Missouri NWI

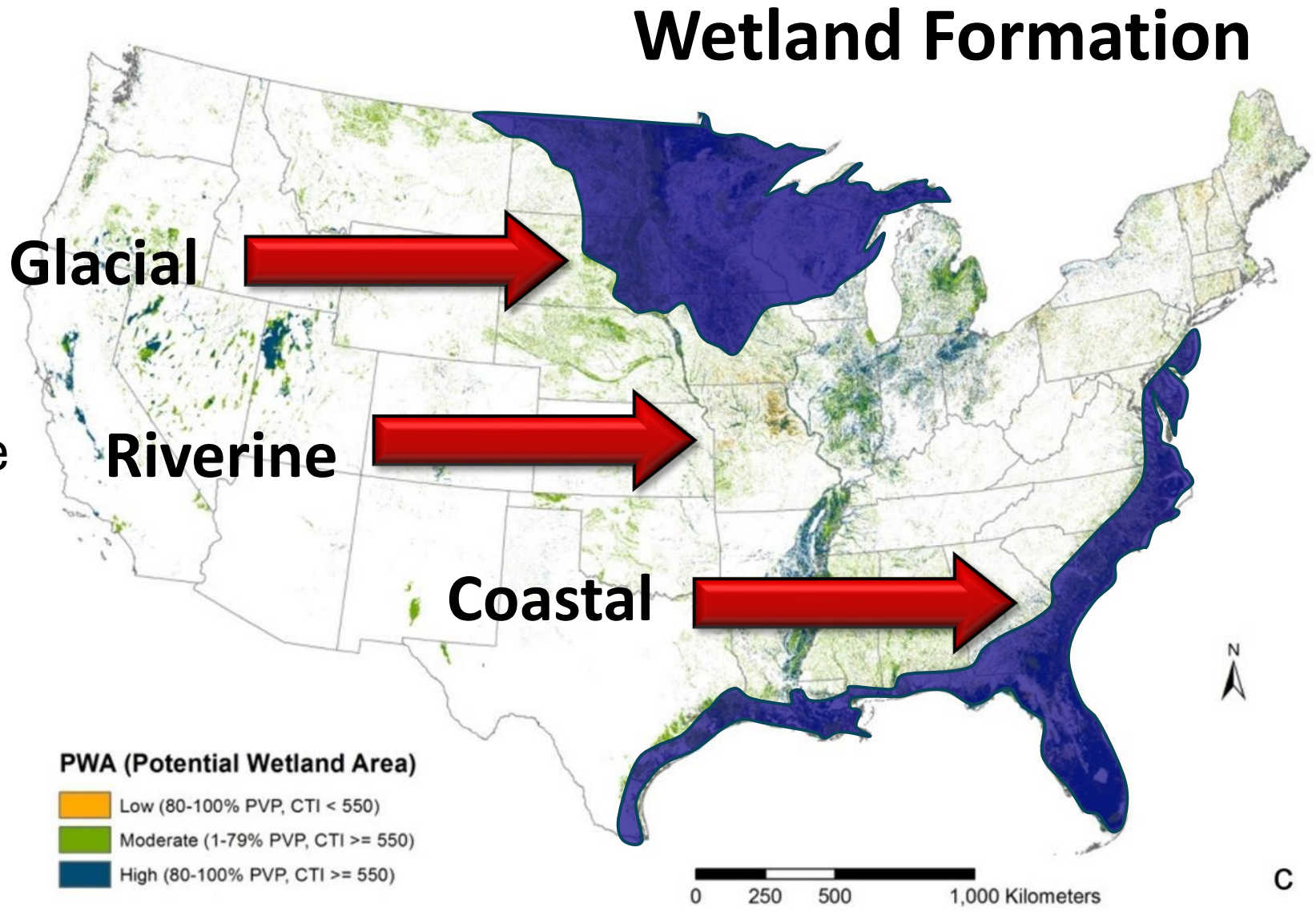
Critical Linkages

Frank Nelson, Wetland Coordinator,

Missouri Dept. of Conservation

Extent of Wetlands in the US

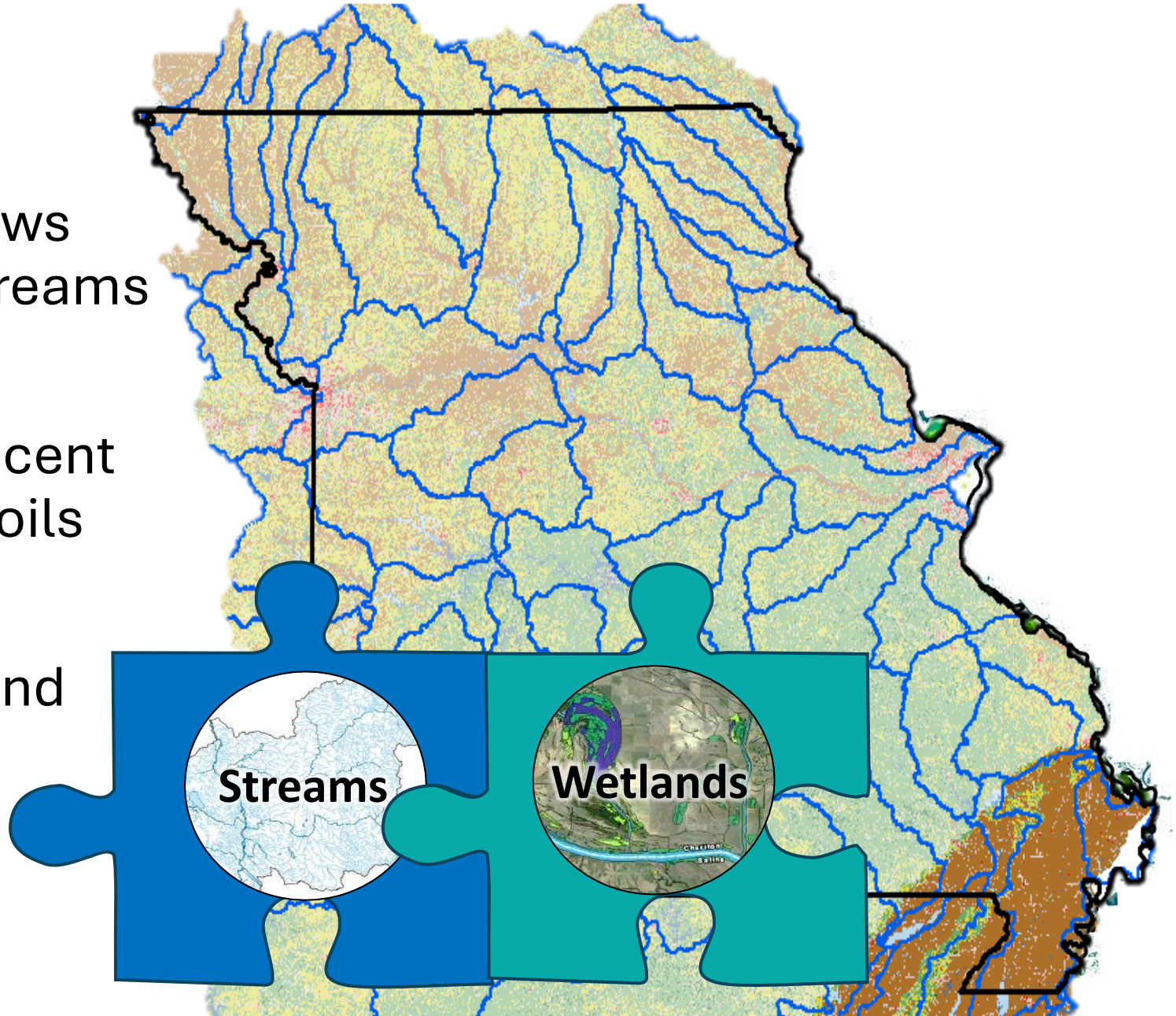
- Wetland extent varies across North America
- Missouri's wetlands shaped by fluvial/riverine processes



Horvath, E.K., Christensen, J.R., Mehaffey, M.H. and Neale, A.C., 2017. Building a potential wetland restoration indicator for the contiguous United States. Ecological indicators, 83,

Extent of Wetlands in Missouri

- Distribution of NWI follows Missouri's Rivers and Streams
- Many fall within the adjacent floodplain and alluvial soils
- And influenced by the land use in the surrounding watersheds

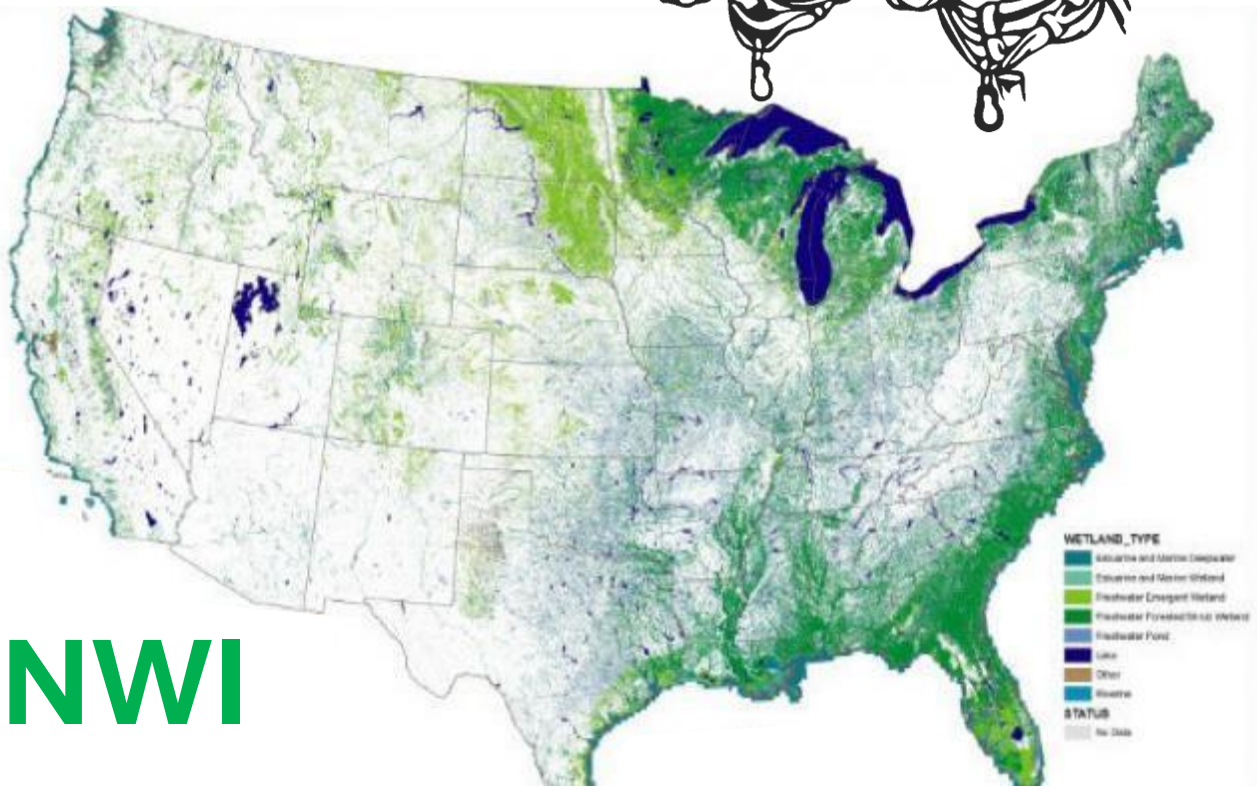


National Blue-Green Digital GIS Infrastructure

Geospatial Workhorses across
public and private sectors

NHD

National Hydrography Dataset



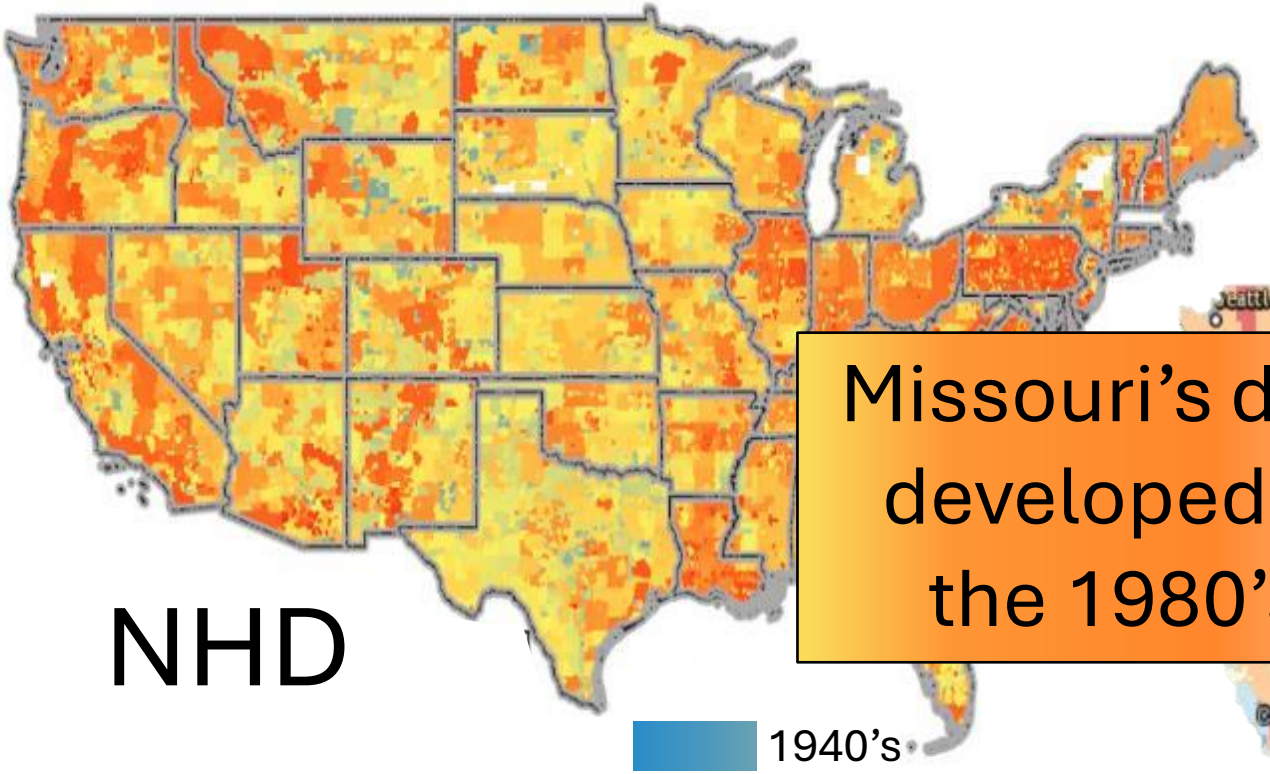
NWI

National Wetlands Inventory

USGS Map, Al Rea,
https://idwr.idaho.gov/wp-content/uploads/sites/2/gis/20170309-Presentation-HydroTWG.pdf

National Blue-Green Digital GIS Infrastructure

Spans over 64 years



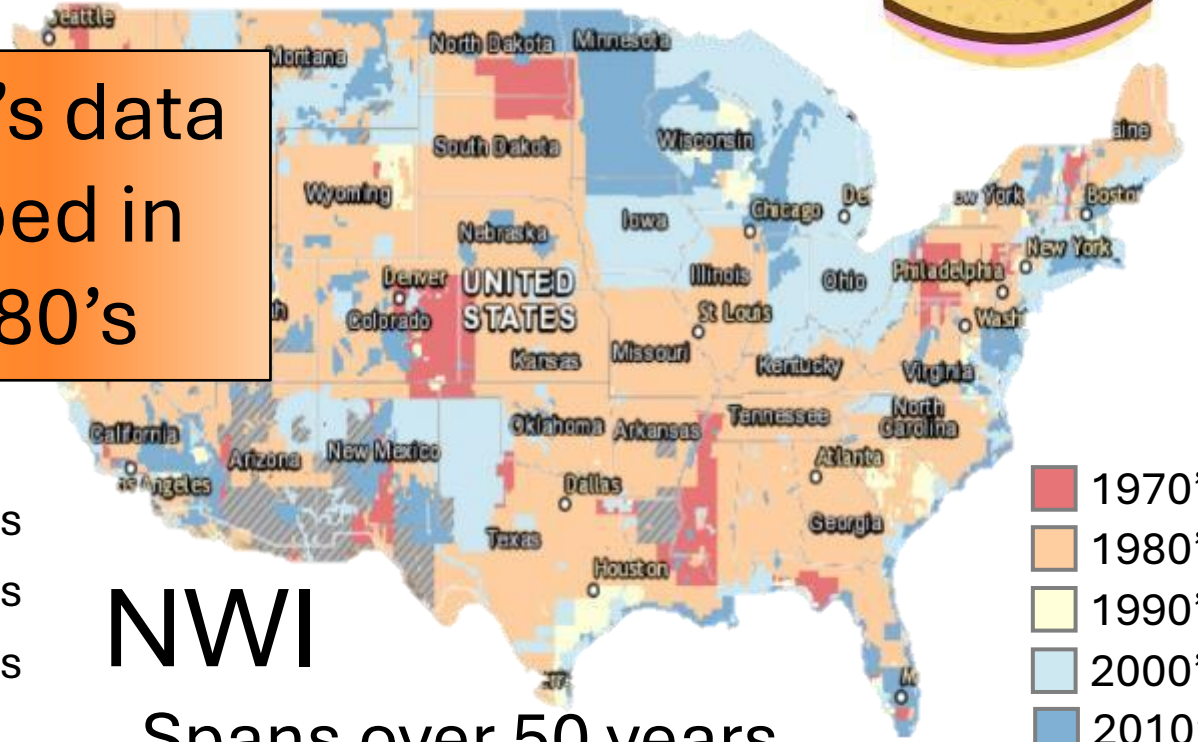
NHD

1940's
1950's
1960's
1970's
1980's
1990's
2000's

Impacts of Aging

Data used with caveats

Missouri's data developed in the 1980's



NWI

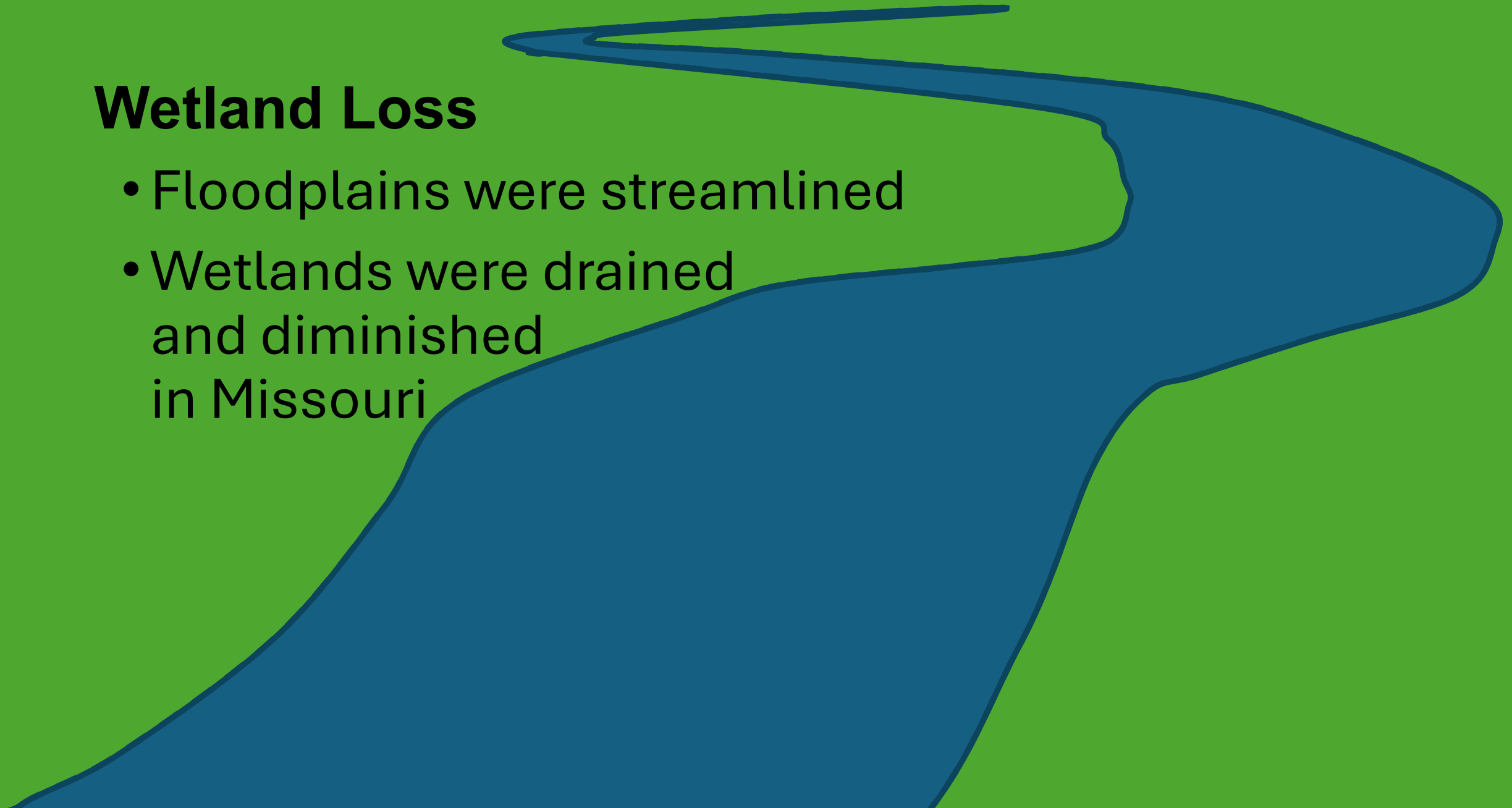
1970's
1980's
1990's
2000's
2010's

Spans over 50 years

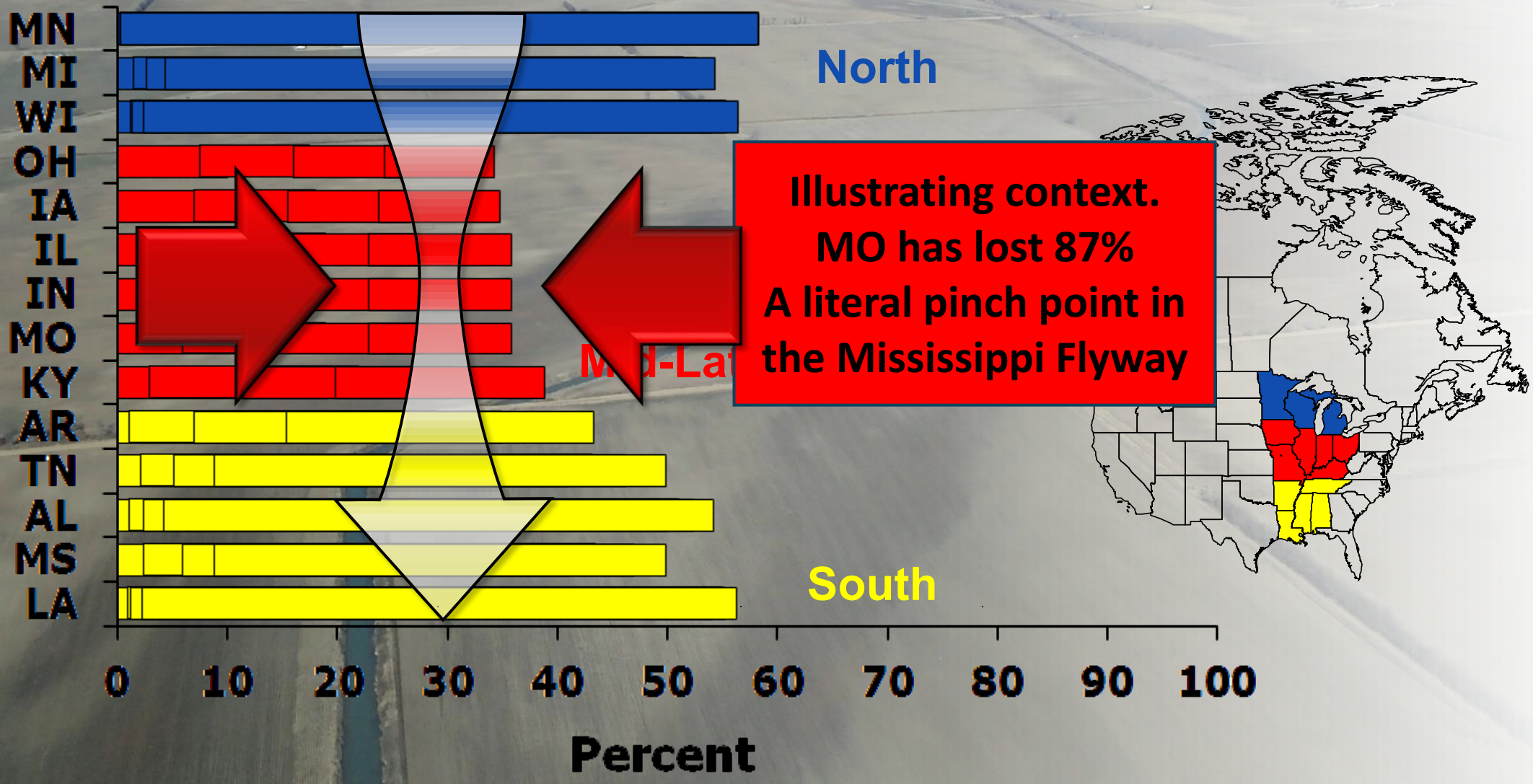
Information from Analisa Stasey, USGS

Wetland Loss

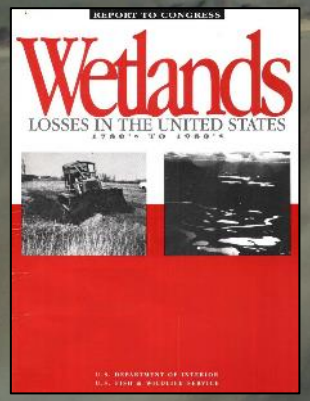
- Floodplains were streamlined
- Wetlands were drained and diminished in Missouri



National Status and Trends Reports



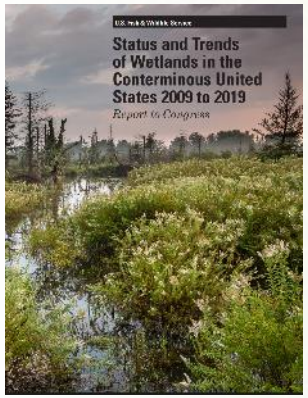
Illustrating context.
MO has lost 87%
A literal pinch point in
the Mississippi Flyway



National Status and Trends Reports

- Tracks with observations in Missouri
  - National data comes in handy to cite

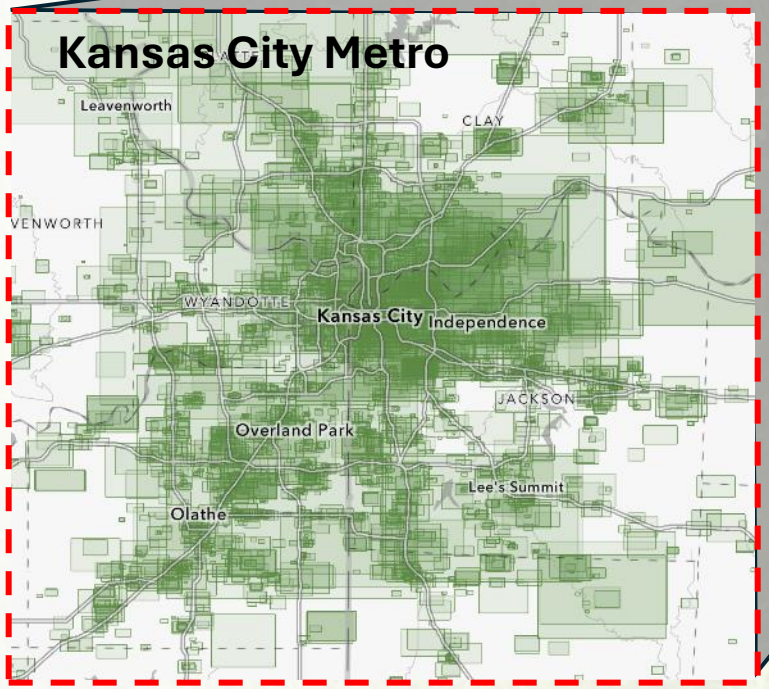
- Net wetland loss increased substantially (>50%) since 2009
  - Loss of forested wetlands
  - Increase in ponds

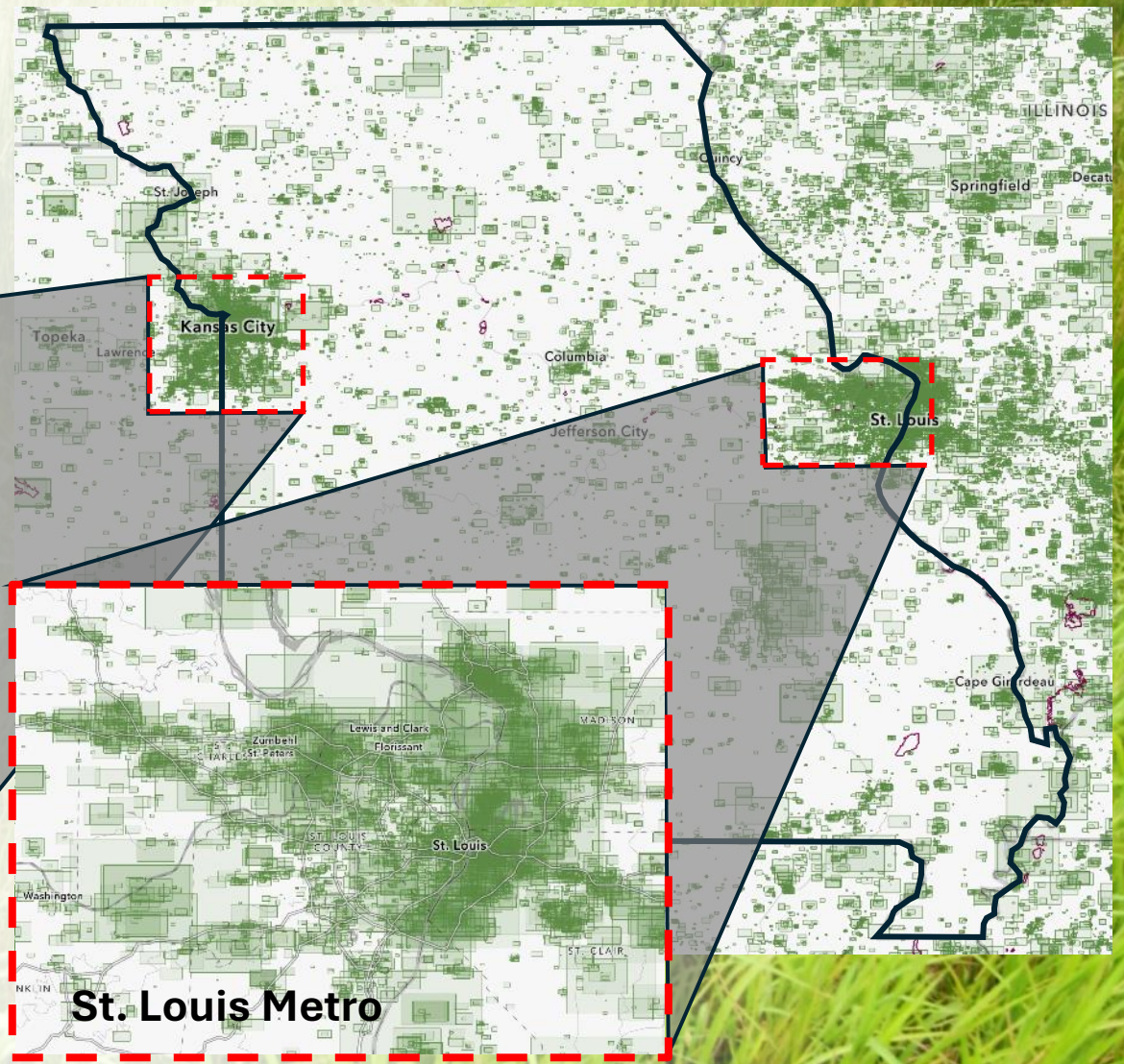


Use of NWI GIS data across Missouri

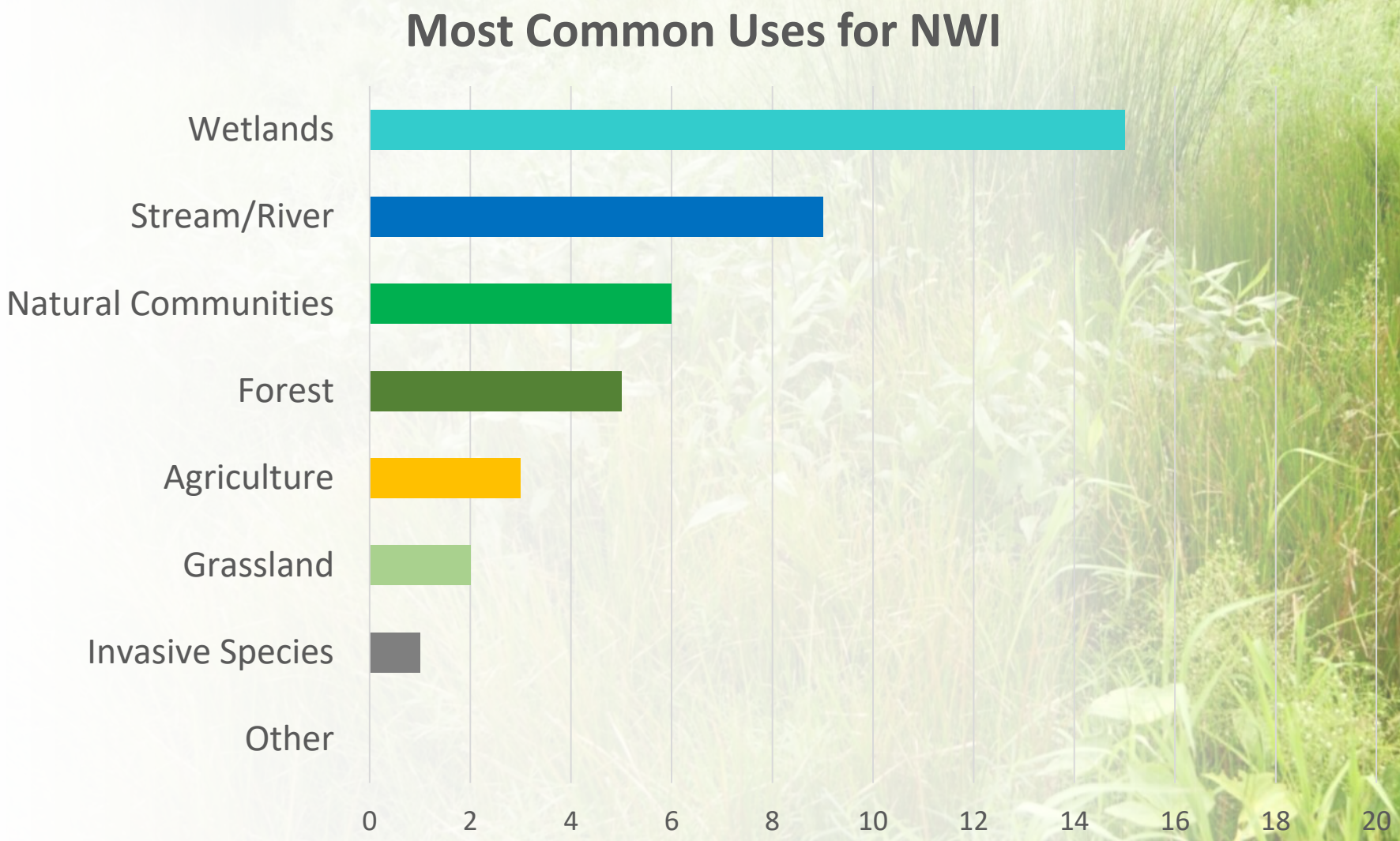
- Data frequently downloaded in and around urban centers

- Focus is on development and potential environmental impacts





Use of NWI GIS data within MDC

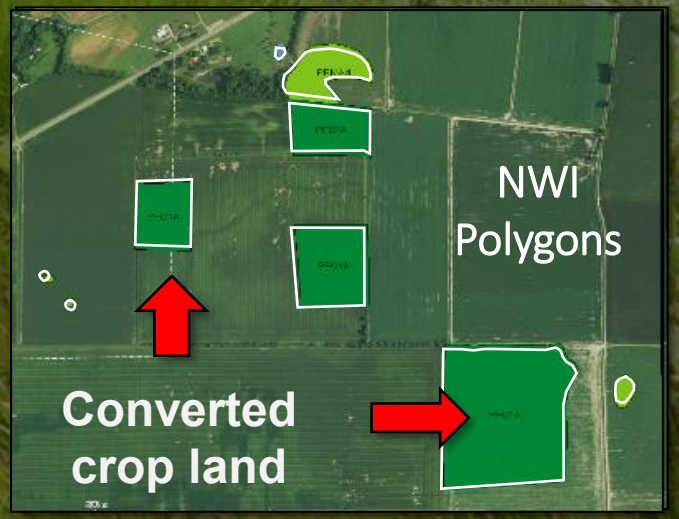


Current Uses For NWI within MDC

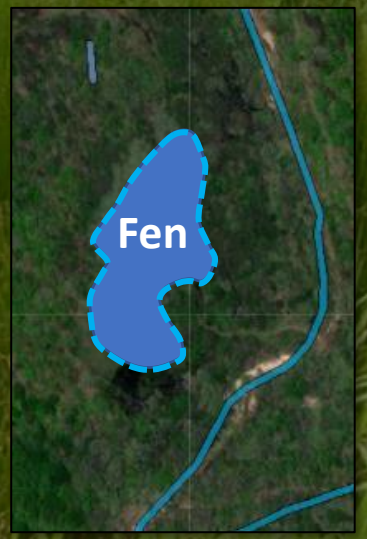
- Identify extent of known wetlands
  - To search for Species of Conservation of Concern
  - To search for unique wetlands and their condition
    - Potential fens as identified as PEMb
- Environmental review
- Research, monitoring, planning
- Wetland construction and management
- Wetland determinations
- Restoration

Changes and Uncertainty: Wetlands

Cont. Wetland Loss



Restored Wetlands

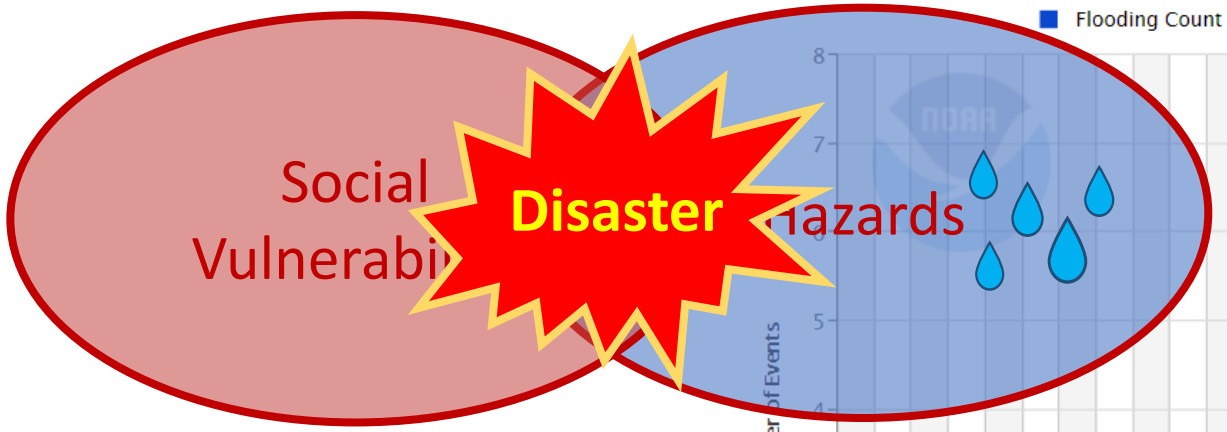


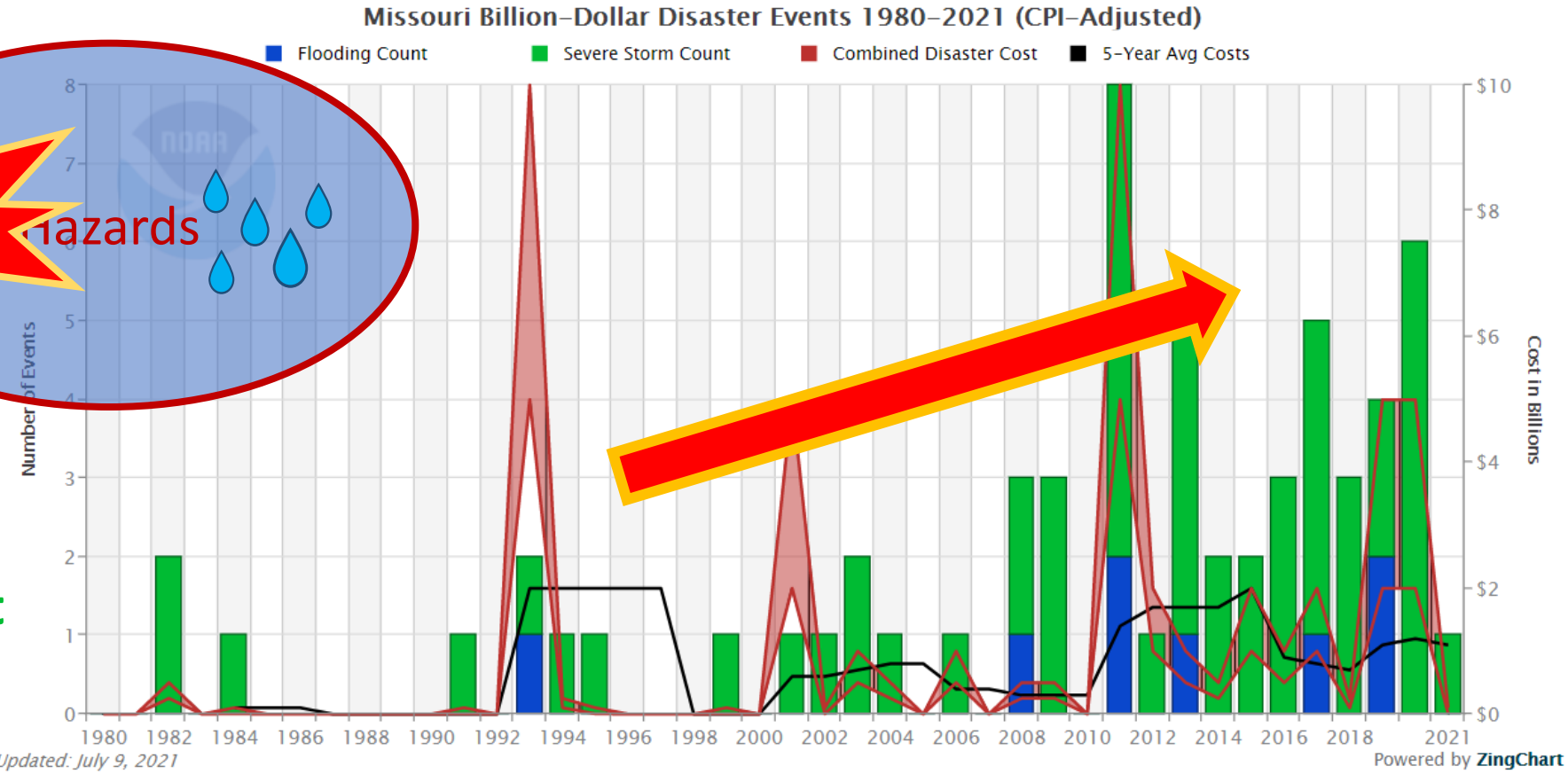
Unmapped Wetlands

- How many wetlands exist in Missouri?
- What type?
- What has restoration potential?

Changes in Climate and Disaster Events

1980's → 1990's → 2000's → 2010's → 2020's





Disaster Frequency Associated with:

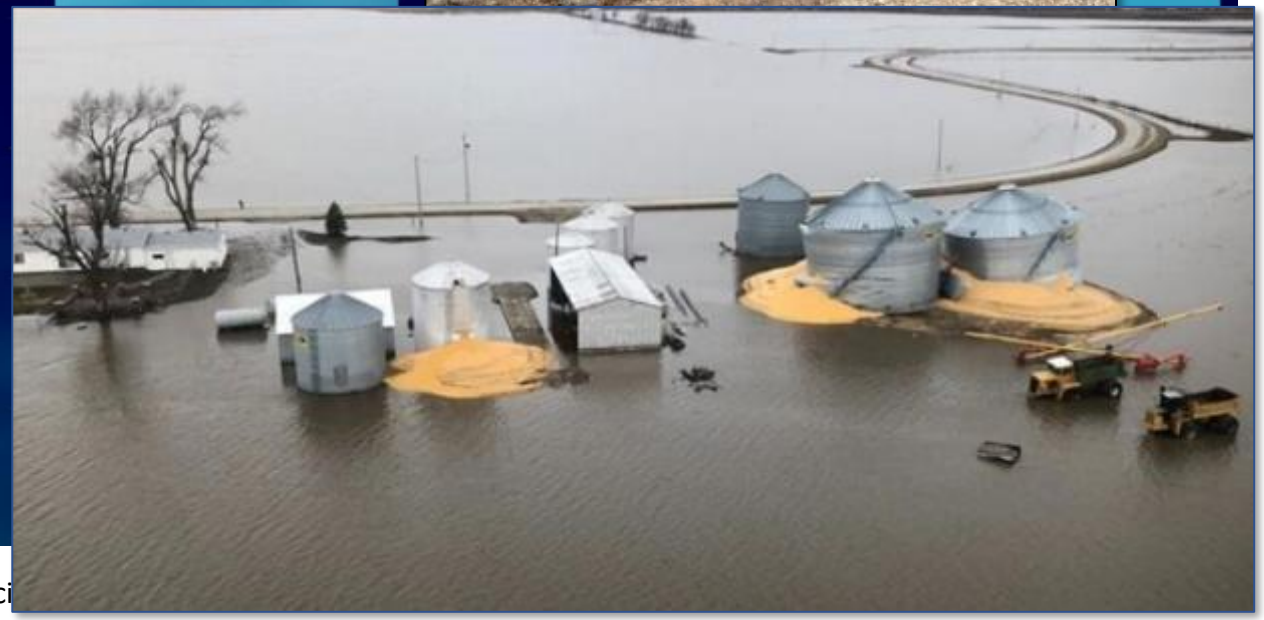
- **Severe Storms Count**
- **Flooding Count**

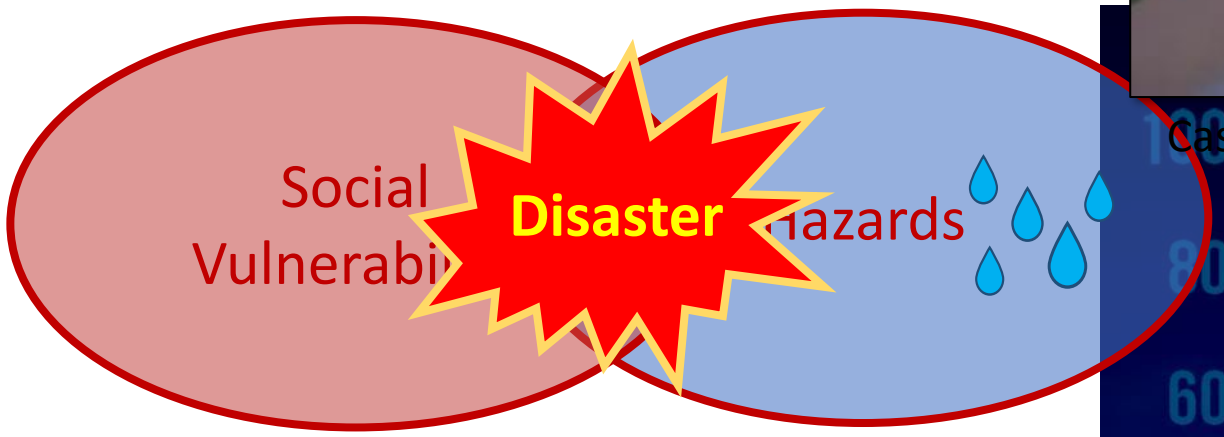
NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2021). https://www.ncdc.noaa.gov/billions/, DOI: 10.25921/s

Changes in Climate a

1980's | 1990's | s

Cassville, MO





More Inland Flooding

Increase in flood severity index…it's happening

https://www.climatecentral.org/outreach/alert-archive/2016InlandFlooding.php?market=kansasci

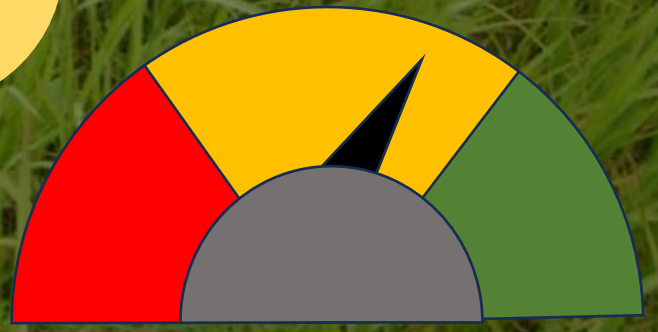
Van Westen, C.J., 2013. Remote sensing and GIS for natural hazards assessment and disaster risk management. *Treatise on geomorphology*, *3*, pp.259-298.

Changes and Uncertainty: Wetlands

- What was limiting us and our partners from prioritizing wetland conservation statewide?

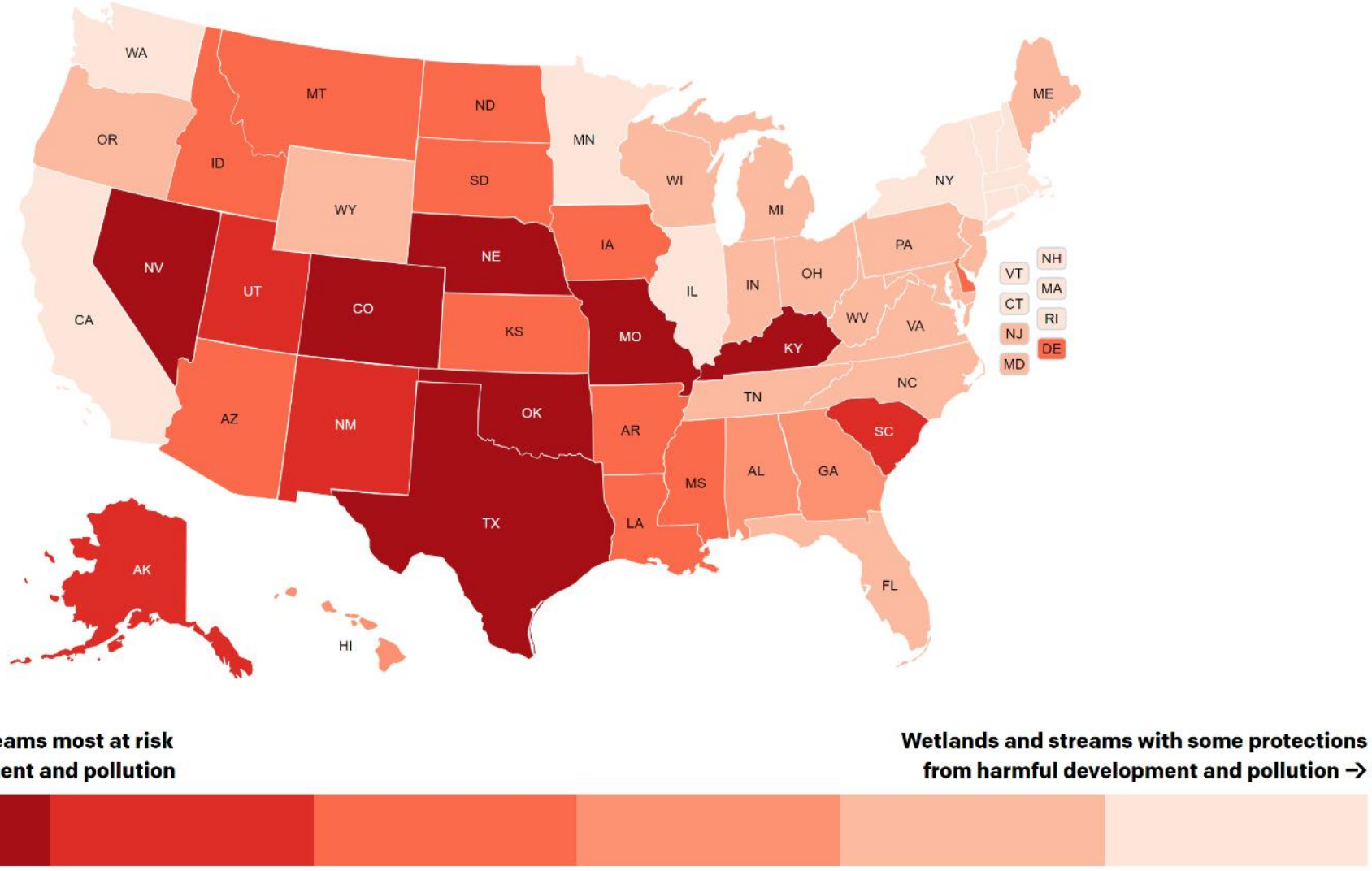
Need to update MO NWI

- How many wetlands exist in Missouri?
- What type?
- What has restoration potential?



Changes to Legal Protections Increase Wetland Vulnerabilities

Missouri doesn't have state protections and has always deferred to federal protections



[Wetlands and Streams Most in Danger After the U.S. Supreme Court's Sackett v. EPA Ruling - Earthjustice]

New Uses For updated NWI+

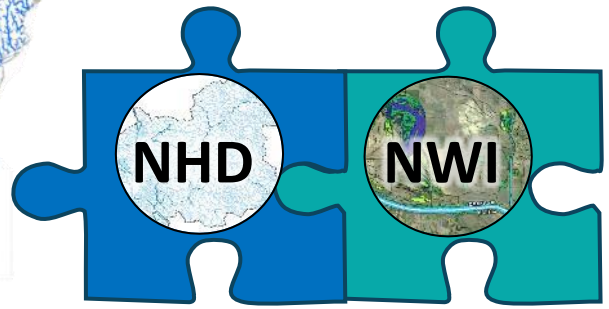
Future Applications

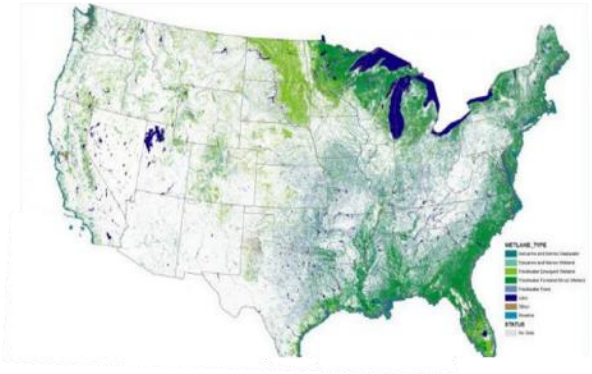
- Create a better/accurate baseline of wetlands in Missouri
- Use to prioritize Wetland Conservation:
  - Protection
  - Management
  - Enhancement
  - Rehabilitation
- Consider Nature-Based Solutions to reduce Flood Risks

Bridges, T. S., J. K. King, J. D. Simm, M. W. Beck, G. Collins, Q. Lodder, and R. K. Mohan, eds. 2021. Overview: International Guidelines on Natural and Nature-Based Features for Flood Risk Management. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Updating MO's Stream and Wetland GIS Layers

- 2020 Discussions Among Partners





Who is interested in collaborating?

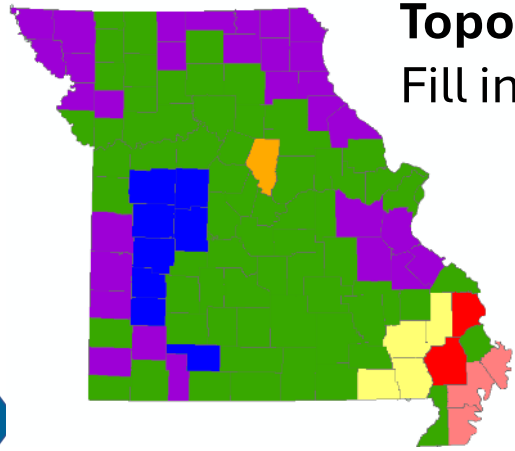
Updating MO's Stream and Wetland GIS Layers

- 2022 Actions Among Partners

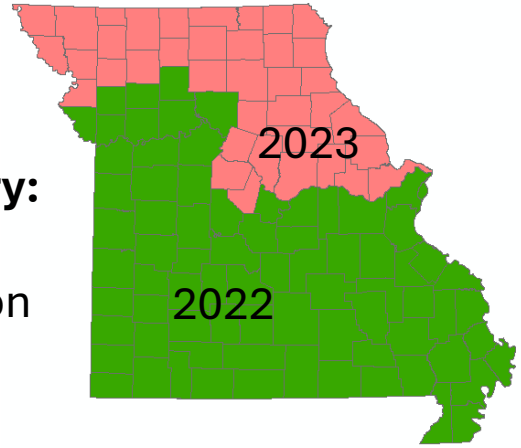
- Coordinate Steps
  - Lidar
  - Leaf-Off Imagery
  - Leaf-On Imagery
  - Hydrography 1st
  - Wetlands 2nd

Updated Hydro and Wetlands Layers for Missouri

Acquire base layers:



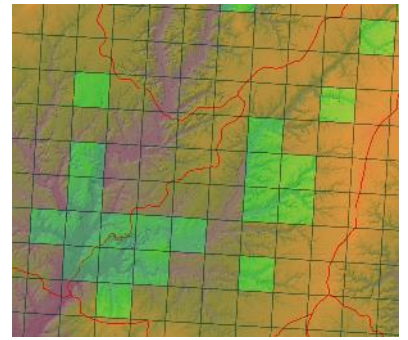
Topography:
Fill in gaps



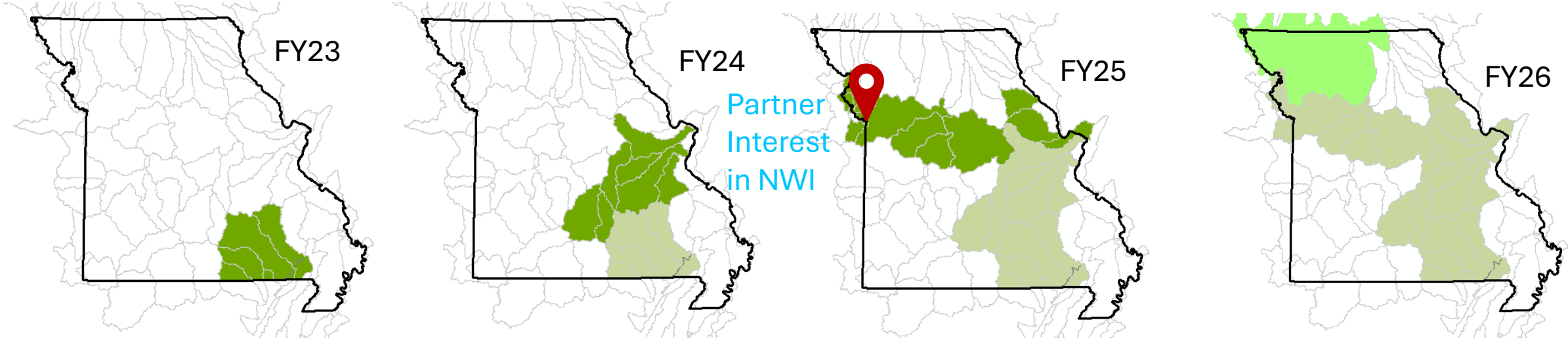
Leaf-Off Imagery:
Current and
Higher Resolution

Updating MO's Stream and Wetland GIS Layers

- NHD is now elevation derived hydrography **(EDH)** data
- As collaboration of agencies, incrementally working our way across Missouri



Online Review Portal



Updating MO's Stream and Wetland GIS Layers

Updating EDH: Small Watershed Examples

Halbrook Branch:

Small Watershed Dent Co.

Old NHD:

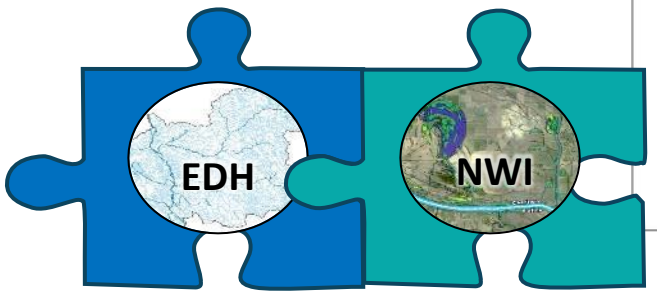
12 Open Water Bodies

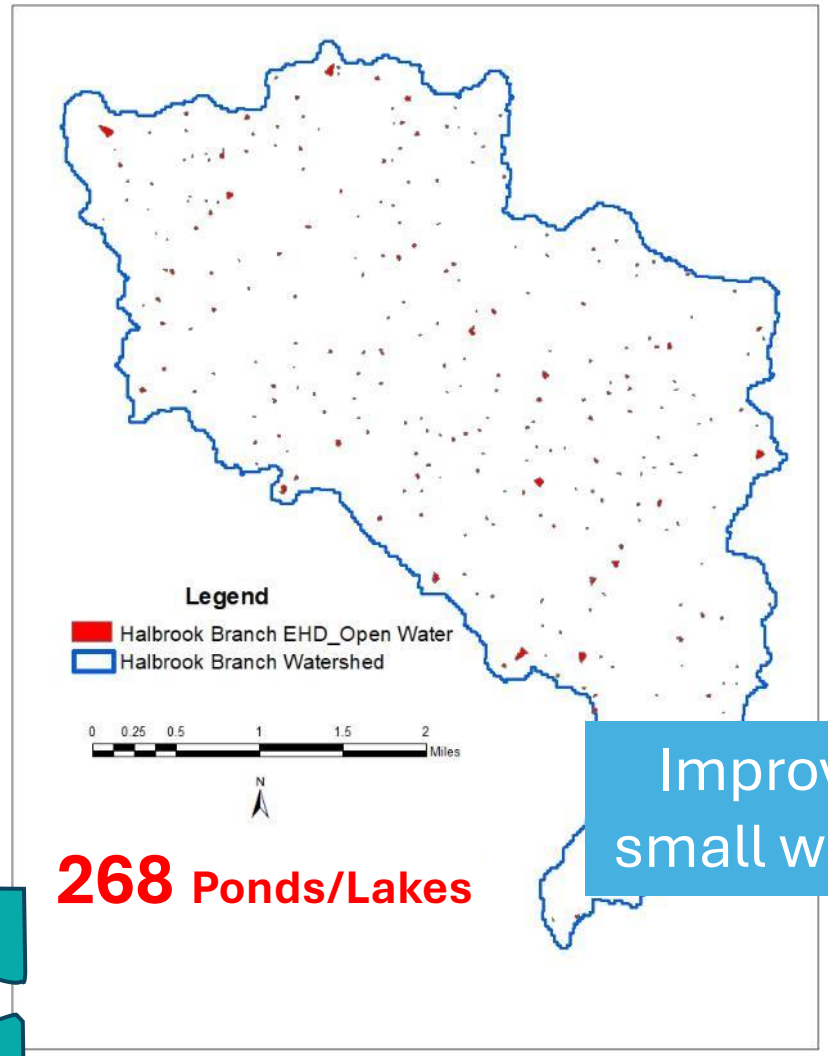
18 1st Order Streams

EDH:

268 Open Water Bodies

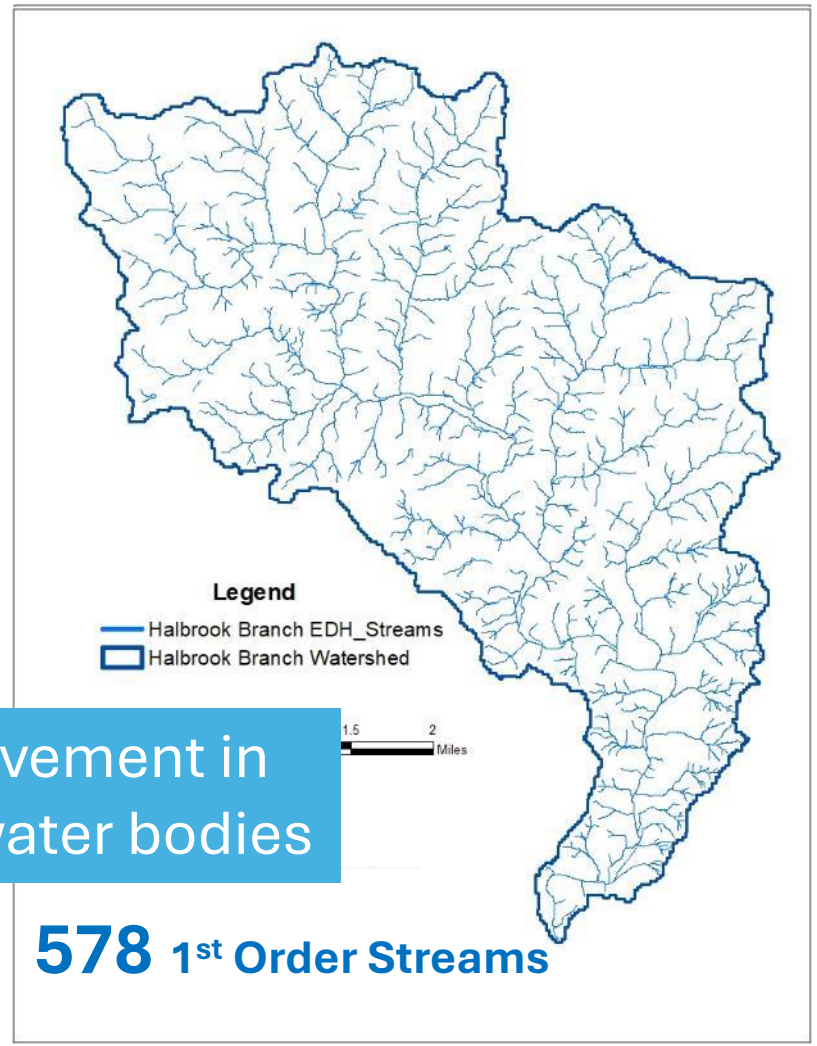
578 1st Order Streams





268 Ponds/Lakes

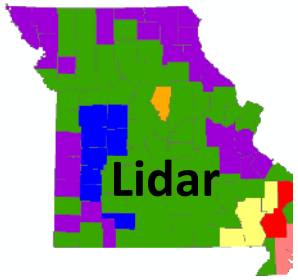
Improvement in small water bodies

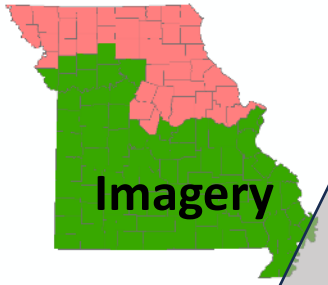


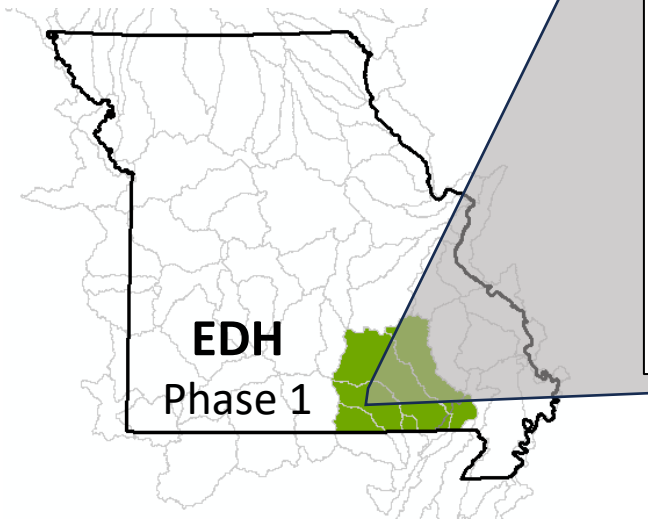
578 1st Order Streams

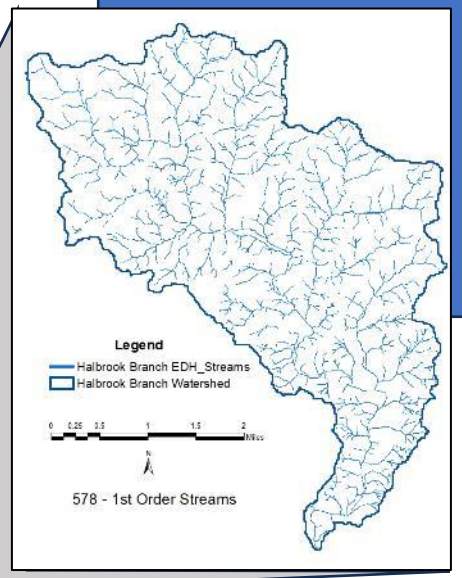
Using EDH as Springboard into NWI+

- Just Beginning
  - MDC—State Funds
  - KC Water—EPA WPP Grant

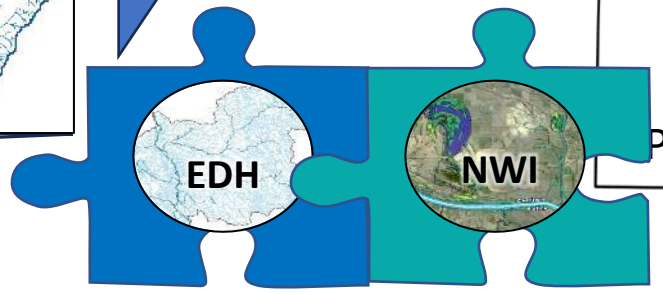


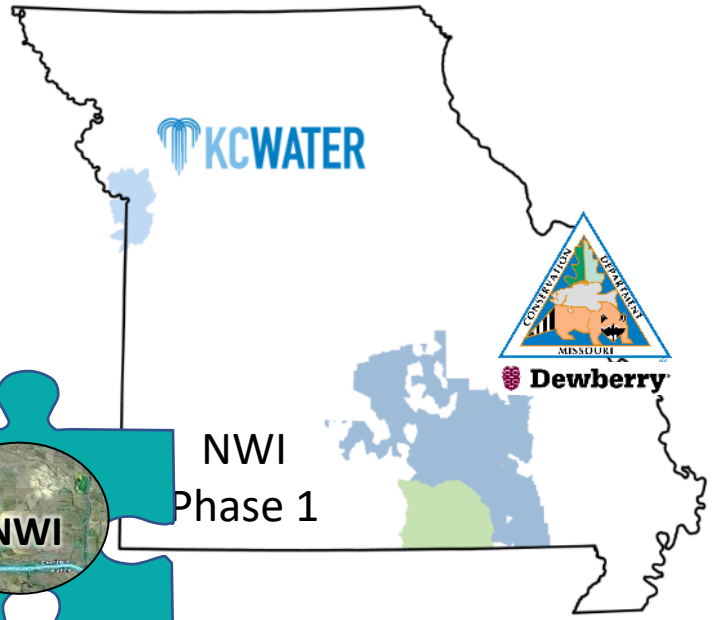






- Efficiencies Using EDH Deliverables
  - Reduces double handling
    - Hydro-enforced DEM's
    - Stream flow network
  - Incorporation of pond polygons smaller than federal standard





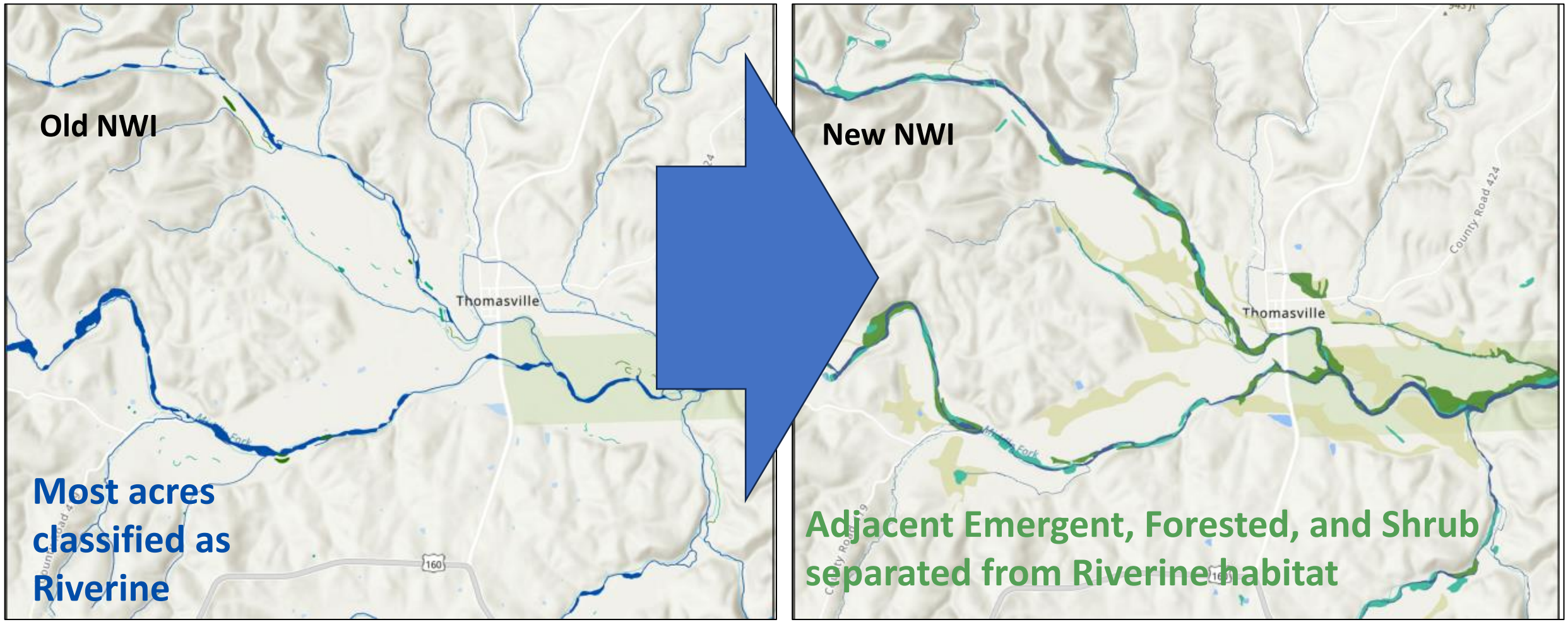
NWI Updates

FY26

FY25

Comparison of Old NWI to New NWI

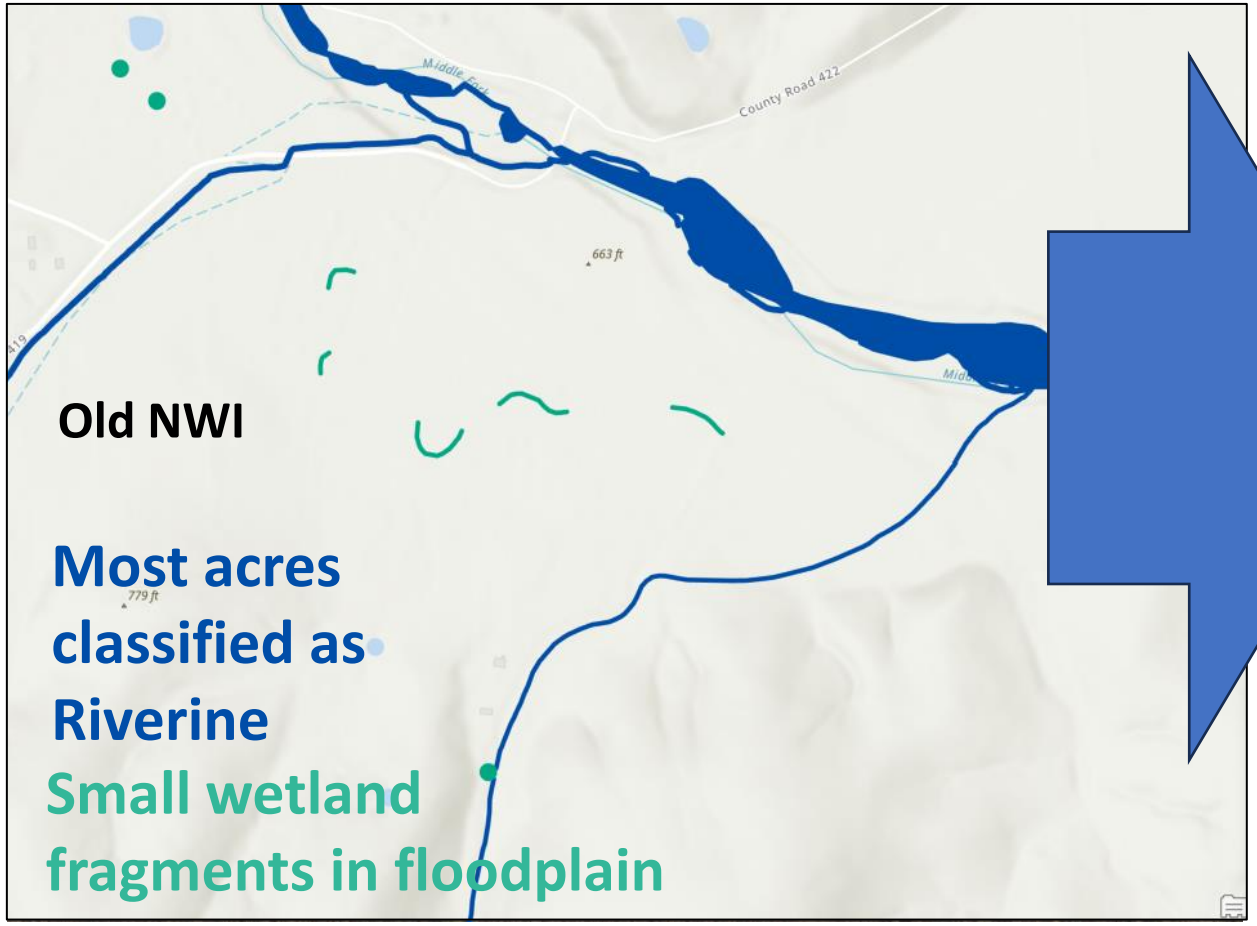
- Pilot Area: 4 square miles, in the Ozarks near Thomasville

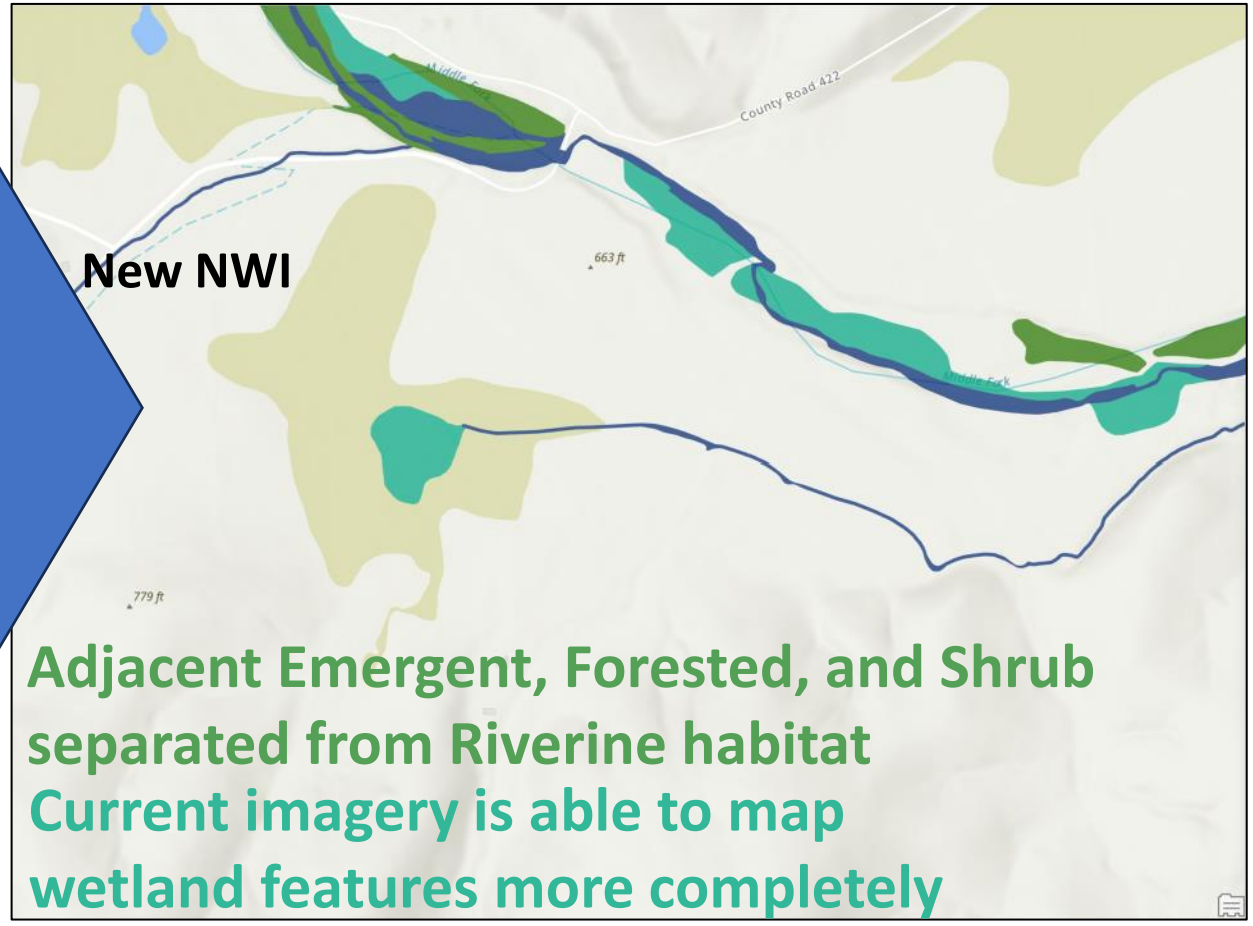


Comparison of Old NWI to New NWI

- Pilot Area: 1 mile across, in the Ozarks near Thomasville

Emergent Wetland
Forested Wetland
Pond
Riverine
Other (Farmed)





Updating MO's Stream and Wetland GIS Layers

NWI and other National GIS Data is Critical

- Serves an important role for multiple agencies and organizations

Integration is Necessary

- Focusing on a coordinated watershed approach for multiple GIS layers is and will benefit future wetland conservation