DRAFT BUSINESS PLAN
Spring 2014

A strategy prepared by LCC Technical Advisory Groups to guide immediate conservation actions to restore and connect wildlife with people on the rich soils of a functional working landscape.
CONSERVATION IN AMERICA’S HEARTLAND

In the middle of North America, tallgrass prairie once covered 170 million acres. These grasslands and associated wetlands, savannas, and forests supported a staggering diversity of flora and fauna. Big rivers—the Mississippi, Missouri, Illinois, and Platte—cut through the prairie landscape. These watery paths once carried native peoples and early explorers into the middle of the continent. They traveled between villages, describing channels, sloughs, forests, and marshes overflowing with waterfowl, fish, mussels, and other aquatic life and wide open grasslands that extended across the landscape like a vast ocean.

Over the course of the nineteenth and early twentieth century, the tallgrass prairie was slowly and systematically plowed under and paved over for agricultural and urban development. Today, less than 4% of the prairie remains scattered across the region in relatively small, fragmented remnants. In the course of making land suitable to grow crops, marshes were drained, fields were tilled, waterways were straightened, and rivers were dammed. Habitats were destroyed or degraded and wildlife suffered the consequences.

Today, the Midwestern United States is a working landscape with agriculture and related products providing the economic backbone of the region as well as the predominant land use. The region has over 400,000 farms and is a major producer of corn, soybeans, fruits, vegetables and livestock. Ownership, cropping, irrigation, and drainage of these lands have been in flux, dramatically altering the condition and use of large areas in response to climate, extreme weather events, global economics, agriculture policies, and commodity prices.

The entire Mississippi River basin covers nearly 800 million acres of land. According to the U.S. Department of Agriculture, the market value of agricultural products in the basin is worth more than $54 billion annually. Wildlife related recreation—hunting, fishing, and wildlife watching—in Illinois alone totaled $3.8 million in 2011. Manufacturing and service sector jobs anchor the economy as well. Large urban centers—Chicago, Indianapolis, Columbus, St. Louis, Kansas City, Des Moines—provide a place for millions of people to live and work.

Big rivers provide a stable source of transportation that has long supported human migration and trade for millenia. Today, shipping on the river distributes grain, coal, and other manufactured products across and out of the region. In the upper basin of the Mississippi, the lower 200 miles (commonly called the Middle Mississippi) and the lower 735 miles of the Missouri River remain free-flowing with a minimum depth of 9 feet capable of supporting commercial navigation without impoundment.

Embedded in this landscape, there are many scattered acres—both large and small—of grassland, wetland, forest, river, and stream habitat vital to a diversity of aquatic and terrestrial wildlife on both public and private lands. These valuable pockets of biodiversity are under stress from climate change, invasive species, urbanization, agriculture nutrient and sediment run-off, and habitat fragmentation and loss.

Additionally, agricultural practices in the region have led to elevated nutrient loads in the form of nitrogen and phosphorous discharged into local waterways. A consequence of this has been not
only poor local water quality in the Midwest, but also hypoxia a thousand miles downstream in the Gulf of Mexico. Better known as the “Dead Zone,” areas of hypoxia occur where the concentration of dissolved oxygen in the water column decreases to a level that can no longer support fish and other aquatic organisms. The Dead Zone significantly impacts the economic viability of Gulf coast fisheries, while threatening the broader ecological integrity of the region.

The Eastern Tallgrass Prairie and Big Rivers Landscape Conservation Cooperative (ETPBR LCC) sits in the heart of the Midwest. From central Ohio, it stretches across parts of Indiana, Illinois, Iowa, Missouri, and Minnesota all the way to eastern Nebraska, Kansas, and Oklahoma. One of 22 Landscape Conservation Cooperatives, the ETPBR LCC is a public-private partnership composed of state, tribal, and federal agencies as well as non-governmental organizations, universities, and others headed by a Steering Committee of program leaders and directors of these organizations. Partners in the LCC recognize that conservation challenges transcend political and jurisdictional boundaries and require a networked approach—holistic, collaborative, adaptive, and grounded in science—to ensure the sustainability of North America’s land, water, wildlife, and cultural resources.

**STRATEGIC APPROACH**

The Steering Committee of the ETPBR LCC convened at Dickson Mounds Museum in Illinois, on September 5-6, 2012 for a Strategic Planning Retreat. The output of the retreat laid the foundation for the ETPBR LCC Operations and Strategic Plan: 2013-2020. This plan was further informed by discussions with stakeholders within the LCC geographic area and additional conference calls with the Steering Committee.

**Vision:** Functional tallgrass prairie and big rivers natural communities embedded in a healthy and productive agricultural and urban landscape – ecologically connected lands and waters, managed cooperatively for current and future generations.

**Characteristics of success** -- Interconnected human and wildlife communities supported by the productive soils of the eastern tallgrass prairie and wealth of big river ecosystems across the region will be achieved by:

1) Sustaining healthy tallgrass prairie and big rivers ecosystems with a full complement of species, habitats, and community processes for their intrinsic worth and for services they provide to current and future generations;

2) Effectively addressing the intensifying threats that lead to landscape degradation;

3) Protecting water quality from local watersheds downstream to the Gulf of Mexico;

4) Using best management practices on agricultural and urban working lands that contribute to the viability of natural and cultural resources within a functional landscape; and

5) Engaging landowners and the public in a balanced appreciation for and understanding of their responsibility for cooperatively managing interconnected ecosystems.

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Mission: The ETPBR LCC coordinates among many partners across the eastern tallgrass prairie and big rivers ecosystems in portions of 11 states (eastern Nebraska, Kansas, Oklahoma, and south Dakota, central portions of Iowa, Missouri, Illinois, Indiana, western Ohio, along with small southern sections in Minnesota and Wisconsin) to:

1) Understand the consequences of landscape-scale change.
2) Develop common landscape-level conservation objectives and strategies; and
3) Produce pragmatic science (i.e. practical and achievable) that addresses current and future environmental stressors.

Within the ETPBR LCC region, the steering committee members identified key habitats that support a functional landscape for fish and wildlife species, focusing on tallgrass prairie and big river ecosystems. Functional landscapes may be defined as lands and waters with the properties and elements required to support desirable populations of fish and wildlife, while also providing human society with desired goods and services, including food, fiber, water, energy, and living space. Conservation approaches from other LCCs will be adapted as appropriate for other associated habitats, like wetlands and woodlands.

To balance conservation efforts, emphasis will be placed on large-scale Vistas, or expansive restoration sites and big river systems that represent the iconic and historic landscapes of the region, as well as smaller-scale Gems that exist as scattered pockets of biodiversity that remain tucked among the working lands of a region largely dominated by agriculture and urbanization.

Focal Areas: To conserve tallgrass prairie and river habitats, the LCC will focus on large and small-scale restoration within the dominant land uses in the region—both rural and urban.

The four focal areas and two supporting networks for technical expertise are:

Technical Advisory Groups (TAGs)  
Prairie Restoration Techniques  
River Restoration Techniques  
Agroecology Conservation Practices  
Urban Watershed Management

Expert Networks  
Communications  
Human Dimensions

The ETPBR LCC Operations and Strategic Plan outlines initial goals, objectives, and strategies for each of the four focal areas which are summarized in this plan, including human dimensions approaches and communications strategies in each area. Moreover, the plan lays out three Operational Frameworks for Decision Making adopted by the Steering Committee: (a) Strategic Habitat Conservation, (b) Structured Decision Making, and (c) Preliminary Criteria for Project (Science Needs) Selection. These frameworks guide development of collaborative adaptive management schemes, using pragmatic and science-based approaches which are based on prioritization of conservation stressors and needs within the four focal areas and across a regional context.

Note on use of the term “restoration” in this document – The Society of Ecological Restoration defines ecological restoration as “the process of assisting the recovery of an ecosystem that has
been degraded, damaged, or destroyed.” Therefore, the use of the word “restoration” in this plan is meant to encompass the full range of actions from rehabilitation of existing but degraded and damaged ecosystems to the reconstruction of new habitats (e.g. planting prairie on former row-crop agricultural fields that may or may not have been prairie originally).

**STRATEGIC COMMUNITY ENGAGEMENT**

How can the LCC flourish in an era of rapid change? Based on Kotter, 2012, the TAGs and Networks constitute a strategy network that brings vision, opportunity, agility, and inspired action from within the community by:

- Convening many change agents from within the ranks.
- Drawing attention to front-line concerns.
- Viewing the future from multiple angles.
- Focusing passion and intelligence on the biggest opportunities.
- Thinking creatively to solve wicked problems.
- Eliminating collaborative barriers between organizations.
- Promoting a useful flow of information and activity.

Volunteers from the conservation community serve on Technical Advisory Groups (TAGs) for each of the four focal areas listed above. Additionally there are two newly formed networks for Human Dimensions and Communications, which each bring specific expertise that cuts across all focal areas. In addition to the LCC staff, four Coordinators from the Illinois Natural History Survey provide support for these groups.

TAGs and Networks provide a platform for the scientific community to collaboratively define conservation strategies. Over 300 researchers, land managers and end users of information currently participate in one or more of the four TAGs and two Networks.

**PROCESS OF PRIORITIZING ACTIONS IN THE BUSINESS PLAN**

Political and financial constraints do not permit implementation of conservation projects along all potential prairie and big river ecosystems in the LCC. Therefore, the four TAGs, two Expert Networks and Steering Committee are working together to create and refine the Strategic Plan and Business Plan to:

- Describe the need for conservation efforts within each focal area;
- Define conservation and restoration objectives and strategies;
- Identify local benefits of conservation and restoration projects;
- Determine how conservation efforts would address Mississippi Basin and Gulf Hypoxia;
- List immediate priorities for action in the Business Plan;
- Locate and leverage resources needed for projects; and
- Identify and engage stakeholders in focusing, developing, and implementing projects.

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In a first step toward generating Requests for Proposals, the TAG Coordinators worked on developing and securing input from their members to formulate this Business Plan. The plan outlines conservation needs, goals, and strategies for the four focal areas (prairie restoration, river restoration, agroecology, and urban watersheds). In order to develop this Business Plan, the TAG coordinators synthesized input from TAG/Network members in the four focal areas in: (a) the *ETPBR LCC Operations and Strategic Plan*; and (b) a thematic analysis of members’ views—obtained via an online questionnaire—on the most salient concerns. As they cut across all four focal areas, human dimensions approaches and communications strategies are not articulated separately, but rather integrated into each of the four focal areas.

Themes on environmental stressors and conservation needs obtained from TAG members’ responses were then ranked based on the total number of TAG members citing these themes. The highest priority environmental stressors and conservation needs were then used to generate a proposed Action Plan for each of the four Focal Areas. Alleviating Gulf Hypoxia was identified by the Steering Committee as an overarching conservation need and integrated into all four focal areas.

The Action Plan will be recommended to the Steering Committee for their consideration. Accounting for guidance from the Steering Committee, the four TAG coordinators will continue to: (a) work directly with their members to define conservation needs that constitute the greatest constraints to achieve the ETPBR LCC’s Vision; and (b) seek input from their TAG members on prioritizing conservation needs for ETPBR LCC action, including funding as fiscal resources become available.

**FOCAL AREA ACTIONS PLANS
FOCAL AREA 1: PRAIRIE RESTORATION TECHNIQUES**

**Landscape Conservation Need**
Tallgrass prairie once covered 170 million acres; it has all but vanished from North America due to conversion to agriculture during the latter part of the 19th and into the early 20th century. Most loss was in the east part of the region which includes portions of Minnesota, Illinois, Missouri, Wisconsin, Indiana, and Ohio. Less than 0.1% of original prairie remains in Iowa, Illinois, and Indiana. Further west, tallgrass prairie had been utilized as hay or pasture, but those areas are now meeting their demise in North and South Dakota, and in eastern Nebraska, Kansas, and Oklahoma prairie is being converted to commodity crops such as corn. Similarly imperiled are habitats associated with or adjacent to tallgrass prairie such as oak savannas and barrens, sand prairies, wet prairies and sedge meadows, and forested wetlands. Over the past 150 to 200 years, the flora and fauna dependent on healthy, tallgrass prairie ecosystem complexes has suffered.

With little extant prairie remaining and declining trends accelerating in some areas, conservation of prairie and grassland associated habitats (e.g. savanna, wetlands) is urgent. However, prairie restoration outcomes can be fraught with limitations (e.g. site location, soil conditions, seed availability, personnel, surrounding and past land use, hydrology, funding) and uncertainties (e.g.
weather, invasive plant species management, loss of funding) that can hinder success or lead to unanticipated negative results. If planned and implemented properly, prairie restoration can support a range of vital ecosystem services including survival of grassland birds and other species, pollination, flood water storage, groundwater recharge, filtering of agricultural nutrient run-off, fuel biomass, grazing lands, and carbon sequestration.

Goals
Determine where and how to focus restoration for biodiversity conservation, taking advantage of both large-scale and small-scale opportunities (vistas and gems). This includes physical locations on the landscape as well as refinement of restoration methods, planning, coordination, education, and scientific research.

Objectives
- Create functional large-scale prairie ecosystems that provide wildlife habitat, particularly for declining species such as pollinators and grassland birds.
- Protect, connect, expand, and manage remnant prairies to preserve genetic diversity and local ecotypes.
- Promote the values and management of prairie ecosystems among communities and landowners.

Immediate Strategies

**Prairie Strategy 1: Inventory prairie land assets and restoration methods**
Construct and maintain knowledge exchange tools to compile, house, and disseminate data and analyses about known prairie remnants, actively managed prairie sites, and prairie restoration projects.

(a) Build a dynamic knowledge exchange to house data on: (1) status and history of land areas in prairie or available for restoration; and (2) techniques used in prairie restoration projects, including a directory of scientists and managers with prairie restoration experience and expertise.

(b) Develop mechanisms for practitioners and researchers to access the database, input new information, and identify methods to support improved management strategies.

**Prairie Strategy 2: Design and integrate prairie conservation plans at the landscape level**
Expand conservation plans to regional and multi-state scales to address large-scale long-term stressors such as habitat fragmentation, climate change, hydrologic dysfunction, and invasive species.

(a) Inventory and identify collective opportunities to implement a regional plan for conservation, building from existing efforts such as the Minnesota Prairie Conservation Plan 2010, an ambitious 25-year $3.5 billion agreement to align the conservation actions of multiple agencies and organizations in the state. Another example is the Bird Conservation Area model for grassland birds in Iowa.

(b) Develop and iteratively improve landscape conservation designs (LCDs) that prescribe prairie conservation project locations and size where they might have the greatest conservation impact.
Develop simulation tools to guide implementation of landscape-scale prairie conservation plans selecting methods and locations where physical features and social capacity maximize multiple ecosystem benefits.

**Prairie Strategy 3: Improve prairie restoration and management techniques**

Develop prairie restoration guidance for techniques that maximize desired outcomes (e.g. botanically diverse, healthy plant community, quality wildlife habitat, low cover of exotic and invasive plant species) while minimizing resource input such as costs, staff time, equipment, and invasive plant species management.

(a) Identify and develop definitions of success for restoration of prairie and other natural communities, including measurable biological interactions that will guide management of restoration projects.
(b) Develop and share information on local ecotype seed production and availability.
(c) Develop and promote use of Prairie Best Management Practices (BMPs) applicable to the region.
(d) Track prairie restoration efforts and monitoring results to share with the community of practice.

**FOCAL AREA 2: RIVER RESTORATION TECHNIQUES**

**Landscape Conservation Need**

Big rivers ecosystems of the Midwest provide a myriad of services to wildlife and aquatic species as well as communities along them. Presently, such services are being disrupted by anthropogenic alterations of the big rivers landscape, predominantly caused by urbanization, extensive agricultural land use, dams, and river diversions. Such practices have negatively modified natural hydrology and sediment transportation, altered or eliminated riparian zones and grass buffers, decreased water quality, intensified flooding, and disrupted wildlife and aquatic species habitats. Restoration of the Midwest big rivers would be optimally attained through managing flow-regimes, maintaining and re-establishing floodplain connectivity, removal of inactive dams to re-establish forested riparian areas, as well as engaging local stakeholders, such as landowners and local governments, by building their capacity to adopt tools that would enhance land use practices.

**Goals**

Determine where and how to focus big river ecosystem restoration for biodiversity conservation, taking advantage of both large-scale and small-scale opportunities.

**Objectives**

The long-term objectives of the River Restoration TAG, as written in the Strategic Plan, are to:

- Restore long stretches of free-flowing and interconnected big river ecosystems through large-scale restoration processes.
- Protect, connect, and expand existing intact free-flowing mainstem channels and interconnected segments of large rivers and headwaters.
- Enhance connectivity between upland and lowland terrestrial habitats along big river corridors.
- Promote appreciation among water users for functional riverine ecosystems.
Immediate Strategies

**River Strategy 1: Inventory river conservation assets and vulnerable ecosystems**
Create a database that would enhance scientific knowledge about current restoration projects.
   (a) Create an inventory of existing river restoration goals and assessment models.
   (b) Conduct vulnerability assessments for stream ecosystems that would help prioritize restoration sites.

**River Strategy 2: Model physical and social conditions to target river restoration**
Develop and use tools for modelling site conditions, including land use, climate change and social values, to guide river restoration.
   (a) Understand how river systems are impacted by stakeholder decisions in watersheds.
   (b) Conduct hydrologic modelling including transport of sediments and nutrients.
   (c) Predict geomorphic and land cover responses.
   (d) Target conservation to critical habitats for aquatic species.

**River Strategy 3: Improve river restoration techniques that minimize stressors and limitations**
Minimize uncertainties created by environmental stressors and limitations through restoration techniques.
   (a) Increase lateral connectivity.
   (b) Reduce hydrological alterations.
   (c) Promote sustainable land use.
   (d) Understand and monitor wildlife response.

**River Strategy 4: Enhance social awareness and capacity for river restoration**
Understand the economic and social limitations of adopting best management practices and devise decision making tools to involve communities in restoration projects.
   (a) Clearinghouse of best management practices (BMPs) for river restoration.
   (b) Simulation tools to guide decision makers in river restoration approaches
   (c) Enhance social awareness and capacity for river restoration through outreach to property managers on the benefits of river restoration, including extremes of drought and flooding due to climate shifts.
      a. Conduct outreach programs for landowners to promote awareness of the ecosystem services associated with river restoration.
      b. Build the capacity of local agencies to promote preservation and restoration of forested riparian zones and floodplains.

**FOCAL AREA 3: AGROECOLOGY CONSERVATION PRACTICES**

**Landscape Conservation Need**
The Midwest is the agricultural heartland of America with one of the largest agricultural economies in the world. Agriculture is strongly connected to the environment. Agricultural production is critically dependent on environmental stressors – rainfall, heat, pests, ozone levels and extreme events such as flooding, drought, freezing, and damaging storms. There is great interest in potential impacts of climate change on these agricultural stressors and their effects on crop production. Application of *agroecology* principles, the study of ecological processes that
operate in agricultural production systems, can improve agricultural resilience to environmental stressors while increasing ecosystem service provision.

Agricultural fields and surrounding lands provide many ecosystem services, including habitat for wildlife; however, the level of benefit is determined by management practices. Intensive activities such as tillage, drainage, irrigation, and fertilizer and pesticide use have had considerable impact on the surrounding environment. Fertilizer runoff in particular has been linked to local algal blooms and to the expansion of the hypoxic zone in the Gulf of Mexico. Water management is another major conservation concern. Tens of thousands of miles of tile drainage shunt chemical, sediment, and nutrient-laden water from millions of acres of agricultural land directly into incised, channelized streams that lead to the region’s major rivers. During times of drought, farms may use irrigation to replace the water that was purposely removed in response to past flooding conditions. Irrigation taps into surface and underground aquifers during times when they are already taxed and slow to recover. As management intensity increases and untiled areas shrink, the value of agricultural land for plant diversity, wildlife habitat, water quality protection, and other ecosystem services decreases.

Economic drivers for crop production provide one of the greatest hurdles for conservation on agricultural lands. Significant economic and political influence is held by agricultural interests, including farmers, land managers, technical consultants, equipment manufacturers, seed companies, chemical companies, and grain processors. Demand for biofuels has inadvertently driven fragmentation and loss of ecosystem services as even the most marginal land is converted to crop production. Political and financial constraints do not permit implementation of conservation practices on all agricultural land in the Midwest; therefore prioritization of activities and efficient allocation of resources is imperative.

To prioritize conservation efforts and allocate resources most efficiently, three major research needs must be met:

- Understand what practices return the greatest conservation value.
- Understand which physical (e.g., watersheds) and managerial (e.g., cultural practices) areas have the greatest potential for improvement.
- Understand what resources are available to support and leverage conservation efforts.

Anticipated outcomes and benefits will be quantified more precisely as the needed knowledge is secured. However, some general outcomes can be expected:

- Increased amount and quality of wildlife habitat integrated into farmland, including tallgrass prairie habitat, particularly for grassland birds and riparian species, as well as provision of migratory corridors for birds and fish passage within the Mississippi River basin.
- Water quality protection for 18 million people in the Mississippi River watershed, as well as adjacent watersheds. Reduction of contributions to the Gulf of Mexico Hypoxic Zone and improvement of the Gulf ecology and economy.
- Economically viable agriculture, increased food security, and preparedness and flexibility in the face of climate change. Engagement among producers to implement the best management practices for their fields.
The overarching strategy is to use economics and incentives to influence best management practices for habitat conservation on agricultural working lands. Traditionally, the strategy has been opportunistic – based primarily on landowner willingness to participate. Recent efforts, such as the Mississippi River Basin Healthy Watersheds Initiative (MRBI) through the Natural Resources Conservation Service, have targeted watersheds in which water quality is significantly impaired and have the greatest potential for improvement. The Agroecology TAG plans to build on the effort to prioritize resource allocation by supporting research to identify priority conservation areas and activities that will provide the greatest improvement to wildlife habitat and water quality.

Goal
Integrate functional natural communities within food, fiber, and fuel production systems to provide wildlife habitat and protect water quality both locally and downstream.

Objectives
- Develop and promote wildlife conservation practices that: a) improve connectivity among uplands, floodplains and channels; b) enhance viability of functional ecological processes; and c) restore native prairie and riverine communities as an integral part of food, fiber, and fuel production systems.
- Develop and promote conservation practices that improve water quality and wildlife habitat within the Midwest as well as reducing downstream nutrient export to the Gulf of Mexico.

Immediate Strategies

**Agroecology Strategy 1: Assess and model impacts of changing land use, management practices and climate shifts on agricultural conservation**
Collect and organize data to model impacts of changing land use, management practices, and climate shifts on agricultural conservation policies and practices at multiple landscape scales.
(a) Identify and map indicators of social capacity to motivate adoption of practices with multiple benefits through networking and extension.
(b) Use economic modeling and cost-benefit analysis to evaluate and improve incentive programs and policies that support focused conservation efforts.
(c) Expand pilot decision support tools that optimize siting of conservation practices at the local level by assessing and incorporating stakeholder perspectives.
(d) Target conservation programs spatially by using simulation tools to map and prioritize watersheds.

**Agroecology Strategy 2: Quantify the impacts of existing and emerging conservation practices and design effective strategies at multiple scales**
Assess impacts of existing and emerging agricultural technologies on multiple spatial and temporal scales and use the information to design effective conservation practices.
(a) Evaluate the environmental, social and economic impacts of existing practices as well as new technologies such as drainage management systems and alternative crops (e.g., perennial grains, biomass/biofuels).
(b) Design and promote agricultural conservation practices with multiple benefits including wildlife, water quality, and agricultural production.

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Agroecology Strategy 3: *Promote adoption of conservation friendly farming practices*
Understand and encourage conservation friendly farming practices by understanding and employing social and economic incentives.

(a) Determine landowner and land manager motivations and incentives that influence land management decisions.
(b) Identify social indicators that reveal the capacity to network and provide extension to motivate adoption of practices with multiple benefits.
(c) Design outreach methods that encourage use of conservation practices.
(d) Develop partnerships and communication systems between researchers, conservation organizations, extension services, land managers, policy makers, and others to identify barriers and promote conservation practices.

**FOCAL AREA 4: URBAN WATERSHED MANAGEMENT**

**Landscape Conservation Need**
The 2012 projected census lists 83 percent of the population of the U.S. as living in an urban region. Urban areas lead to increased suburban and exurban development. The regional landscape that encompasses the ETPBR LCC consists of a rural and agricultural matrix containing a mixture of large (e.g., Chicago, St. Louis, Indianapolis, Kansas City), medium (e.g., Columbus, Quad Cities, Cincinnati), and small metropolitan centers (e.g., Springfield IL, Dayton, Independence MO).

Human activities in these centers affect not only environmental quality within the urban regions but also the surrounding rural landscapes. Moreover, waters from these centers contribute to the Big Rivers and, ultimately, the Gulf of Mexico. Impervious surfaces contribute to increased stormwater runoff, leading to erosion and scouring stream beds, flushing that contains high concentrations of urban pollutants (e.g., motor oil from streets, salts, herbicides), and urban flooding. Management practices such as urban stream restoration (including riparian corridors), use of permeable surfaces to enhance surface water infiltration, and promotion of green space are examples of a growing suite of best management practices being applied in urban centers to improve water quality and regulate flows.

Urban conservation concerns more than water quality. Wildlife habitat, air quality, and control of invasive species are also of importance in establishing and maintaining quality urban environments.

**Goal**
Integrate urban land development and wildlife conservation in an interconnected river system in small towns, suburbs, and large cities.

**Objectives**
- Build on re-orientation of cities to their waterfronts to promote local wildlife habitat and outdoor recreation.
• Utilize river systems as the foundation for incorporating functional wildlife corridors in green infrastructure plans.
• Design urban, suburban, and small estate developments to accommodate conservation of prairie and river systems in urban green spaces.
• Enhance viability of small towns in rural areas by attracting tourists and businesses to areas to recreational activities at local prairie and river restoration sites.

Immediate Strategies

Urban Strategy 1: Quantify benefits of urban habitat restoration
Quantify the ecological and economic benefits of restored riverine ecosystems.
• Determine ecological impacts of urban habitat restoration at a watershed level.
• Identify benefits of stormwater management to riparian, floodplain, and off-channel habitats.
• Design habitat for fish and wildlife based on stream classification and channel dynamics.
• Develop sampling techniques to monitor effectiveness of removing pollutants through groundwater infiltration.
• Quantify economic benefits of urban habitat restoration (ecosystem services of undeveloped lands, particularly water quality and flood control).

Urban Strategy 2: Integrate regional conservation design into urban development
Develop and incorporate urban design Best Management Practices (BMPs) to protect and enhance riparian, floodplain, and associated habitats.
• Develop regional green infrastructure networks, including trails in riparian corridors to enhance recreation and wildlife habitat.
• Establish green space plans that restrict development to protect small streams, floodplains, forested riparian corridors, and similar areas to benefit fish and wildlife.
• Enhance and promote urban restoration and conservation of species of special concern (e.g., bats, mussels).
• Develop decision making tools to predict impacts of development pressures and wildlife response in urban watersheds.
• Develop technical support and simulation tools for monitoring, data integration, stream classification, channel dynamics, and operation and management costs of restoration projects.
• Improve applicability of green infrastructure plans that incorporate wildlife habitat and corridors as a base layer in comprehensive metropolitan planning and zoning.

Urban Strategy 3: Engage land use decision-makers in urban conservation actions
Use best available science and social policy to convey to land use decision-makers the significance of urban wildlife.
• Integrate data from multiple sources in a manner accessible to planners and other urban decision makers (e.g., county surveyors, drainage boards, mayors, town councils).
• Provide educational outreach on protection of urban riparian systems.
• Develop partnerships and enhance opportunities for stakeholder input.
• Provide education on protection of urban riverine systems that engages communities in restoration.
Immediate strategies in this Business Plan cross-referenced with strategy numbers in the ETPBR LCC Operations and Strategic Plan:

**Prairie Restoration**
1) Inventory prairie land assets and restoration methods (PRS AS 1-3)
2) Design and integrate prairie conservation plans at the landscape level (PRS AS 4, PRS GS 1-4)
3) Improve prairie restoration and management techniques (PRS DE 1-6, PRS IM 1)

**River Restoration**
1) Inventory river conservation assets and vulnerable ecosystems (RRS AS 1-5)
2) Model physical and social conditions to target river restoration (RRS GS 4)
3) Improve river restoration techniques that minimize stressors and limitations (RRS DE 1-3)
4) Enhance social awareness and capacity for river restoration (RRS IM 1-3)

**Agroecology Conservation Practices**
1) Assess and model impacts of changing land use, management practices and climate shifts (RRS DE 1-3)
2) Quantify the impacts of existing and emerging conservation practices and design effective strategies at multiple scales (AES AS 3-6)
3) Encourage conservation friendly farming practices (AES DE 1-4)

**Urban Watershed Management**
1) Quantify benefits of urban habitat restoration (UWS AS 2-3)
2) Integrate regional conservation design into urban development (UWS IM 2-4)
3) Engage land use decision-makers in urban conservation actions (UWS IM 2-4)