The Floodplain Explorer

An Online GIS Tool for Guiding Floodplain Protection & Restoration in the Mississippi River Basin

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FATHOM

University of BRISTOL

The University of Iowa

The Nature Conservancy

Floodplain Prioritization Essentials

- Precision about ***where*** to work
- Transparency about ***why*** to work there
- Clarity about ***how*** to work there

- Key features:
  - Comprehensive ***floodplain data***
  - Dynamic footprint of sites based on ***multiple criteria***
  - Multiple spatial ***scales***: basin-wide, regional, local
  - Framework for building ***locally relevant spinoffs***

A Comprehensive U.S. Flood Model

- Based on high-precision terrain model
- Models flows based on thousands of USGS gaging stations + NOAA rainfall data
- Multiple return periods (1-in-5-year, -100-yr., -500-yr.)
- Explicit representation of Army Corps National Levee Database
- High validation rate against FEMA and USGS data
- No gaps!

Freshwater Network - Mississippi River Basin Floodplain Tool

The Floodplains Prioritization Tool (FP Tool) is designed to identify critical opportunities for floodplain protection and restoration in the Mississippi River Basin. Use the selector widgets below to specify criteria related to water quality, wildlife habitat, and human exposure to flood risk. The map on the right will change in response to your selections to identify sites meeting these criteria and identify those geographies where floodplain restoration or conservation is likely to have the greatest positive impact on the health of this river system.

Identify Floodplain Units

Select Flood Frequency

- 1-in-5-year
- 1-in-100-year
- 1-in-500-year

View Floodplains By Watershed

Zoom in to Activate

- HUC-8
- HUC-12
- Catchment

Select Management Action

- Protection
- Restoration

Filter Floodplain Units

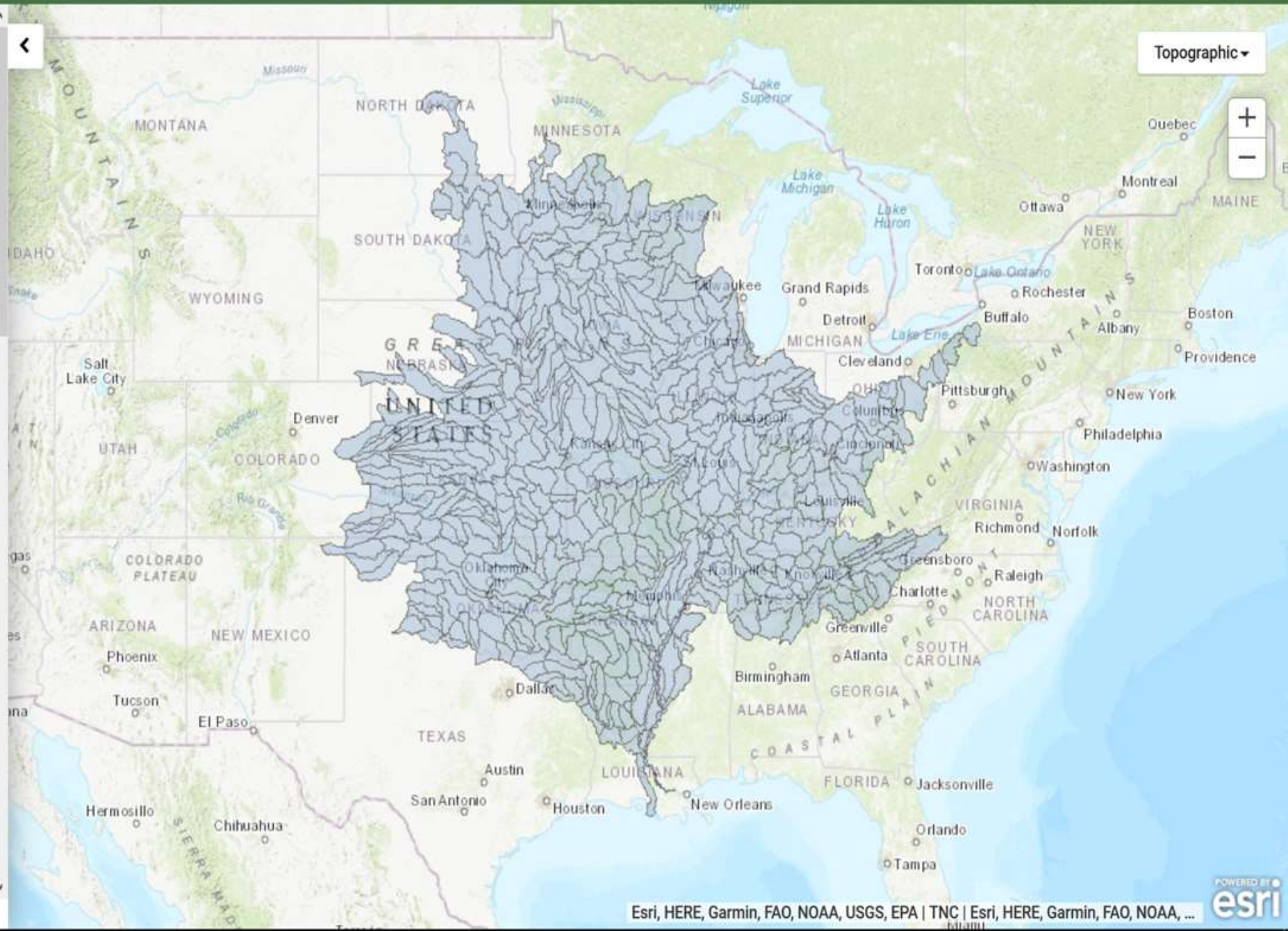
Available Floodplain Area

Available floodplain area for given flood frequency and management action

0 to > 50,000 acres

Nutrients

Local Nutrient Loading



How much floodplain is available for:

Protection – In *forest*, *wetland*, or *grassland*

Restoration – In *ag* or *pasture*

Mississippi River Basin Floodplain Explorer

Identify Floodplain Units

Select Flood Frequency

1-in-5-year | 1-in-100-year | 1-in-500-year

View Floodplains By Watershed

HUC-8 | HUC-12 | Catchment

Select Management Action

Protection | Restoration

Available Floodplain Area

☑ Area of floodplain in agriculture or pasture land — 500 to 2,500 acres

Nutrients

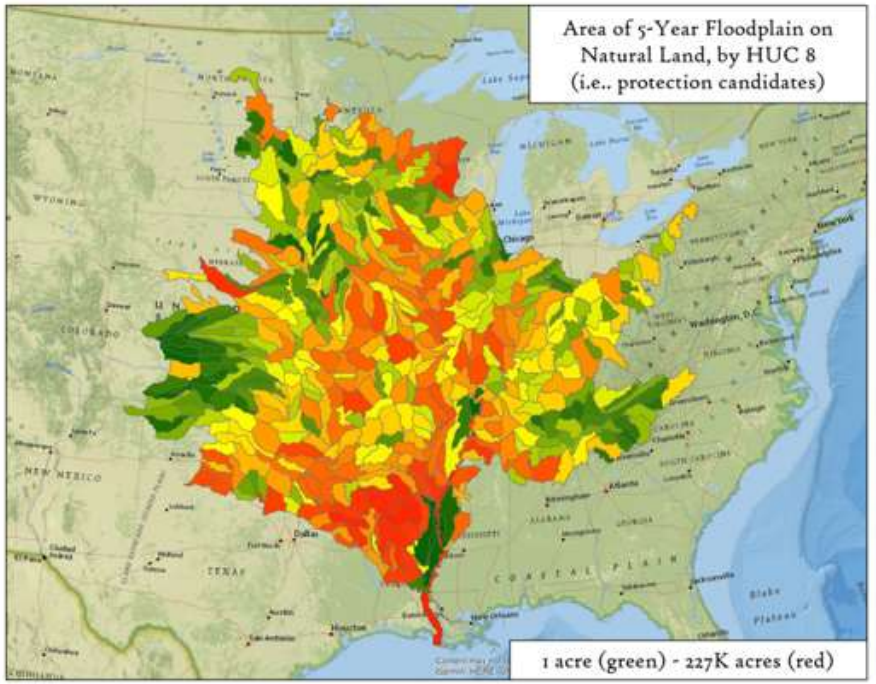
☑ Local nutrient impact — 50 to 100 %

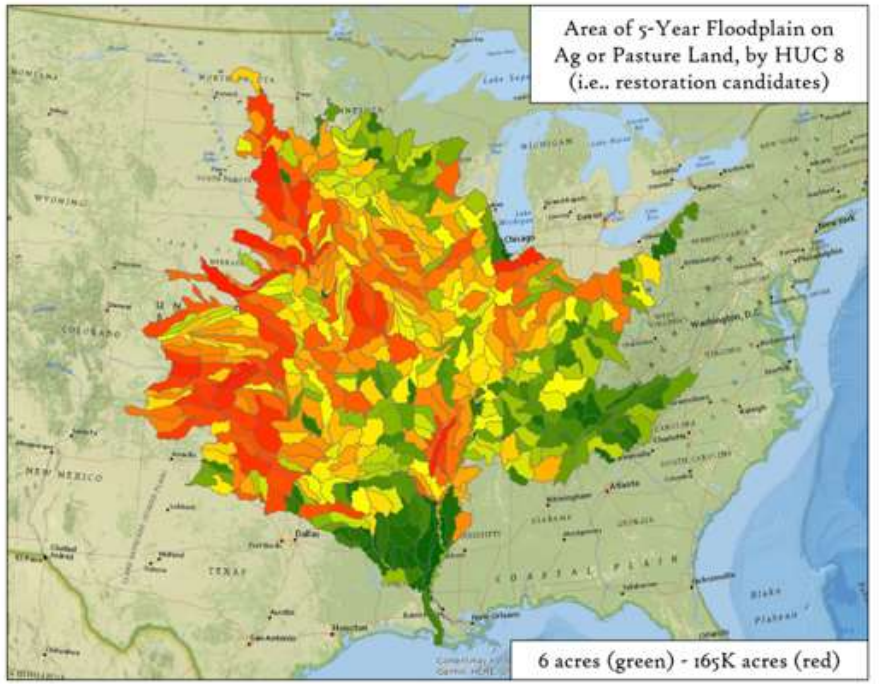
☑ Nutrient contribution to the Gulf of Mexico — 50 to 100 %

☐ Growing degree days — ~~50 to 100 %~~

Land Conversion

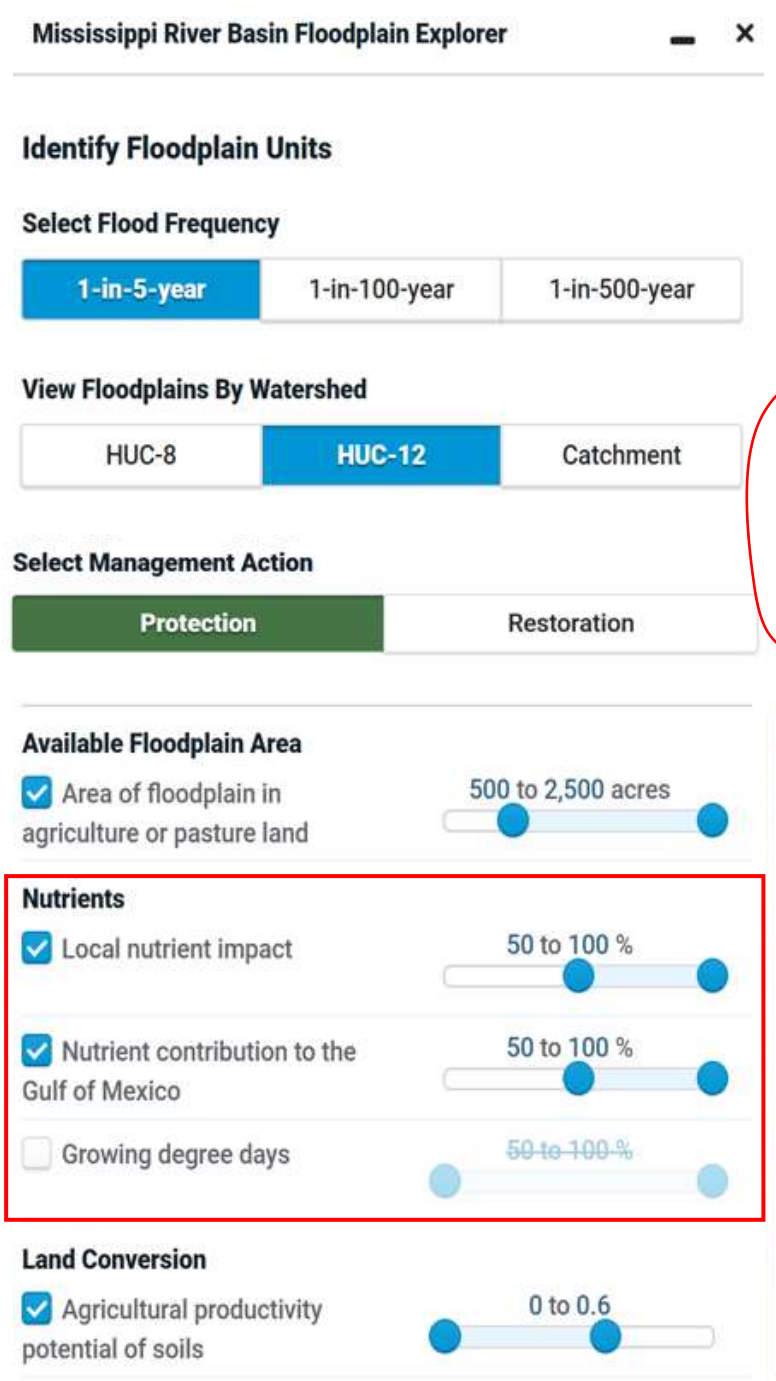
☑ Agricultural productivity potential of soils — 0 to 0.6

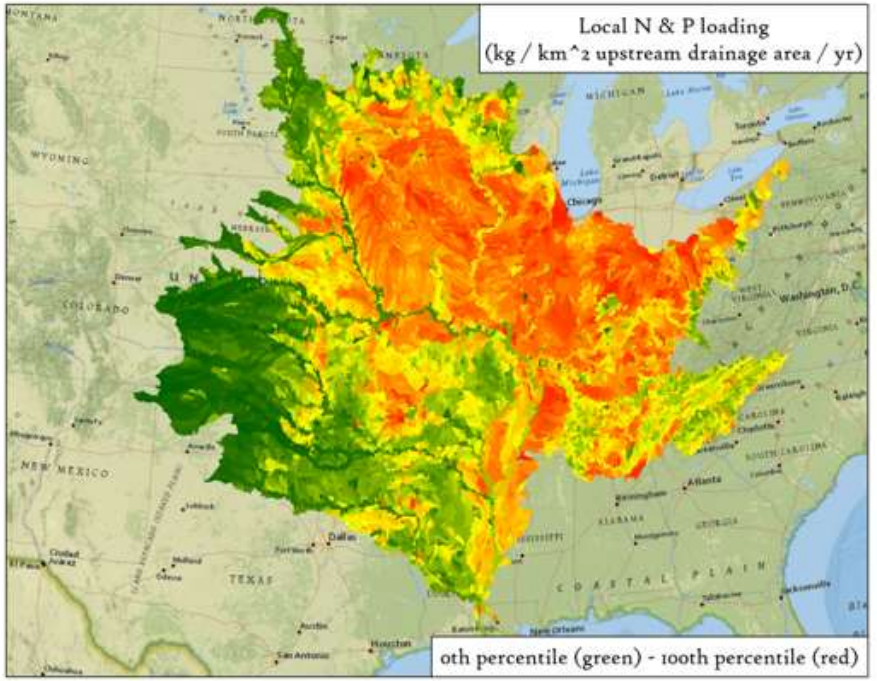


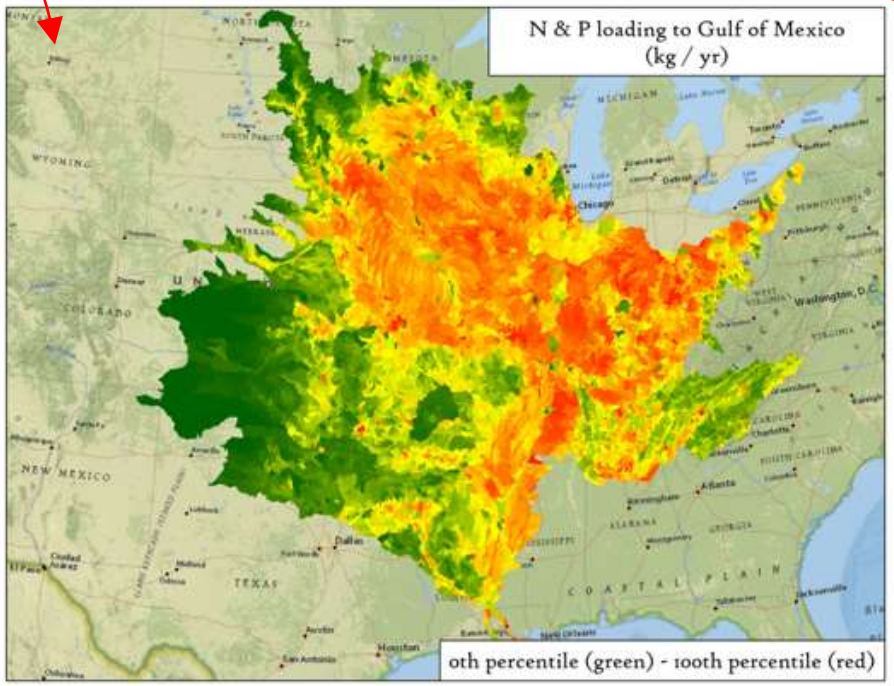


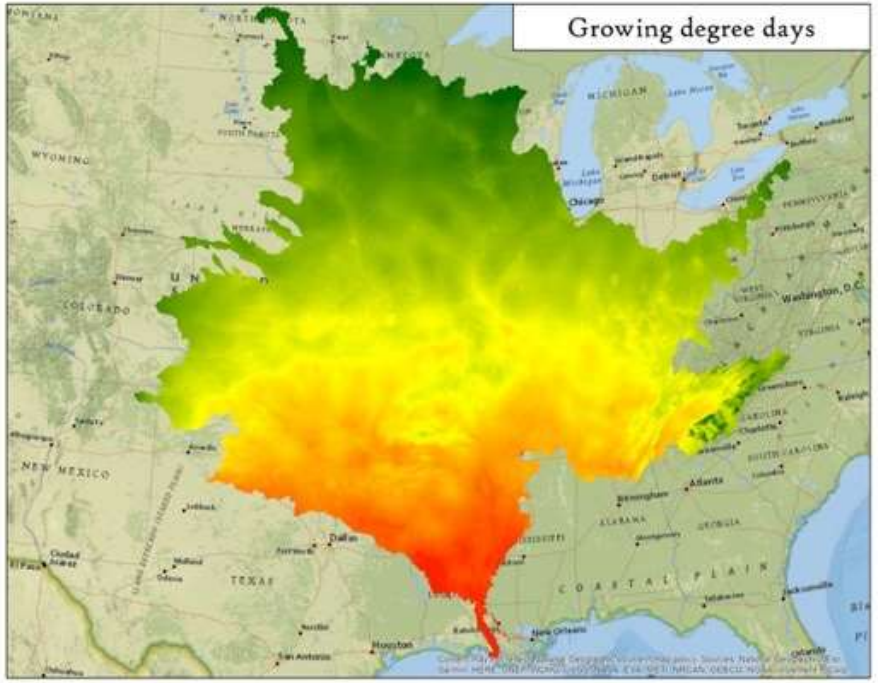
Water Quality

- Nutrient loading to *local waters*
- Nutrient loading to *Gulf of Mexico*
- Growing degree days – In conjunction with higher loading, facilitates *denitrification*





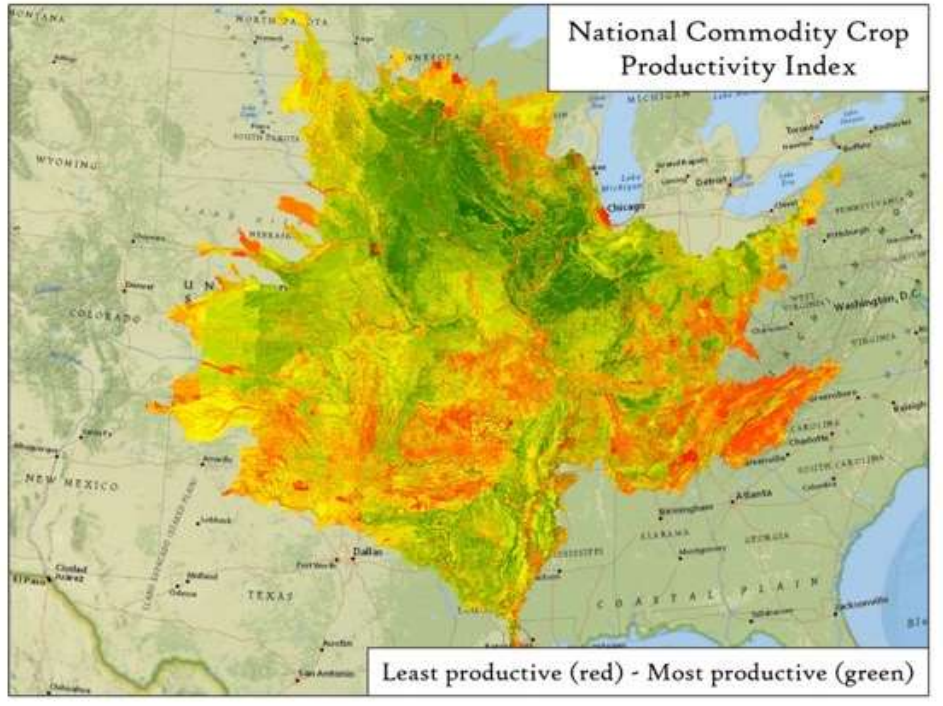


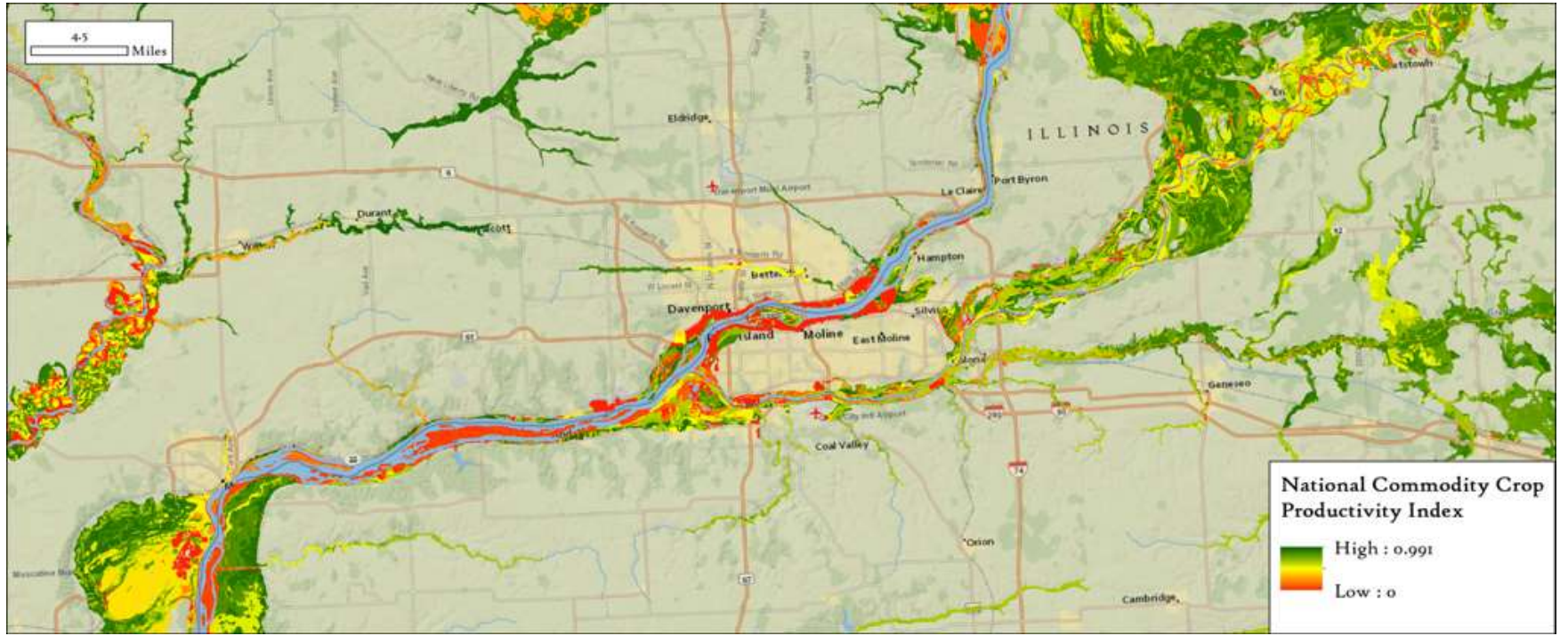


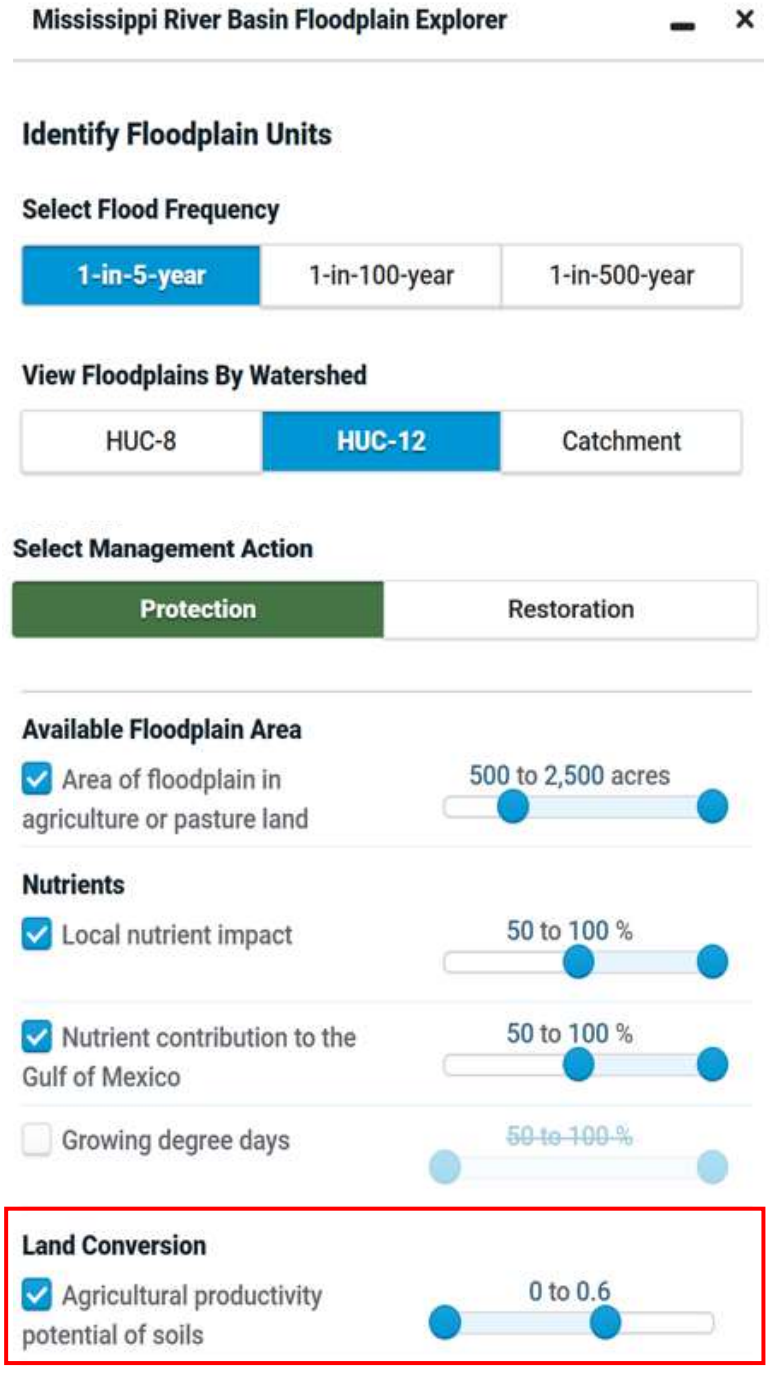
Soil Quality

- National Commodity Crop Productivity Index – A measure of ***soils' inherent capacity to produce commodity crops***

- Draw restoration efforts to relatively less desirable soils







Habitat

- Important Bird Areas — Present / Absent
- TNC Ecoregional Assessment Units — Present / Absent
- At-Risk Wetland Species — 0 to 8
- USFWS Threatened & Endangered Species Active Critical Habitat — Present / Absent
- American Bird Conservancy Corridors & Key Habitat Bird Areas — Present / Absent
- National Fish Habitat Partnership Cumulative Habitat Condition Index — 0 to 5

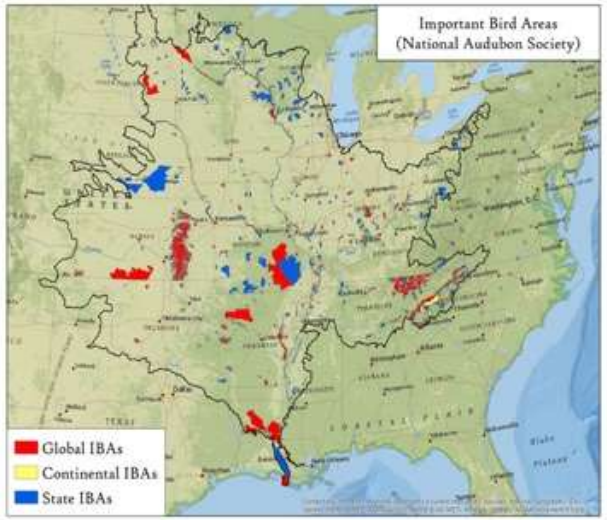
Population Exposure

- Current population — 0 to 700
- Projected population (2050) — 121 to 400

Future Economic Asset Exposure

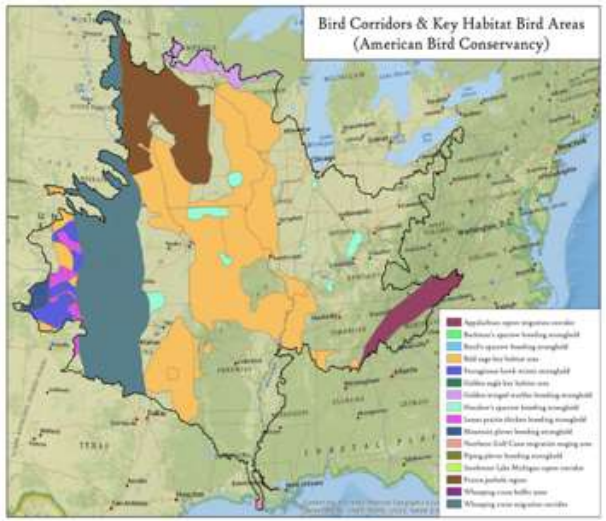
- Economic asset exposure (2050) (SSP2) — 6 to 400
- Economic asset exposure (2050) (SSP5) — 0 to 400

Important Bird Areas (Audubon)

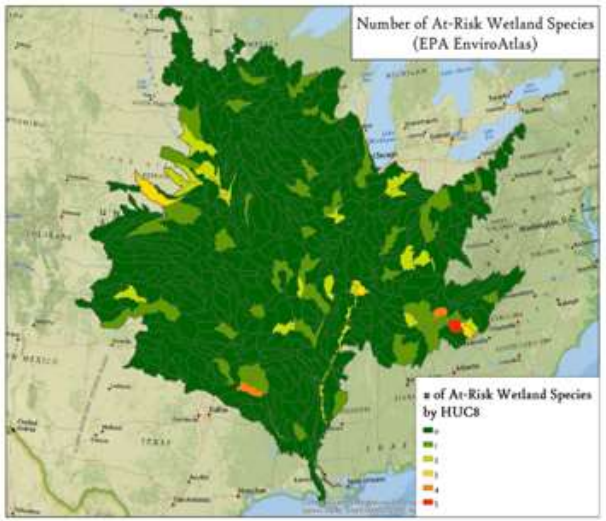


TNC Ecoregional Rollup Units

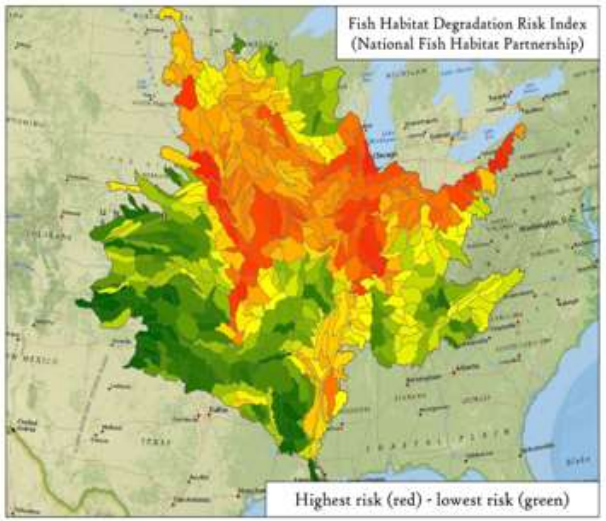
USFWS Threatened & Endangered Species



Bird Corridors & Key Habitat Areas (American Bird Conservancy)



Number of At-Risk Wetland Species (EPA)



Fish Habitat Degradation Risk Index (NFHP)

Habitat

- Important Bird Areas — Present / Absent
- TNC Ecoregional Assessment Units — Present / Absent
- At-Risk Wetland Species — 0 to 8
- USFWS Threatened & Endangered Species Active Critical Habitat — Present / Absent
- American Bird Conservancy Corridors & Key Habitat Bird Areas — Present / Absent
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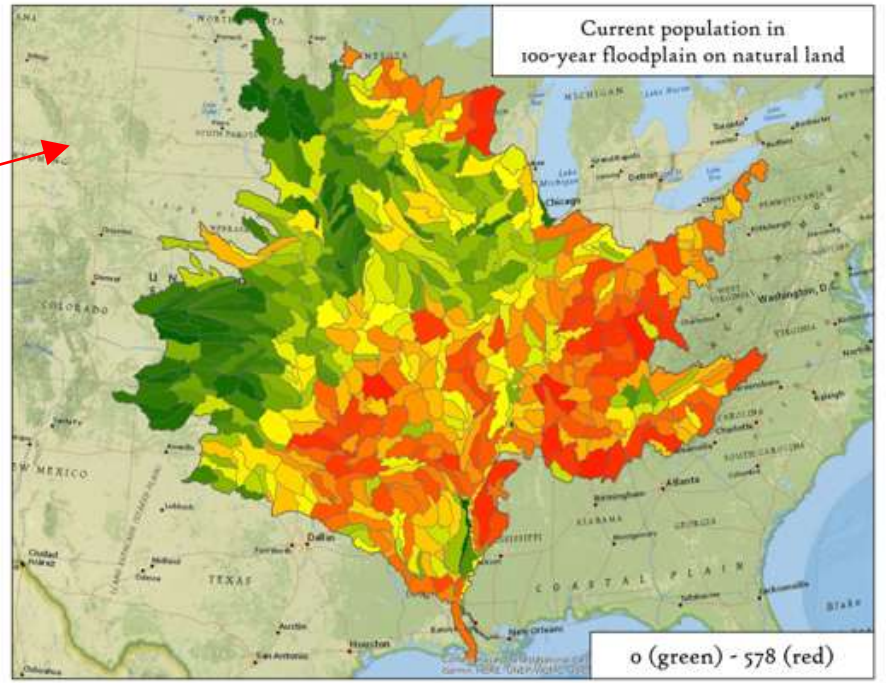
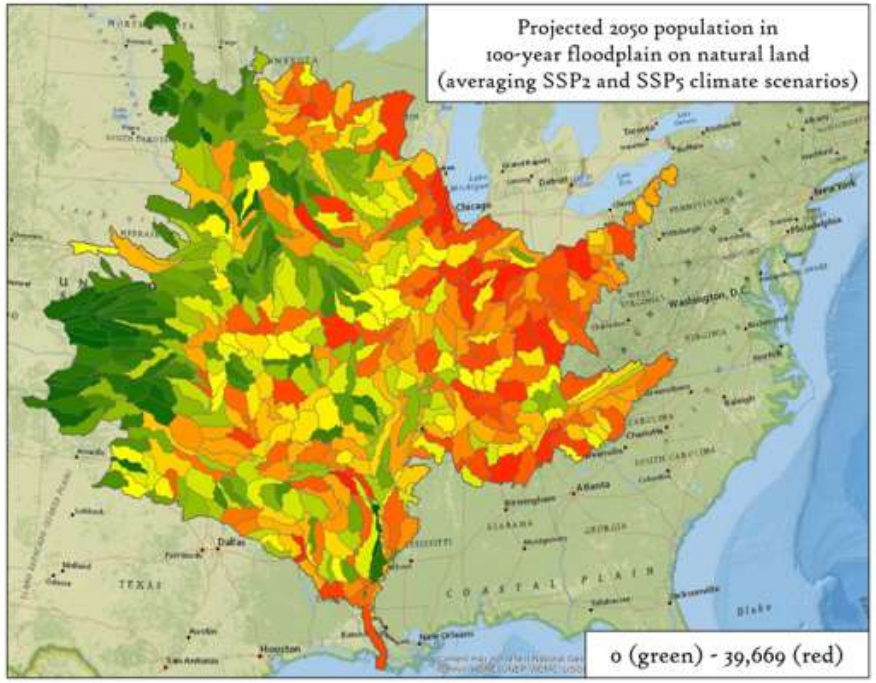
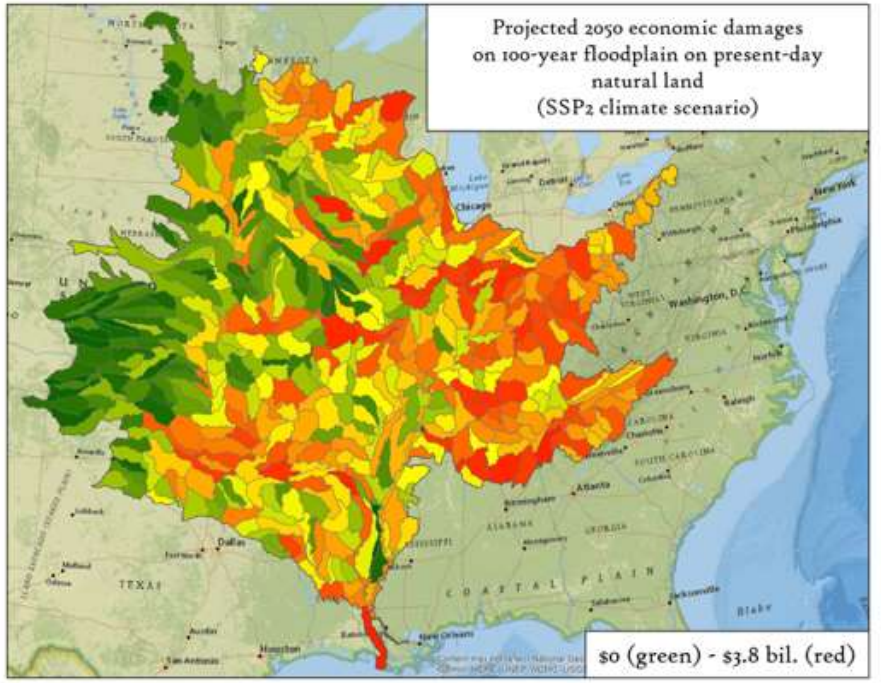
Human Exposure to Flooding

- *Current population* in the floodplain
- *Future population (2050)* in the floodplain
- *Future property damage (2050)* from flooding

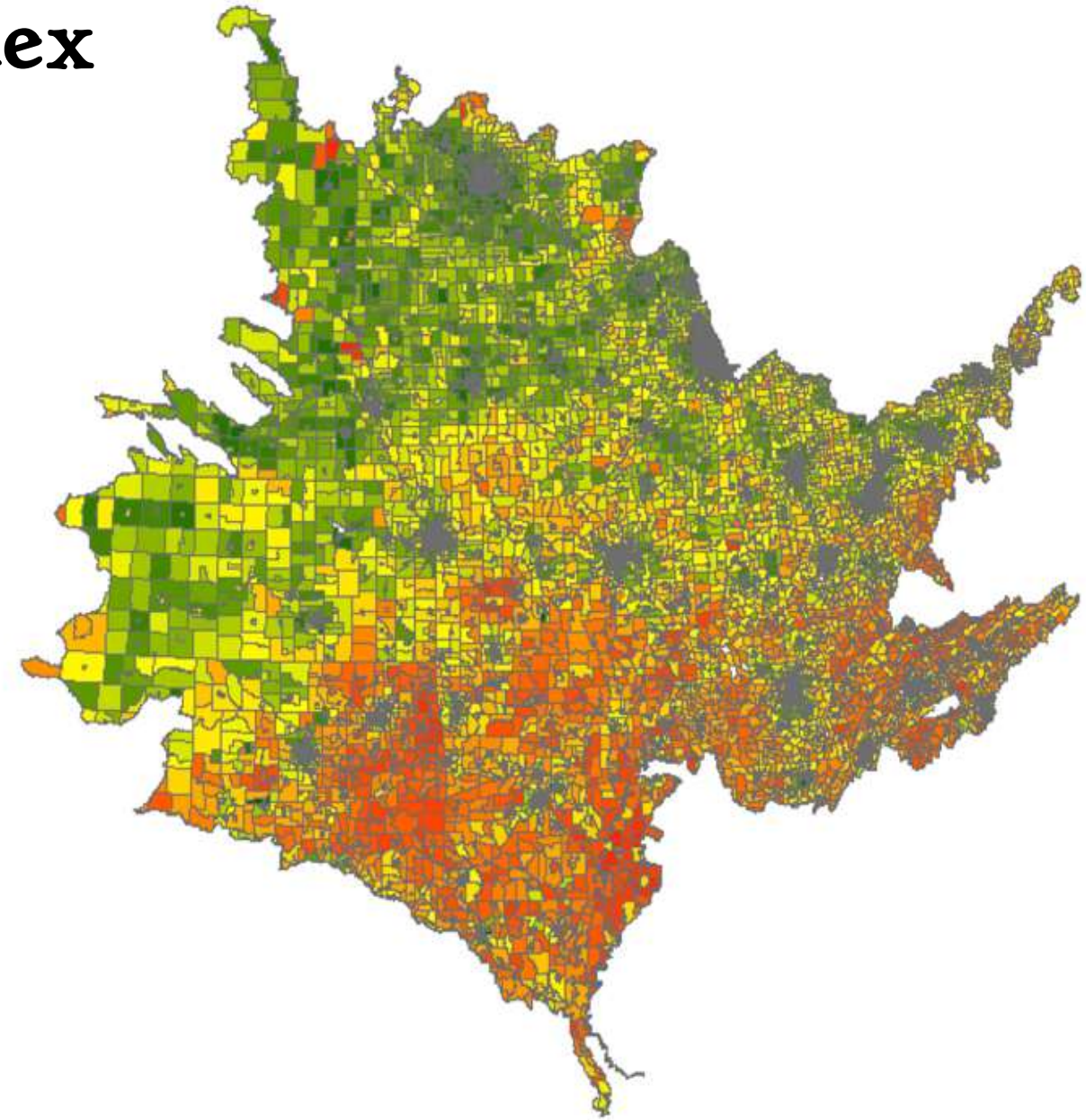






Social Vulnerability Index

- Census tract scale
- Index of social vulnerability to disaster based on 22 variables from American Community Survey
- E.g. *per-capita income*, % pop. *<20 and >64 yrs. old*, *education level*, *racial demographics*, *local rents*, etc.



Strategies for Use (1/2)

- The tool is not just for decision support – but to facilitate broader conversations
- Multiple floodplain benefits = multiple ways to reconcile them
  - Laser-focus on one issue of concern
  - Balance across benefits
  - Generate alternative footprints / maps + see where they overlap

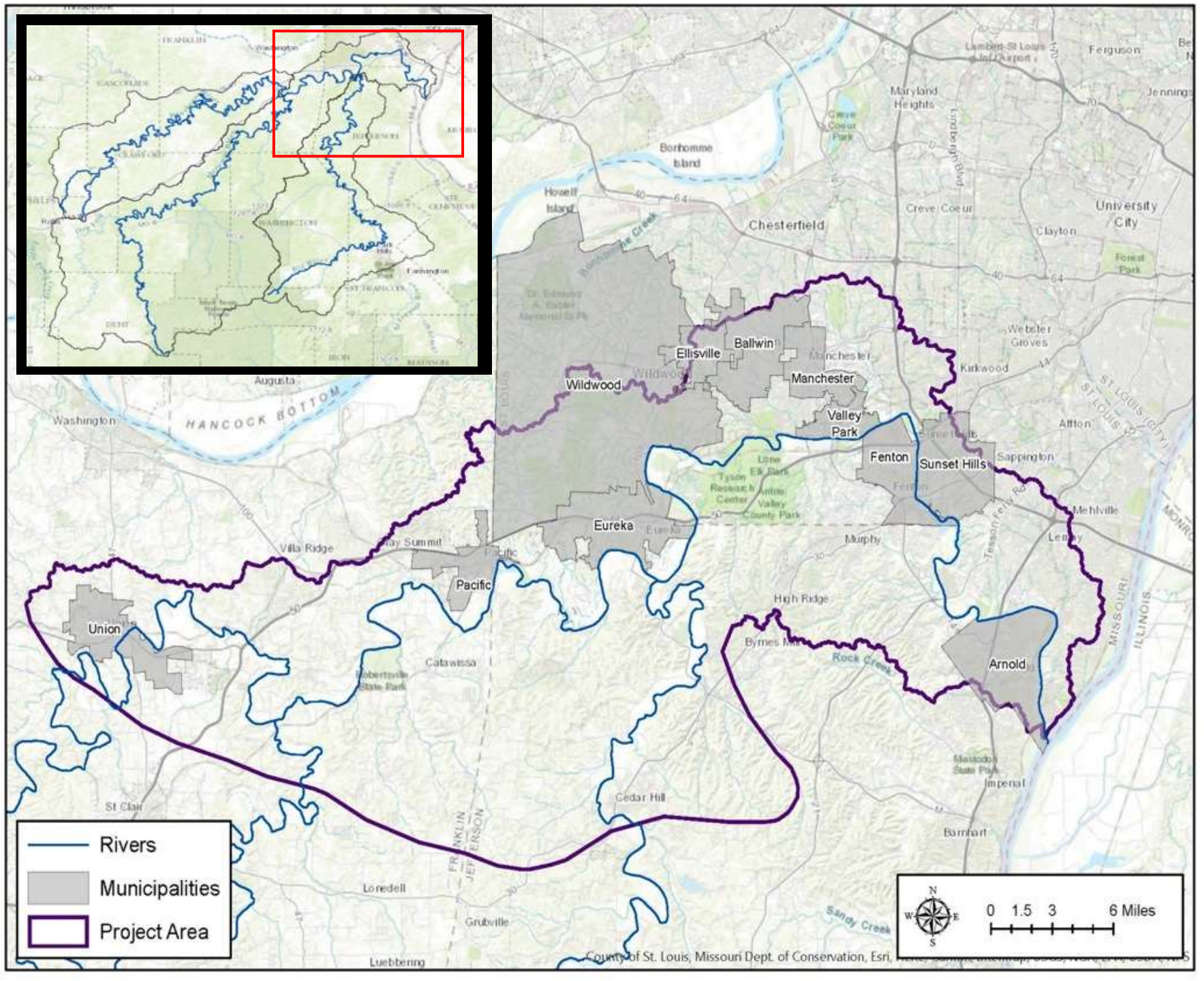
Strategies for Use (2/2)

- This is not a site-scale tool – it provides a first cut to ID watersheds that:
  1. Contain significant opportunity for conservation
  2. Conservation could be especially impactful

- Highly customizable to local geographies

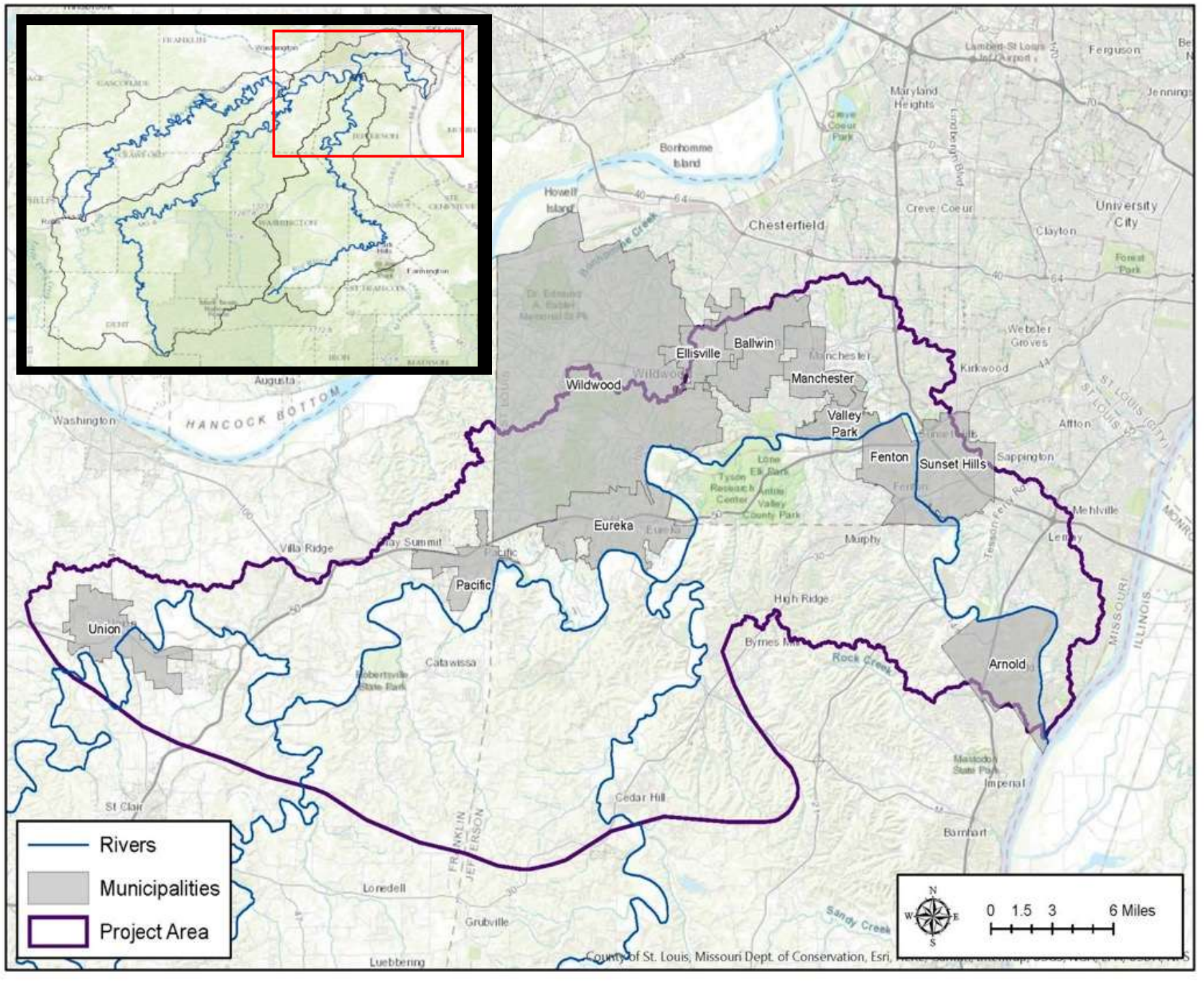
The Lower Meramec River Multi-Jurisdictional Flood Management Plan

- 115 river miles on Meramec R. + 2 tributaries
- 3 counties
- 8 municipalities



Lessons Learned

- Plug into a formal planning process / cycle
- Customization is critical – based on stakeholders / potential users



Potential FP Tool Users	Potential Applications
Federal, State and Local Governments	Development of watershed plans for water quality, e.g. 9 Key Element Plans; siting of natural infrastructure projects
Land Trusts	Strategic conservation planning; prioritizing projects; grant proposals; wetland education & outreach
Compensatory Mitigation Project Sponsors/Wetland Regulators	Identify and analyze potential restoration sites; guide project selection; support mitigation goals and improve outcomes
County Planners/Regional Planning Commissions	Aid in developing local and regional comprehensive plans; parks and open space plans; flood control and water quality improvements
Private Businesses	Wetland restoration as one component of meeting regulatory requirements, e.g. water quality trading and Adaptive Management programs
Wetland Consultants	Wetland restoration planning and design
Watershed Planners	Watershed assessments, water quality planning
Wildlife/Other Resources Managers	Prioritize projects; identify and analyze sites; wetland restoration planning and design
Universities/University Extensions	Wetland research; education and outreach; economic valuation of wetland ecosystem services