

Establishing the Scientific Basis for Ecosystem Management On the Upper Mississippi River



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The Upper Mississippi River: A Great but Altered Ecosystem

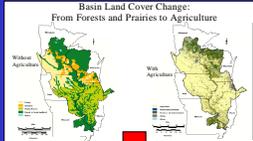


Ecological Values:

- A "nationally significant" floodplain river ecosystem - 866 miles (2,165,000 acres) of channels, backwaters, marshes and forests
- Over 485 species of fish, mussels, birds and mammals
- Abundance driven by one of the most fertile basins in the world
- 40% of North America's migratory waterfowl
- Annual recreational value of \$200 million
- Annual tourism value of \$6.6 billion
- Annual harvest of fish, mussels and furbearers of \$3.9 million



Alterations That Have Impacted the Basin and River



Floodplain development: levees have isolated the floodplain from the channel

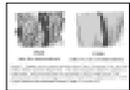
A Few of Many Ecological Consequences

Physical -

Elimination of long-term fluvial dynamics



Sedimentation and habitat degradation



Loss of floodplain connectivity

Reach	% Developed Floodplain
Upper Impounded	71
Lower Impounded	53
Open River	82

Biological -

Reduced forest species and age diversity

Reduced mussel diversity



Altered fish community composition

DECISIONS, DECISIONS -

Over the next few years, representatives of three federal agencies, and numerous agencies from five states, all with varying responsibilities and authorities, will be attempting to resolve a host of problems affecting the river's ecological, cultural and economic values. Major questions include:

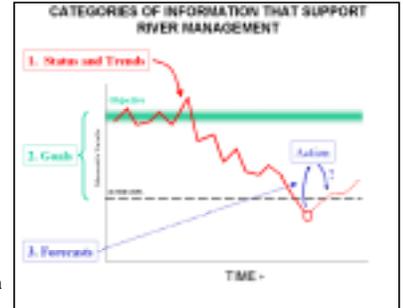
- Should the infrastructure of the **commercial navigation** system be modernized, at a cost of over \$1 billion, to allow expanded traffic capacity?
- What kinds of **habitat rehabilitation** are most needed? Where should projects be sited to best benefit the entire floodplain river ecosystem?
- Should **flood protection** levees be raised to avoid repetitions of the damage incurred during 1993?
- What **management boundaries** within the floodplain river ecosystem are **relevant** to a collaborative and adaptive **ecosystem management** approach?
- How can the ecosystem be protected from **exotic species** like bighead carp, purple loosestrife, and zebra mussels?



- What are **publicly understandable** and **acceptable ecological goals** for the system, and what variables can be used to measure management progress toward them?

How Science Contributes:

River managers and the river community require information at multiple stages of decision making and in a variety of forms. Fish and wildlife managers annually need to scientifically track the **status and trends** of a variety of important ecological variables. The public needs ecological knowledge to establish community **goals**, and comparable interpretations of technical data. Problem conditions demand action, and reliable **forecasts** of likely ecosystem response. Science needs to provide each piece information at the right time and to the right audience.

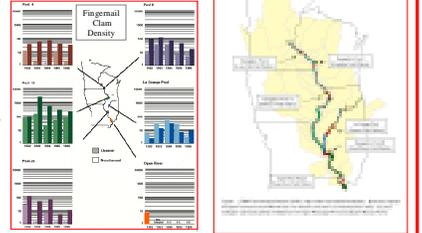


Science Progress:

Status and Trends:

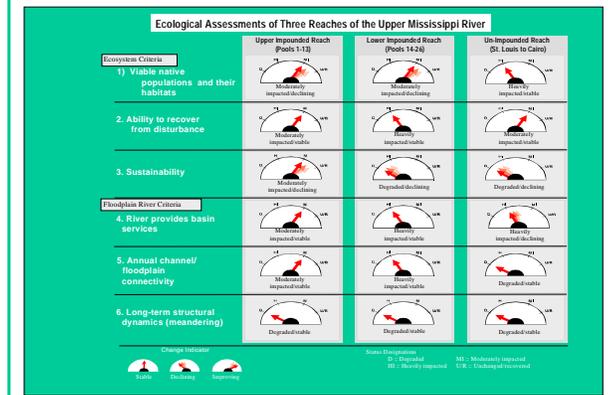
The Long Term Resource Monitoring Program supports observations from 6 Trend Analysis Reaches on:

- water quality and quantity
- sediment
- fish
- vegetation
- macroinvertebrates
- floodplain habitat
- land cover and use



Goals:

A Proposed Set Of Criteria For Measuring River Ecological Health



Forecasts:

- Conditions that define over-wintering fish habitat and its spatial extent
- Flood levels that kill common floodplain tree species
- A chemical/physical habitat envelope suitable for mayflies and fingernail clams
- Aerial changes in floodplain habitat likely to occur over the next 50 years