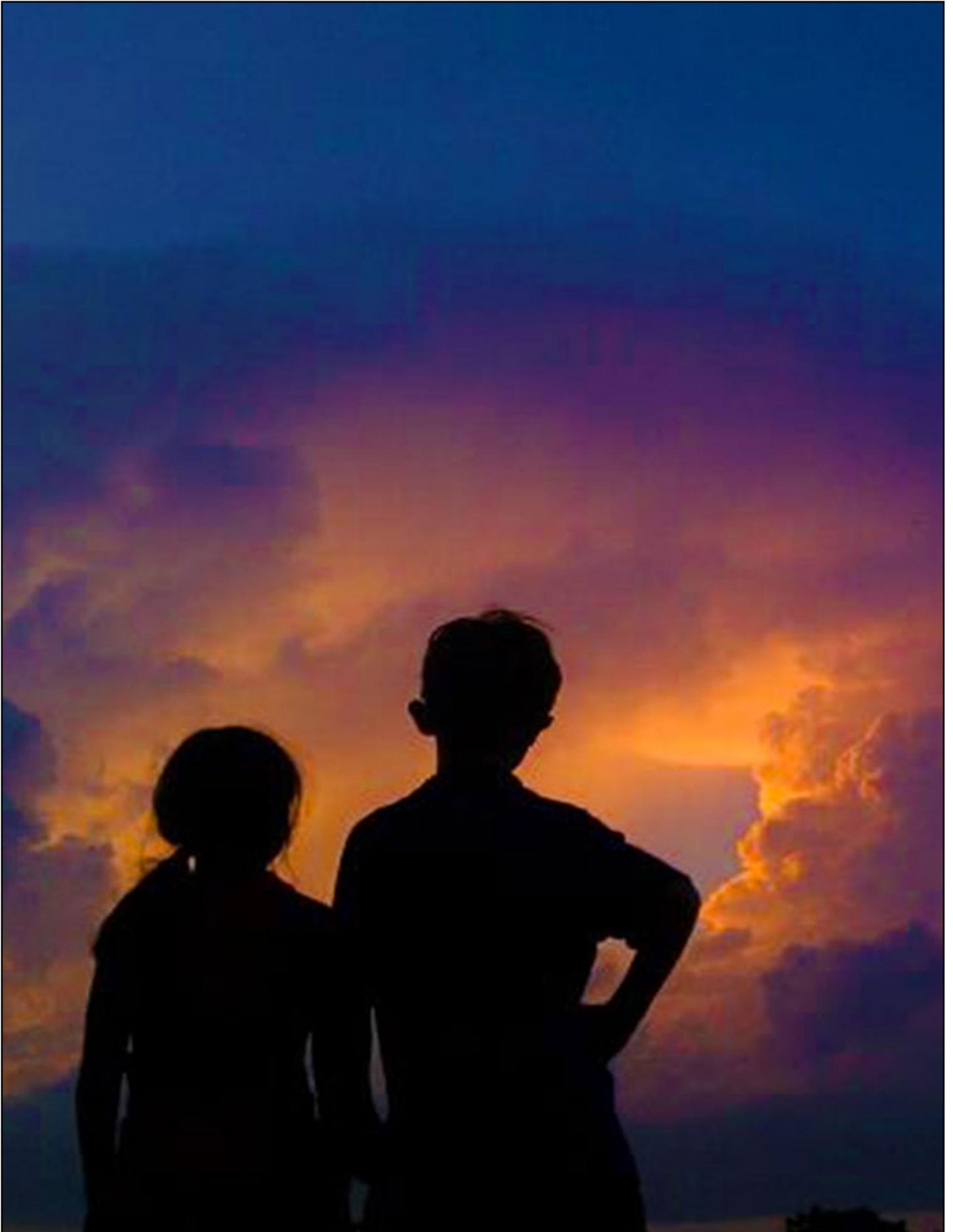
Kids fishing. Photo courtesy of U.S. Fish and Wildlife Service.

opportunity to re-engineer a crossing that better fits a river or stream.

In addition to funding this research, the Upper Midwest and Great Lakes LCC serves as a venue to coordinate vested stakeholder efforts to improve connections between the Great Lakes and their tributaries, while taking into account all of the potential impacts of in-stream barrier removal or retention.

Many organizations and partnerships including the Council of Lake Committees, Council of Great Lakes Fishery Agencies, American Fisheries Society and Association of Fish and Wildlife Agencies are involved in providing guidance for site specific actions to restore severed fish movement pathways.

The LCC is working toward development of a coordinated, Great Lakes wide approach to ensure the cumulative effects of all such actions are considered. To read the full published article, visit <http://www.esajournals.org/doi/full/10.1890/120168>.



Storm clouds breaking. Photo courtesy of Ashley Spratt/U.S. Fish and Wildlife Service.

Our Promising **FUTURE**



Common loons. Photo courtesy of Gary J. Wege/U.S. Fish and Wildlife Service.

Make no little plans, for they have no magic to stir men's blood.

These words are attributed to Daniel Burnham, renowned Chicago architect and urban planner who famously led the development of the 1909 Plan of Chicago. This was no little plan. More than 100 years later, with many of the plan's elements now written across the face of the Chicago metro area, it still remains a living vision for that urban region. Natural open space protection was consciously built into it, thus making conservation part of the Chicago region's DNA.

What will the LCC's signature across the Great Lakes region look like in 100 years, and can we create an equally durable genetic blueprint for conservation? Hard to say, but it is a question worth asking. Landscape Conservation Cooperatives were formed as an experiment in conservation. They were intended as a coordinated response to the many signatures

of landscape-scale stressors carved deeply across the region: habitat disconnection, invasive species, biodiversity loss, contamination, and the impending signature of climate change. Can we – will we – rise to these challenges?

At our November 2013 steering committee meeting, Patrick Doran described four quadrants of *whole system conservation*: informing, enabling, incenting and leading. We've done pretty well in the first two, through the development of data and knowledge, and in the creation of decision tools. We have only begun to explore the second two, but we are particularly well-positioned to demonstrate leadership in landscape-scale natural resource issues. We sit on the doorstep of three of them: aquatic connectivity, coastal conservation, and northern forest conservation.

What does leadership look like for these and other issues? It means serving as the venue for developing

shared visions or conservation designs for landscapes, and then leveraging our resources with those of others in pursuit of implementation.

The LCC network and 22 individual LCCs across North America have been identified by such entities as the National Council for Science and the Environment, the National Wildlife Refuge System, and the National Fish, Wildlife and Plant Adaptation Strategy as the proper place for designing an ecologically-connected network of landscapes capable of sustaining natural resources. This is landscape conservation design. Are we ready to take on this challenge in the upper Midwest and Great Lakes region?

Make no little plans, indeed.

John Rogner
LCC Coordinator

