United States
Department of
Agriculture

Forest Service

Northeastern Area
State and Private Forestry
Newtown Square, PA

NA-TP-04-07

October 2007

Identification of Priority Forests in the Upper Mississippi River System: *A Summary*

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NA-TP-04-07
October 2007
www.na.fs.fed.us

The complete report, Identification of Priority Forests in the Upper Mississippi River System, was prepared by the following individuals for the Upper Mississippi Forest Partnership, and was published by the U.S. Department of Interior, U.S. Geological Survey, in November 2006:

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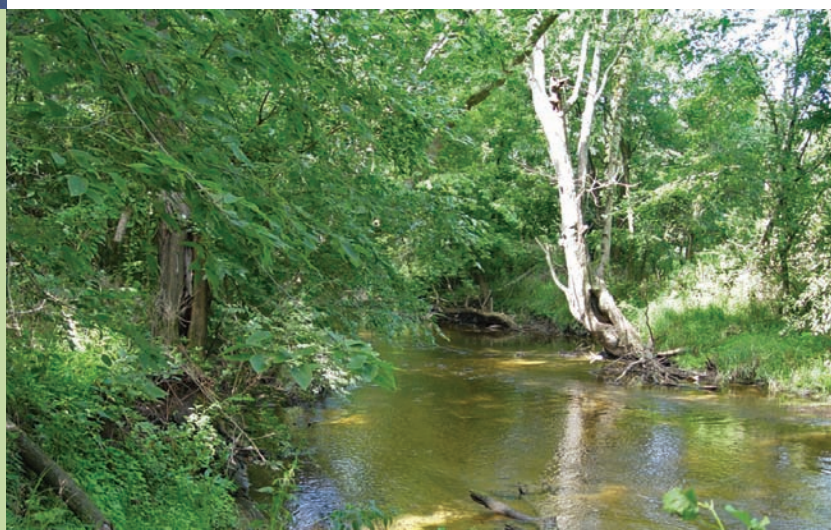
"It is strange how little has been written about the Upper Mississippi. The river below St. Louis has been described time and again, and it is the least interesting part. One can sit on the pilot-house for a few hours and watch the low shores, the ungainly trees and the democratic buzzards, and then one might as well go to bed.

One has seen everything there is to see. Along the Upper Mississippi every hour brings something new. There are crowds of odd islands, bluffs, prairies, hills, woods and villages—everything one could desire to amuse the children."

Mark Twain



Identification of Priority Forests in the Upper Mississippi River System: *A Summary*

Introduction

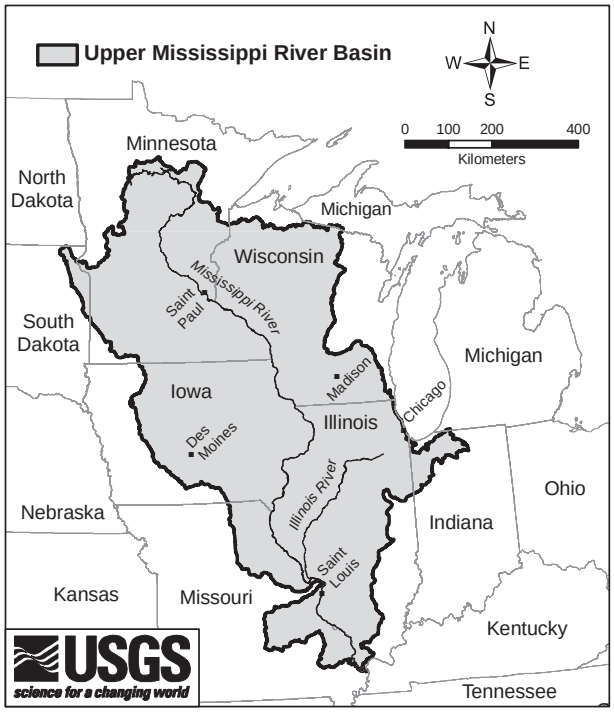
The goal of the Upper Mississippi Forest Partnership is to improve water quality and migratory bird habitat by restoring and enhancing forests in the six-state watershed. This document summarizes the results of a GIS analysis that identified forests where allocation of resources would make the most difference. Also included in this document are case studies that represent priority areas in the six states of interest and involve the issues analyzed. Other land management entities can also use the resulting maps to plan and prioritize their work.

Upper Mississippi River Watershed

The Upper Mississippi River Basin, a major subwatershed of the Mississippi, drains approximately 189,000 square miles in six midwest states. Changing land use and expanding navigational use have transformed the river and its watershed. Conversion of prairies and forest to agriculture has altered the hydrology and increased the runoff of nutrients and sediment. This runoff degrades local rivers and contributes to hypoxia in the Gulf of Mexico.

State and Federal Partnership

To improve water quality and migratory bird habitat in the Upper Mississippi River watershed, State and Federal agencies (the six midwest State Foresters, and the Northeastern Area State and Private Forestry, Forest Service, U.S. Department of Agriculture), formed the Upper Mississippi Forest Partnership. Its focus is restoring riparian forests and improving the condition of forests throughout the watershed.



Key Issues

The Upper Mississippi Forest Partnership is concerned with a number of issues that affect water quality and wildlife habitat:

- Each year, sediment and nutrients are washed off the landscape, into tributaries, and ultimately into the Mississippi River, reducing farm income, increasing channel maintenance costs, threatening drinking water, and filling side channels used by river wildlife.
- Dredging river sediment costs more than $100 million annually.
- The Upper Mississippi River watershed comprises 15% of the entire Mississippi watershed but contributes more than 30% of the nitrogen that causes the hypoxic zone in the Gulf of Mexico.
- Aquatic organisms and fish are harmed by environmental contaminants attached to soil particles and deposited in river pools.
- Forests and wetlands, once important migratory bird habitat, continue to be lost or fragmented by urban population growth, and many remaining forests are unhealthy.

GIS Analysis

To guide its actions the Upper Mississippi Forest Partnership conducted a Geographic Information System (GIS) study in cooperation with the U.S. Geological Survey's (USGS) Upper Midwest Environmental Sciences Center. The resulting report on priority forests, published in November 2006, indicates the forests where allocation of resources could yield the greatest benefit.

Issues Studied

The GIS analysis addressed the following questions related to four issues:

1. **Bottomland forests and afforestation**
   - Where do they exist today?
   - Which sites are of highest priority for reestablishment?
2. **Riparian forest buffers**
   - Which watersheds have a high percentage of agricultural land within 300 feet of water?

- How much of that buffer zone is still in agriculture, and how much is forested?

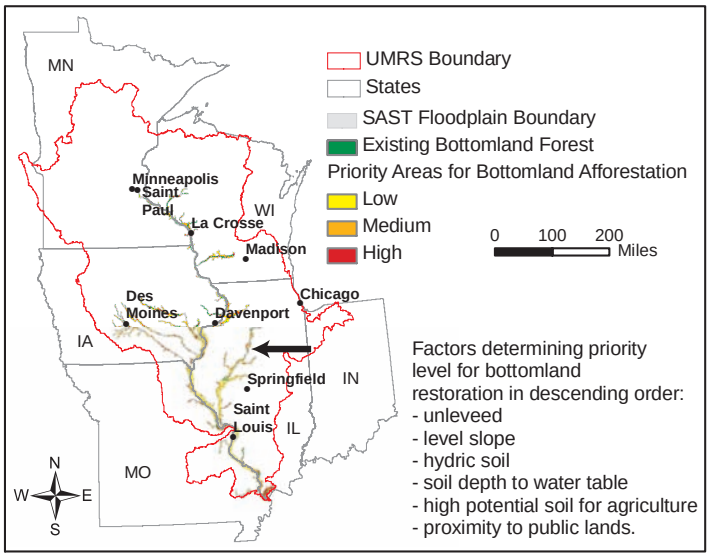
3. **Migratory bird habitat**

- Which forested areas are important for bottomland, upland, shrubland, and grassland birds?

4. **Priority forests for conservation**

- Which forest areas threatened by development are important for several reasons, including slope or soil factors that could contribute to erosion, proximity to public water supply, proximity to existing large tracts of public forestland, or their location in areas where water quality issues are significant.

To address these questions, the land attributes listed below were considered for each of the four major issues.



Bottomland Forests and Afforestation

The analysis prioritized areas within the Upper Mississippi River floodplain based upon their location and capability to regenerate bottomland forest. The existing floodplain is 21% forested. Any forested land cover type (deciduous, coniferous, mixed, woody wetland) within the floodplain was classified as bottomland forest. Six factors determined priority: unleveed, slope, hydric soil, depth to water table, agricultural soil, and proximity to public lands. Of the 2.3 million acres of flood plain identified as having reforestation potential, 24% was high priority, 35% medium priority, and 41% low priority.

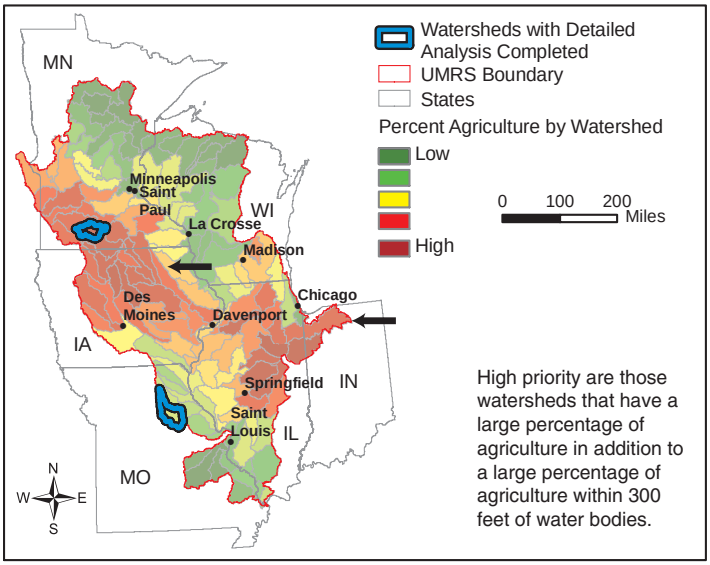
Case Study: Wightman Lake, Illinois
Key Partner: Ducks Unlimited

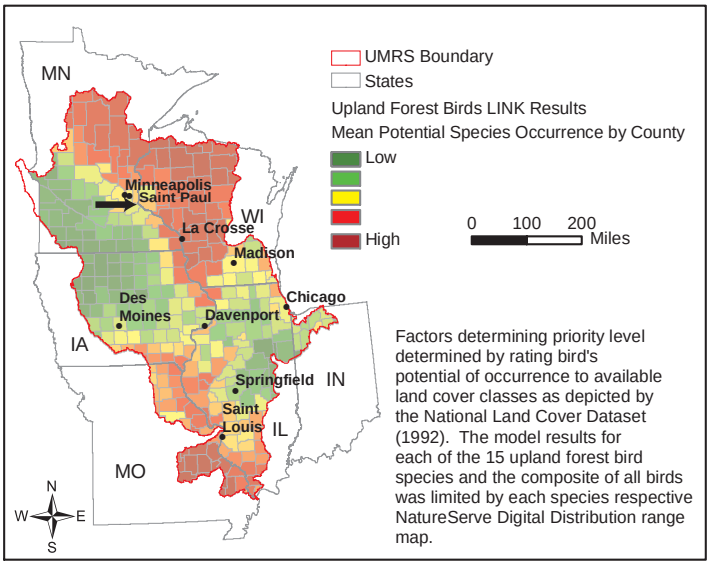
Ducks Unlimited is restoring 110 acres of wetlands and bottomland forests at Wightman Lake, a backwater lake of the Illinois River. A survey found that 81 bird species use the diverse habitat—some only during migration and some for breeding. An inventory of 71 acres of bottomland forest found that it lacked tree species diversity (85% silver maple) and age diversity, and was overstocked (145 ft^2/acre basal area.) A total of 178 trees were harvested to open up the stand and encourage tree regeneration. An additional 12 acres were planted to bottomland hardwoods.

Riparian Forest Buffers

The GIS analysis of riparian corridors consisted of two steps. The first identified high-priority watersheds as those with a high percentage of agricultural land and with agriculture within 300 feet of water bodies.

Land Attributes	Data Source
Forested wetlands	U.S. Fish and Wildlife Service, National Wetlands Inventory, 1980's (except Wisconsin State Data)
Land cover	U.S. Geological Survey (USGS), National Land Cover Database, 1992
Slope	USGS, Digital Elevation Model, dates vary
Public lands	Conservation Biology Institute, Protected Areas Database, dates vary
Housing density	Colorado State University, Theobald, 2005
Public water supply	State GIS Offices, Universities, U.S. Environmental Protection Agency (EPA), 2005
Soils	Natural Resource Conservation Service, Soils Inventory data, STATSGO 1998, and SSURGO dates vary
Nitrogen yield	USGS, SPARROW model, 1997
Flood plain boundary	Interagency Science Assessment and Strategy Team, 1994
Hydrography	EPA/USGS National Hydrography Data set (NHD), 1992
Natural heritage Inventory	State GIS Offices





In the second step, two of the high-priority watersheds were selected for more detailed analysis using SSURGO soils data on soil erosion. This data, combined with land cover data, identified areas where buffers would stop soil and soil nutrients from reaching a water body. Conversely, the data also indicated areas such as forest, close to water, that should remain permanently vegetated.

Case Study: Yellow River Workshops, Indiana
Key Partner: Arrow Head Country RC&D

The Yellow River drains into the Kankakee River, making up the eastern-most drainages of the Upper Mississippi River system and contributing high amounts of nitrogen. Trees along water bodies create a buffer that filters out nutrients before they reach the water. The Arrow Head Country Resource Conservation and Development Area (RC&D) hosted field days and tree planting workshops for landowners along the Yellow River. The events emphasized the value of forest habitat, especially along water systems, both as a buffer and as migratory bird habitat.

Case Study: Targeted CRP bottomland plantings, Iowa
Key Partner: Iowa Department of Natural Resources

Trees never dominated Iowa's landscape, but they were common along streams and rivers. Most of these riparian forests have been eliminated. Landowners with cropland adjacent to streams in northeastern Iowa will be offered incentives to enroll their riparian land in the Conservation Reserve Program (CRP), which reduces soil erosion, and to reestablish bottomland forests.

Migratory Bird Habitat

LINK is an ArcGIS tool designed to map species-habitat patterns across a landscape. LINK uses species-habitat matrices to model potential species habitat and habitat diversity. Because the Upper Mississippi watershed is diverse, the LINK GIS tool was used to analyze four different groups of birds: bottomland, upland, grassland, and shrubland species.

The LINK information will be important to forest managers and private forest landowners in assessing the potential of forested and transitional areas to provide migratory bird habitat. The large-scale analysis points out areas important for habitat connectivity. The potential species richness data points out areas where restoration has a better chance of providing habitat for a variety of species.

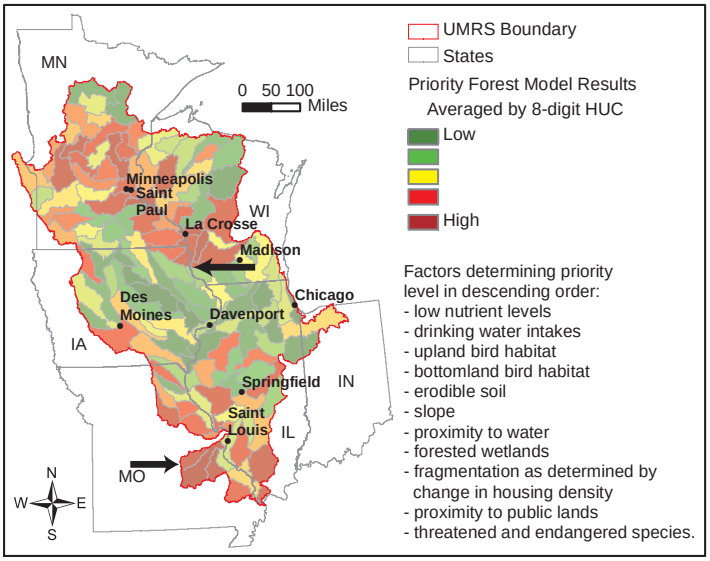
Case Study: Tanglewood Nature Preserve, Minnesota
Key Partner: Minnesota Department of Natural Resources

Tanglewood is a 10-acre nature preserve adjacent to the St. Croix River. A total of 400 locally grown tree seedlings were planted in a 3-acre former hay field. The intent of this project is to "close the gap" in the tree canopy, making Tanglewood more appealing to bird species that prefer larger blocks of unbroken forest. The National Park Service conducted a bird survey on the site and found 29 species, including 4 species of interest. (Species of interest are those species for which management actions may be necessary to achieve ecological or other multiple-use objectives. They may be species for which there are local concerns resulting from declines in habitat, population, and/or distribution, species that are of high public interest, or species such as invasives for which control measures may be desirable.)

Priority Forests for Conservation

Forest conservation consists of long-term sustainable forest stewardship resulting in clean water and migratory bird habitat. The analysis examined bird habitat and runoff nutrient data along with information about drinking water intakes and trends in forest fragmentation.

The results identify forests where action should be given priority. This information will be valuable to forest planners and policy makers, as they make decisions about the future of the Upper Mississippi watershed's forests.



The Northeastern Area can use this data in focusing program activities including Forest Stewardship, Forest Legacy, and Urban Watershed Forestry. Other land management entities can also use the analysis results to plan and prioritize their work.

Case Study: Driftless Area, Wisconsin

Key Partner: Stewardship Forester, Southwest Badger RC&D

Landowners with forest management plans are more likely to keep their forest and not convert it to other land uses. The forested Driftless Area of southwestern Wisconsin is unique—a landscape of sink holes, bluffs, steep hills, and spring-fed streams. Over 2 years the RC&D stewardship forester worked with more than 30 landowners to develop management plans for 2,233 acres of forest. Of this forestland, 85% was actively worked on in some way (trees thinned, harvested, or planted; or invasive species controlled).

Case Study: River Hills Restoration Project, Missouri

Key Partner: Missouri Heritage Conservation Foundation

The River Hills area is known for its diverse habitats important to sensitive wildlife species. Historically fire periodically moved through this landscape. With fire suppression the forests have become overcrowded, and the trees have shifted from types that do well in full sun to types that fair better in shade. Glades have changed from grass to cedar thickets. About 800 acres of privately owned forests will be thinned, and trees will be removed. Land adjacent to public land or already treated private land will be given priority.

Applying the GIS Analysis

Four working groups that the Upper Mississippi Forest Partnership assigned to the issues (bottomland forests, riparian buffers, migratory bird habitat, and priority forest conservation) will continue to use the analysis results. For example, along with results of the 2006 stakeholders meeting discussions, they will use the analysis results to prioritize ongoing efforts of the partnership.

The data will be used by the National Fish and Wildlife Foundation to prioritize projects funded through the Upper Mississippi Watershed Fund.

Discussion with partners continues as to where the Upper Mississippi Forest Partnership can add value to local projects. The GIS data will enhance these discussions.

Other land management entities can use the resulting maps to plan and prioritize their work.

www.na.fs.fed.us/watershed/upper_mississippi_partnership

For more information about the Upper Mississippi River:

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