

# Being well connected: the work of floodplains



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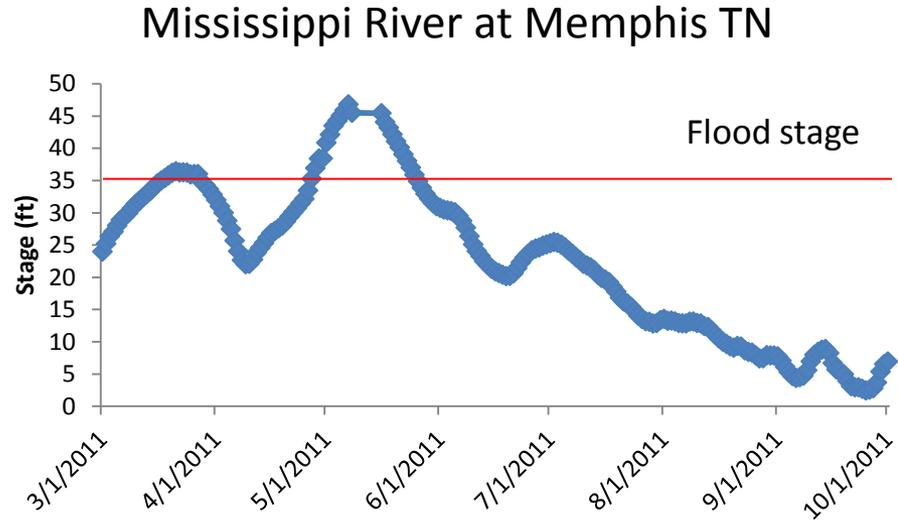
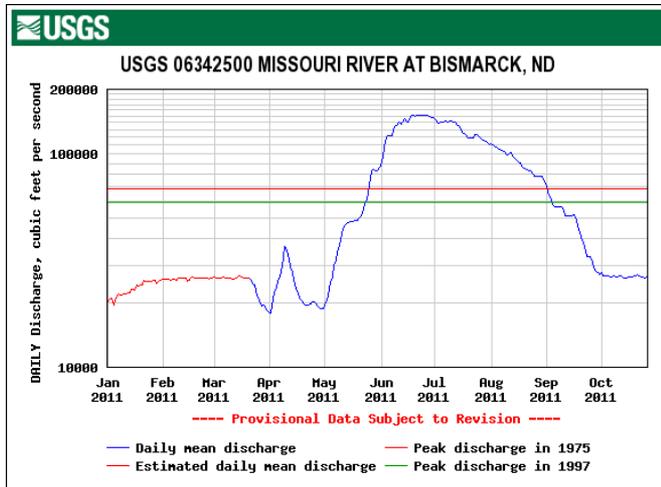
Support from:



Floodwaters from the Mississippi River on May 3 swamp the area north of New Madrid, Mo. (Jeff Roberson/AP)

# Context

Data source: USACE



North Dakota up to \$1 billion- Bismark Tribune

Mississippi River- “several billion” useconomy.about.com

The preliminary indication from the USDA’s Risk Management Agency puts agricultural damage in four states... at 284,000 acres. Agweek.com

In addition to evacuations, petroleum processing and coal transportation disruptions, multiple federal disaster area declarations, etc.

“People living and working along the Missouri River cannot withstand another disaster of this proportion.” MCGA President Billy Thiel, a corn grower from Malta Bend, Mo

# Points

- Rivers are working ecosystems, but much of the 'natural' work is undervalued
  - And much of this natural work is done by floodplains
- Aging of riverine infrastructure provides an opportunity to take advantage of this natural work for flood management
  - Additional flexibility beyond structural flood control

# The work of rivers

Industry , transportation, recreation



<http://library.byways.org/>



# The work of rivers

## River functions

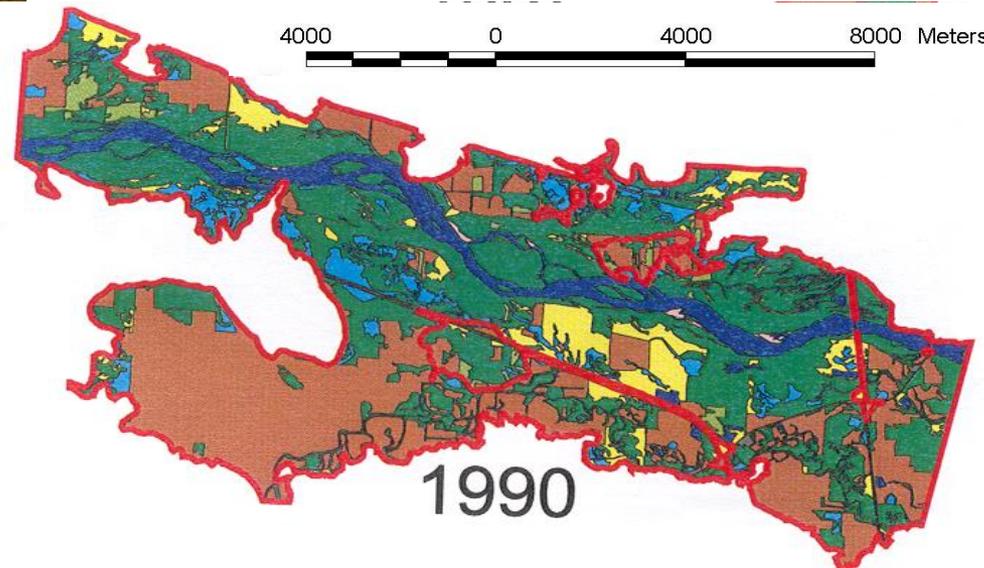
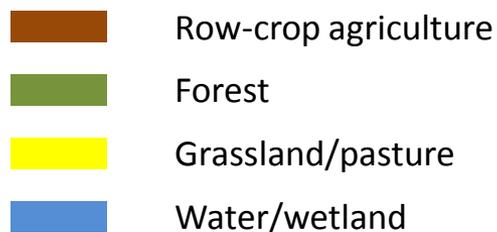
Rivers of water and rivers of sediment...



Moving through often-complex,  
inter-connected landscapes and waterscapes

4000 0 4000 8000 Meters

100-year floodplain, Wisconsin River



# The work of rivers

Is often done in floodplains

- Flood attenuation
- Water quality improvement
- Fish production
- Recreation
- Aquaculture/agriculture
- Groundwater recharge
- Biodiversity maintenance

Reared in the  
main river channel

Reared in  
the floodplain

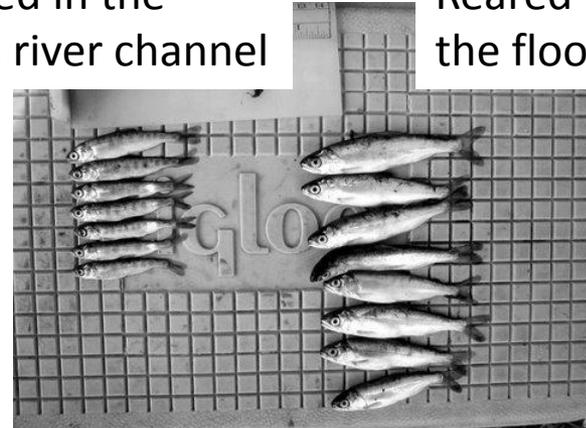
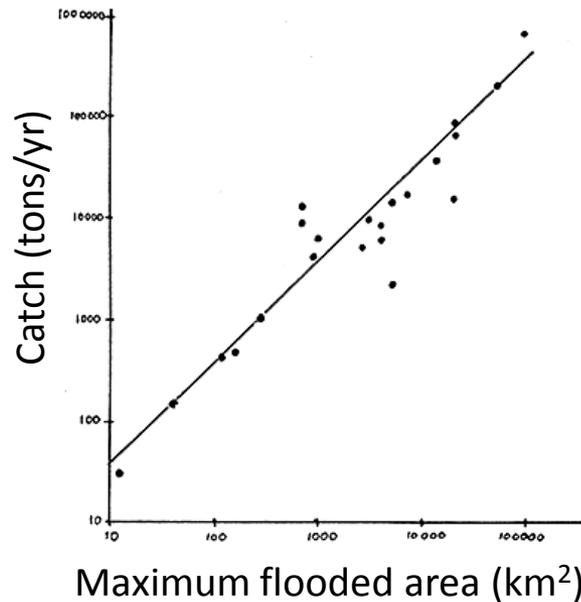


Photo- Jeff Opperman

# The work of rivers

Is often done in floodplains



Welcomme (1985)

Reared in the  
main river channel

Reared in  
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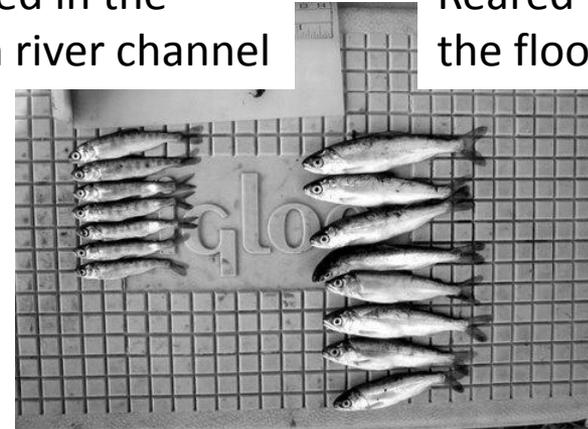


Photo- Jeff Opperman

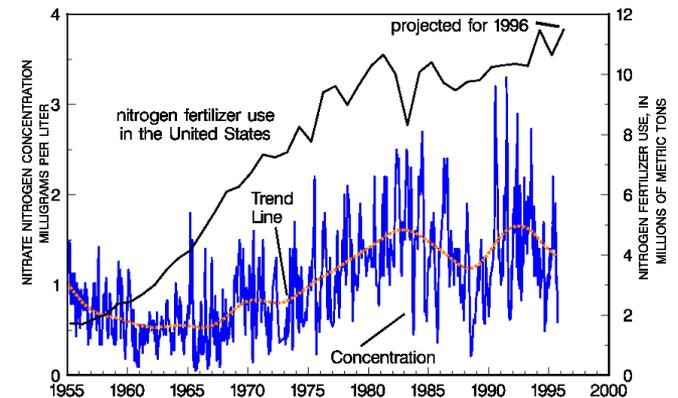
Floodplains are the most productive part of a river

# The work of rivers

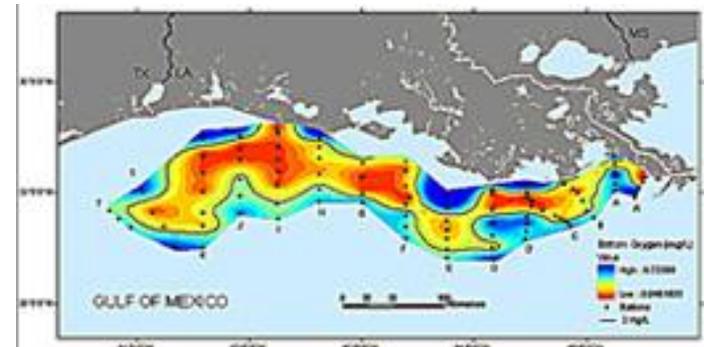
Is often done in floodplains

- Flood attenuation
- Water quality improvement
- Fish production
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- Agriculture
- Groundwater recharge
- Biodiversity maintenance

Figure 2. Estimated nitrogen fertilizer use in the United States, and nitrate concentrations in the Mississippi River at St Francisville, LA., 1955–95



Goolsby et al. USGS

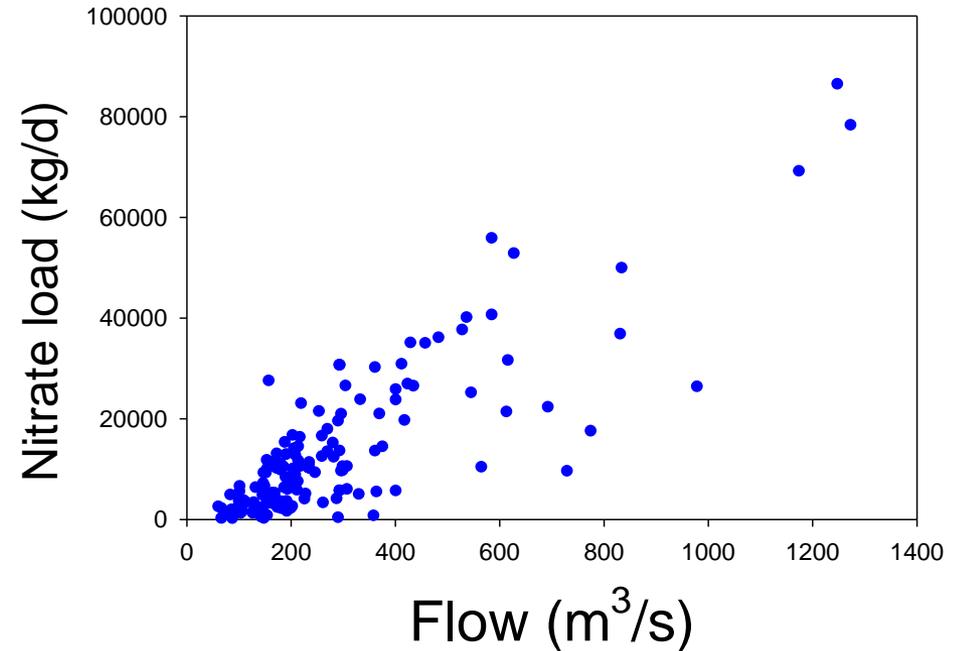


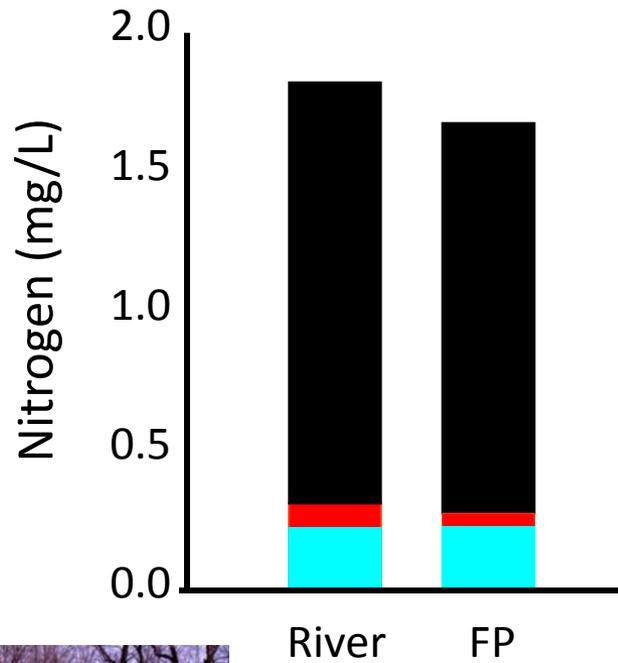
Bottom-water dissolved oxygen concentrations for July 21-28, 2007 (A. Sapp, LUMCON).

# The work of rivers

## Nitrogen removal on floodplains

- Flooding = period of greatest nutrient transport





14 April

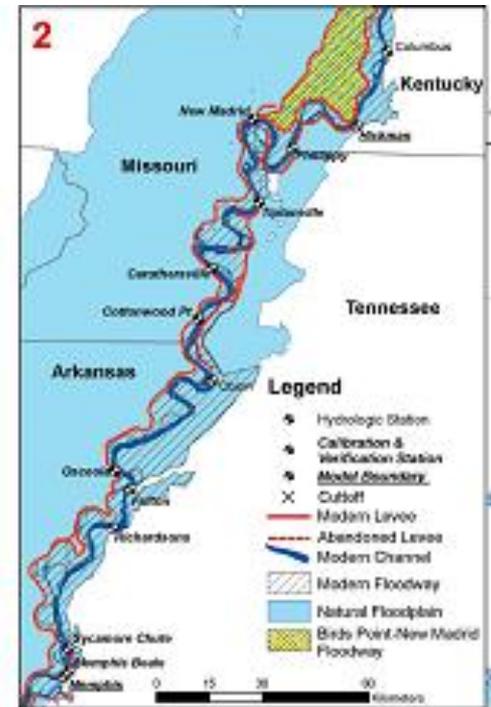


*Flood attenuation as the primary work of floodplains*

# The work of rivers

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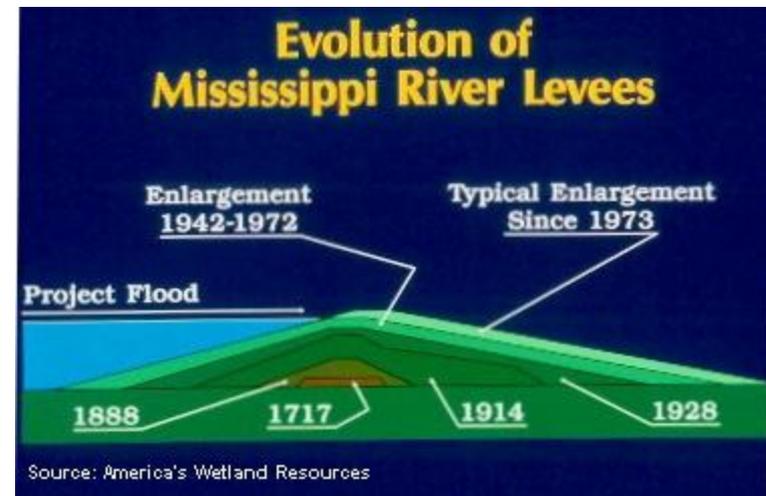
Remo et al. (2009)

# Infrastructure and ecosystem restoration

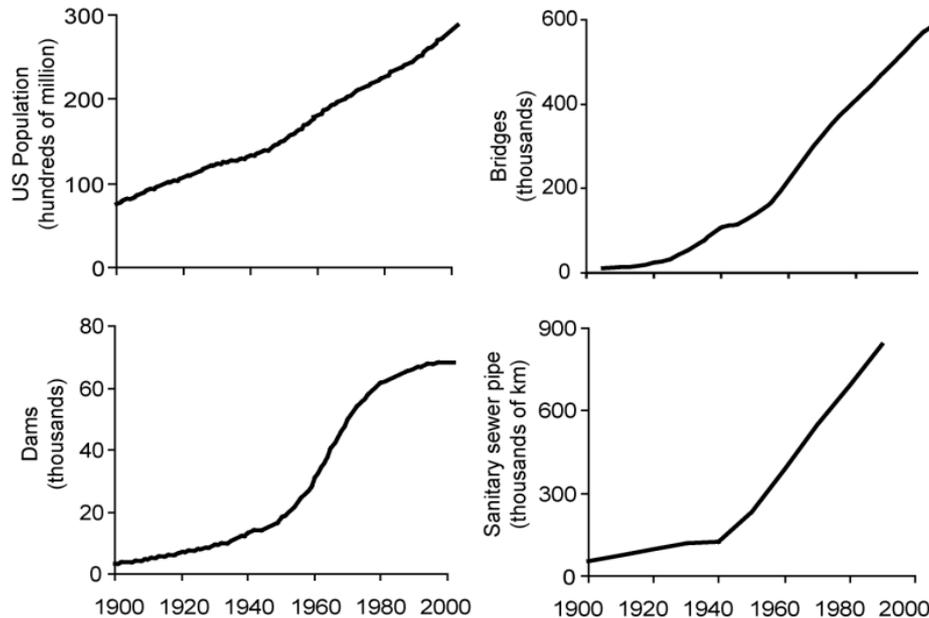
The U.S. Army Corps of Engineers is estimating \$750 million to \$1.3 billion in damage to flood control structures alone for the Missouri River

(+ annual operation/maintenance of \$130 million)

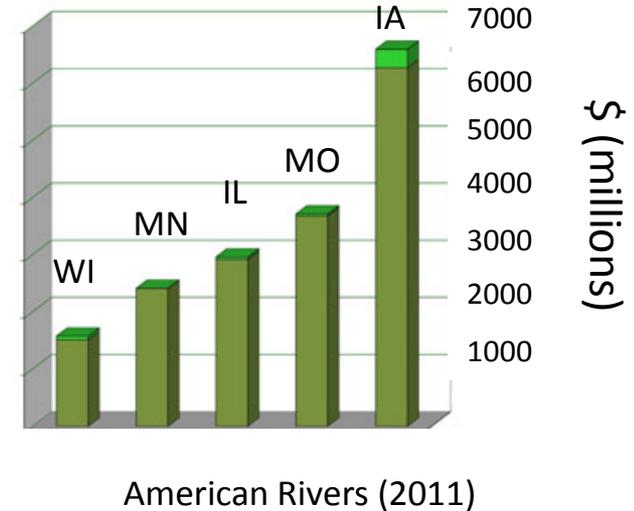
*Levee ages?*



# Infrastructure and ecosystem restoration



UMR Floodplain easement expenses vs. agricultural flood losses, 1993-2003



“ This provocative intersection of aging infrastructure and environmental degradation provides unprecedented and largely unappreciated opportunities for ecosystem restoration.” M. Doyle et al. 2008

# Floodplain restoration to add additional flood management flexibility



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