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Conserving the Big River Vistas of America's Heartland

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.

Goal

Determine where and how to focus big river ecosystem restoration for biodiversity conservation, by 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:

1. Restore long stretches of free-flowing and interconnected big river ecosystems through large-scale restoration processes.
2. Protect, connect, and expand existing intact free-flowing mainstem channels and interconnected segments of large rivers and headwaters.
3. Enhance connectivity between upland and lowland terrestrial habitats along big river corridors.
4. 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, programs, and initiatives (*relates to RRS AS 1-5 in Strategic Plan*).

- (a) Create a clearinghouse of existing river restoration goals, assessment models, restoration, and enhancement projects and programs.
- (b) Inventory data gaps.
- (c) Conduct vulnerability assessments for stream ecosystems and identify common issues facing all river basins.
- (d) Identify river restoration sites of highest priority.

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 (*relates to RRS GS 4 in Strategic Plan*).

- (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.
- (e) Determine the ecological value of river restoration to species and their habitats.



River Strategy 3: Improve river restoration techniques that minimize stressors and limitations.

Minimize uncertainties created by environmental stressors and limitations through restoration techniques (*relates to RRS DE 1-3 in Strategic Plan*).

- (a) Increase lateral connectivity and optimize floodplain functions:
- (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.

Educate property managers on the benefits of river restoration, including extremes of drought and flooding due to climate shifts (*relates to RRS IM 2 in Strategic Plan*).

- (a) Conduct outreach programs among 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.
- (c) Establish collaborations with active and viable stakeholders.

Proposed FY16 Projects for Error! Reference source not found.

Floodplain Connectivity Landscape Design & Outreach Campaign – Development of a floodplain connectivity approach for the mainstems of the Mississippi, Missouri, Wabash, Illinois and Ohio Rivers, based on the hydrogeomorphic assessments recently completed through coordination by National Wildlife Refuge System staff. This effort would be extremely timely, considering extensive and prolonged flooding over the past year, creating an unprecedented opportunity to conserve natural resources and ecosystem services along these big rivers. Synthesize existing conservation planning and design research to formulate a prototype floodplain connectivity approach. **\$280,000**

Below are additional ideas for future projects resulting from two major events co-hosted by the ETPBR LCC partners to convene scientists and managers in the conservation community. For the next couple of years, the LCC will endorse the strategies proposed by participants of these two workshops, working with partners and stakeholders to increase and optimize lateral connectivity.

Floodplain Functions – On July 29-31, 2014, the ETPBR LCC and its partners (The Illinois Natural History Survey, University of Iowa, United States Geologic Survey) conducted a workshop titled *Conceptual Modeling Workshop on Optimizing Management for Multiple Floodplain Functions: Exploring the complexities of managing floodplains to achieve multiple objectives*. This workshop involved 20 participants representing federal and state agencies, academia, and non-governmental organizations. These participants conceptualized ways for identifying hydrological and ecological relationships that would impact the optimization of approaches for providing critical ecosystem services, such as fish habitat, wildlife habitat, nutrient and sediment processing, and flood regulation.

- Developing a blueprint for managing floodplains across different functions and scales
- Developing a management plan for submerged aquatic vegetation
- Conducting demonstration projects
- Using Bayesian networks for developing modeling techniques that:
 - integrate varied stakeholder perspectives
 - evaluate trade-offs



- are based on a review of prior conceptual models
- test main drivers and expected outcomes
- consider spatial variability and identify similarities and differences in place and species
- consider multiple floodplain objectives
- use structured decision making
- Examining the use of models and resources:
 - Prioritize restoration sites for mapping
 - Identify efficient mapping methods and resources needed for mapping
 - Develop natural floodplain resource maps that:
 - contain risks, benefits, and hotspots layers
 - provide information about the relationship of management area with the broader context in a river basin
 - communicate clearly to decision makers
- Developing a workshop for identifying:
 - varied modelling methods
 - objective methods for quantifying floodplain functions
 - methods for measuring management and policy impacts
 - funding sources for conducting floodplain connectivity projects

Floodplain Forest Management – On September 15-17, 2015, the ETPBR LCC and its 30 partners representing 30 federal and state agencies, and non-governmental organizations conducted a workshop titled *Upper Mississippi Floodplain Forest Workshop: Convening scientists and managers to explore the status of current knowledge and science needs*. This workshop aimed to identify research and monitoring priorities and challenges for implementing forest management prescriptions.

- Promoting research on:
 - *Nutrient cycling, sediment transport, and invasive species*—understand the relationship between the dynamics of invasive species and nitrogen saturation in sediments
 - *Flood duration*—conduct collaborative research projects involving several agencies to look at the relationship between species, flood duration, and inundation
- Collecting silvicultural data
- Developing a standard method for terrestrial long-term resource monitoring
- Developing common site classification and a *floodplain features classification* through consistent mapping for all floodplain communities.
- Standardizing the organization and use of prescription and floodplain forest data to properly inform management decisions
- Involving private drainage and levee districts in floodplain forest management

ETPBR LCC Rivier Restoration Outcomes & Performance Metrics

Performance metrics reflect the outcome-based approach that LCCs are taking to produce landscapes capable of sustaining natural and cultural resources. Examples of possible landscape-scale performance metrics for the ETPBR LCC are based on the current objectives for each Focal Area, informed by the US FWS Region 3 Surrogate Species created for the ETPBR LCC and associated research (**Error! Reference source not found.**). These metrics will continue to be refined with input from Technical Advisory Groups.



Potential opportunities for collaboration with existing or emerging monitoring networks include:

- Rivers – Great Rivers Ecological Observatory Network
http://www.ngrrec.org/News-Stories/WaltonGrant3_14/

Table 1: Examples of prairie resources with measurable goals, objectives and performance metrics.

Focal Area	Performance Metrics	Measurable Objectives
River Reconstruction	Greater Redhorse (increase distribution and connectivity). Support a proportion of the continental population for spring and fall migration for: Green-winged Teal (12.5%); Mallards (22%)	Restore long stretches of free-flowing and interconnected big river ecosystems through large-scale restoration processes.
River Protection	Pallid sturgeon (self-sustaining, genetically diverse population of 10,000 wild adults); Shovelnose sturgeon (680,000 adults with regular recruitment, increase size and age structures, decreased mortality)	Protect, connect, and expand existing intact free-flowing mainstem channels and interconnected segments of large rivers and headwaters.
River Connectivity	Paddlefish (maintain annual 30-40% spawning potential of unfished population). Pugnose minnow (increase distribution and connectivity)	Enhance connectivity between upland and lowland terrestrial habitats along big river corridors.
River Appreciation	TBD	Promote appreciation among water users for functional riverine ecosystems.