

Restoring More Natural and Beneficial Functions of Floodplains

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ASFPM Conference
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Founded in 1973, American Rivers protects wild rivers, restores damaged rivers, and conserves clean water for people and nature.



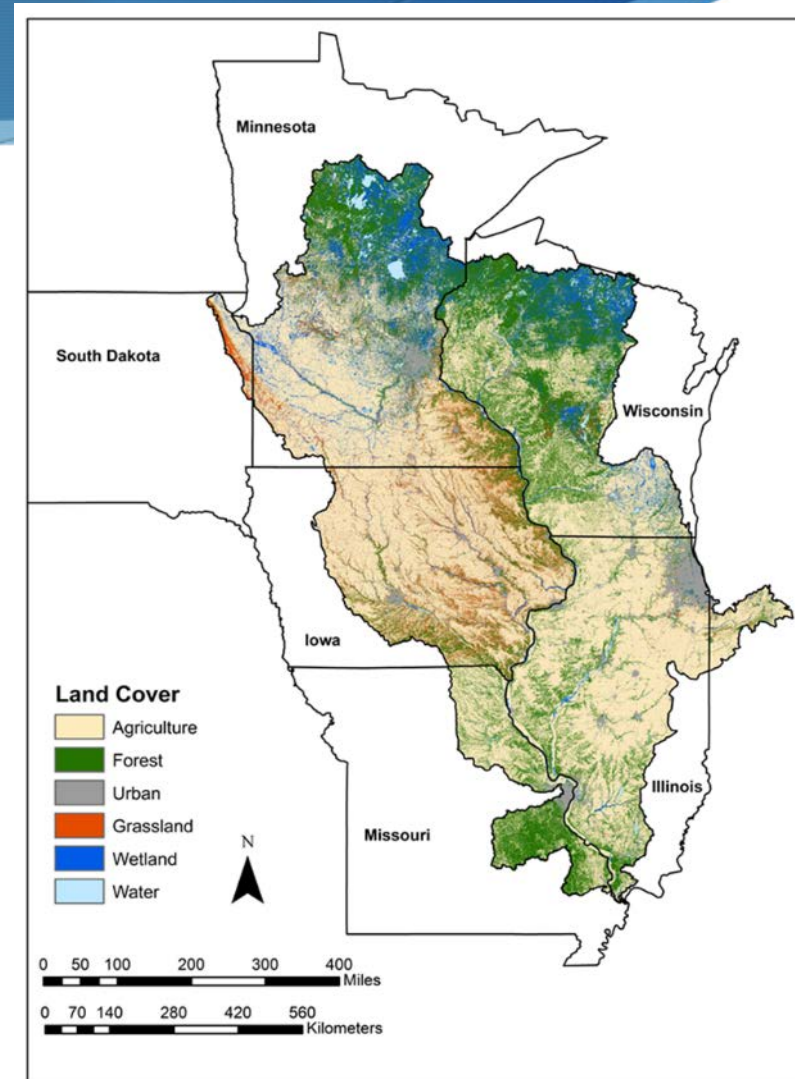
Headquartered in DC, American Rivers has offices across the country and more than 200,000 supporters, members, and volunteers nationwide



Upper Mississippi River Basin Floodplain Restoration

Presentation Outline:

- Summarize current projects in the basin
 - Nutrient Removal
 - Floodplain Easements
 - Farming in Floodplains
- Describe drivers and barriers





Restoring Functional Floodplains





Restoring the Multiple Benefits of Floodplains

Recreation



Water storage and groundwater recharge during floods



Photo by Chris Young



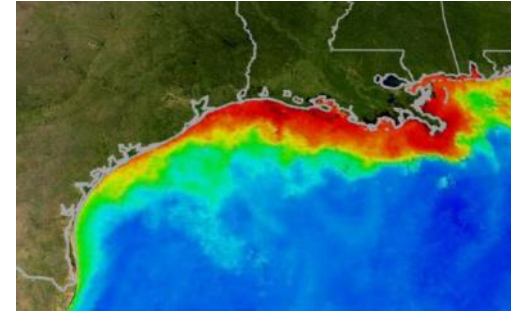


Research Project #1

Nutrient Removal

Completed a literature review on nutrient removal in floodplains

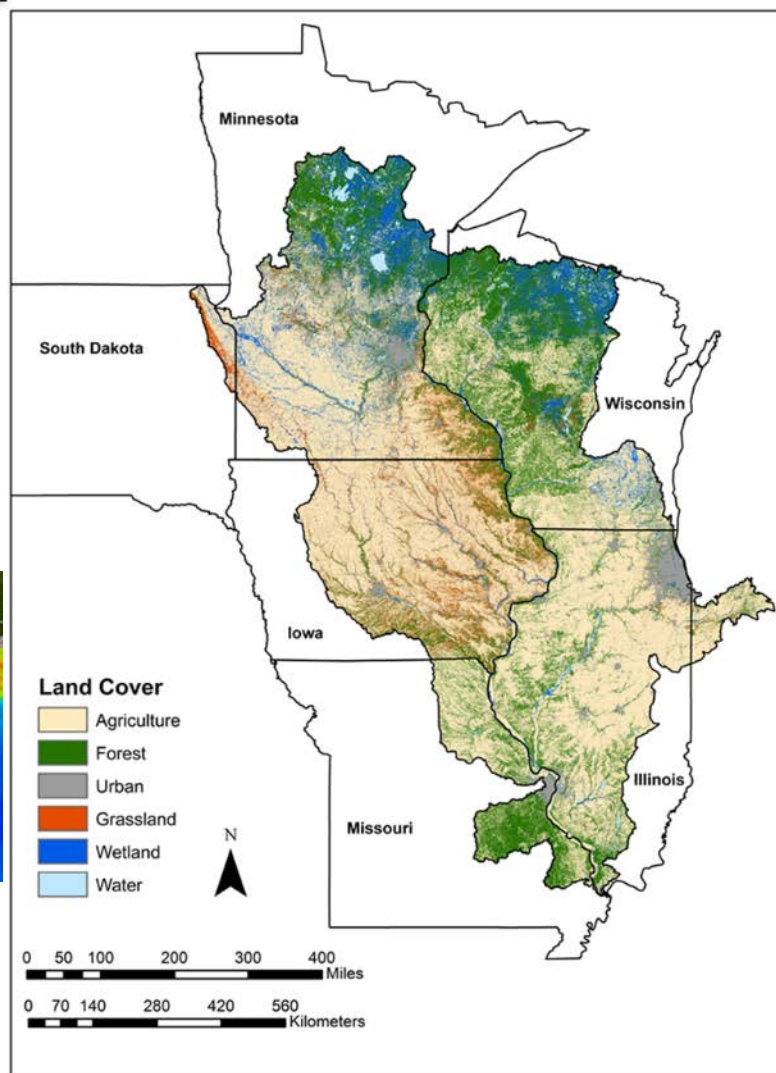
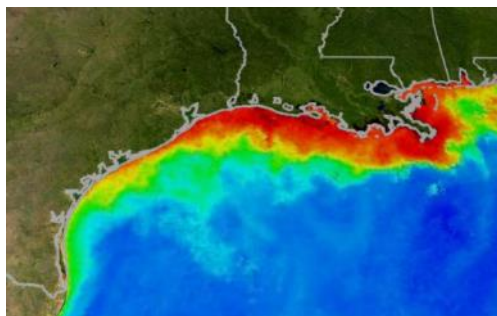
- 💧 **Goal:** direct nutrient removal funds toward floodplain restorations
- 💧 **Driver:** states are trying to spend money on the best practices while updating their strategies
- 💧 **Barrier:** uncertainty in how much nitrogen and phosphorus floodplains can remove





Nutrient Removal: Sources

Nitrogen Fertilizer



Phosphorus Fertilizer & Erosion





Nutrient Removal: Conservation Practices

Some examples:

- Cover Crops
- Conservation Tillage
- Nutrient Management
- Contour Buffer Strips
- Buffers
- Filter Strips
- Wetlands
- Water and Sediment Control Basins (WASCOBs)
- Bioreactors
- Saturated Buffers
- And others!





Nutrient Removal: Preliminary Results

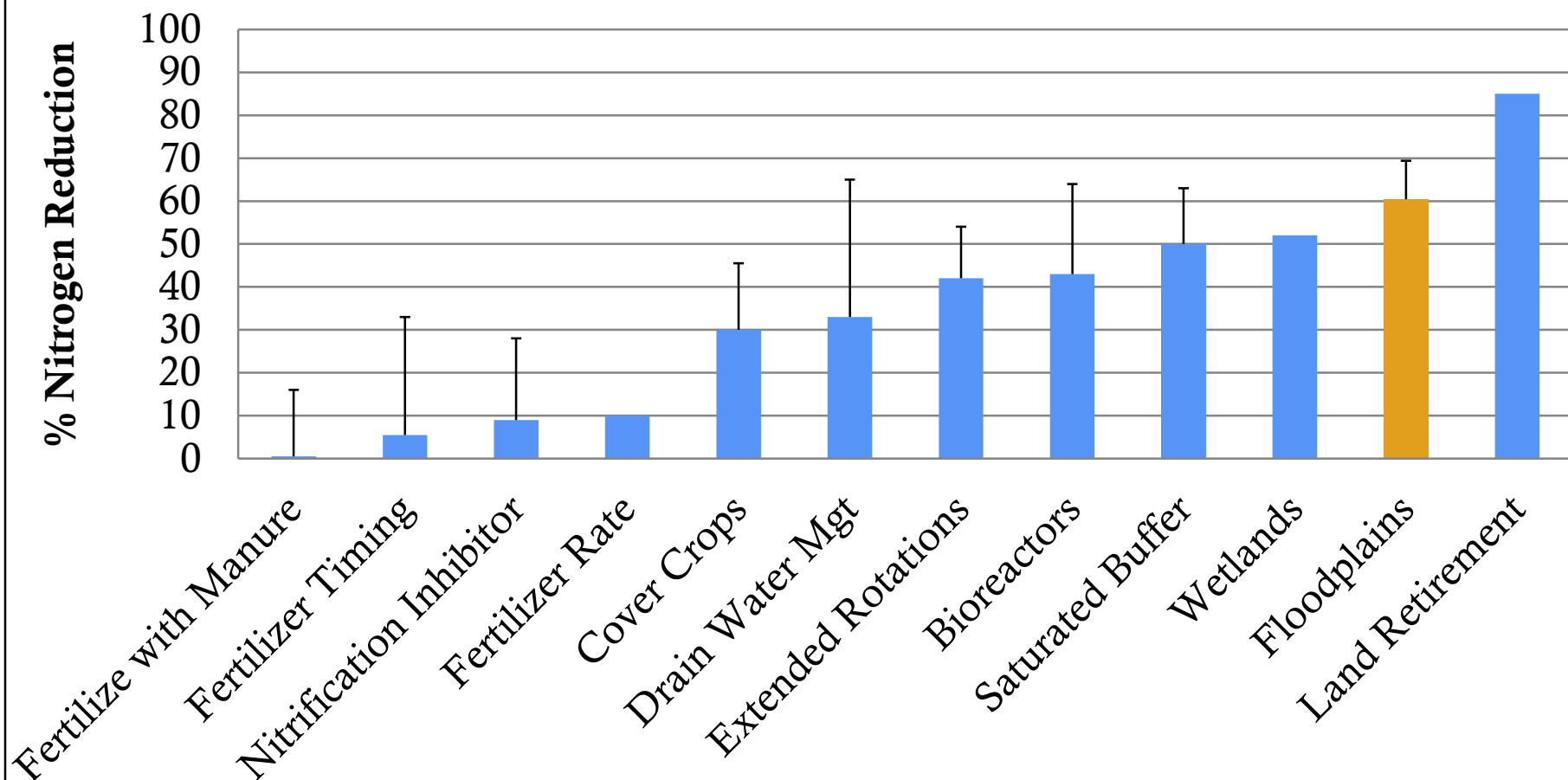
Average Removal in Floodplains

	Load reduction				n
	25 th (kg ha ⁻¹ yr ⁻¹)	75 th (kg ha ⁻¹ yr ⁻¹)	Mean (kg ha ⁻¹ yr ⁻¹)	Median (kg ha ⁻¹ yr ⁻¹)	
Nitrogen	77.1	260	200	137	28
Total Phosphorus	2.75	35.9	26.2	12.2	27



Nutrient Removal: Preliminary Results

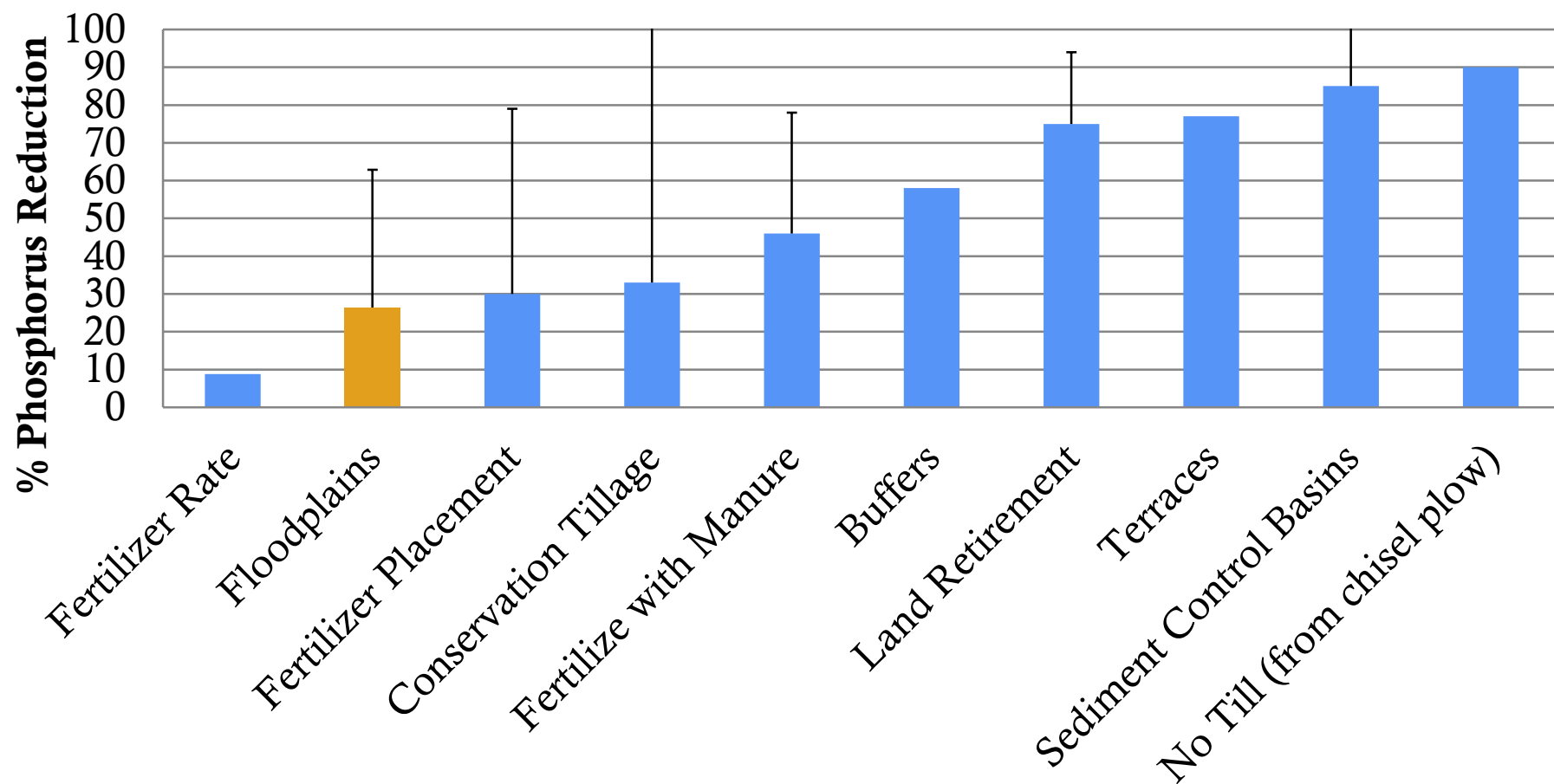
Conservation Practices in the Iowa Nutrient Reduction Strategy





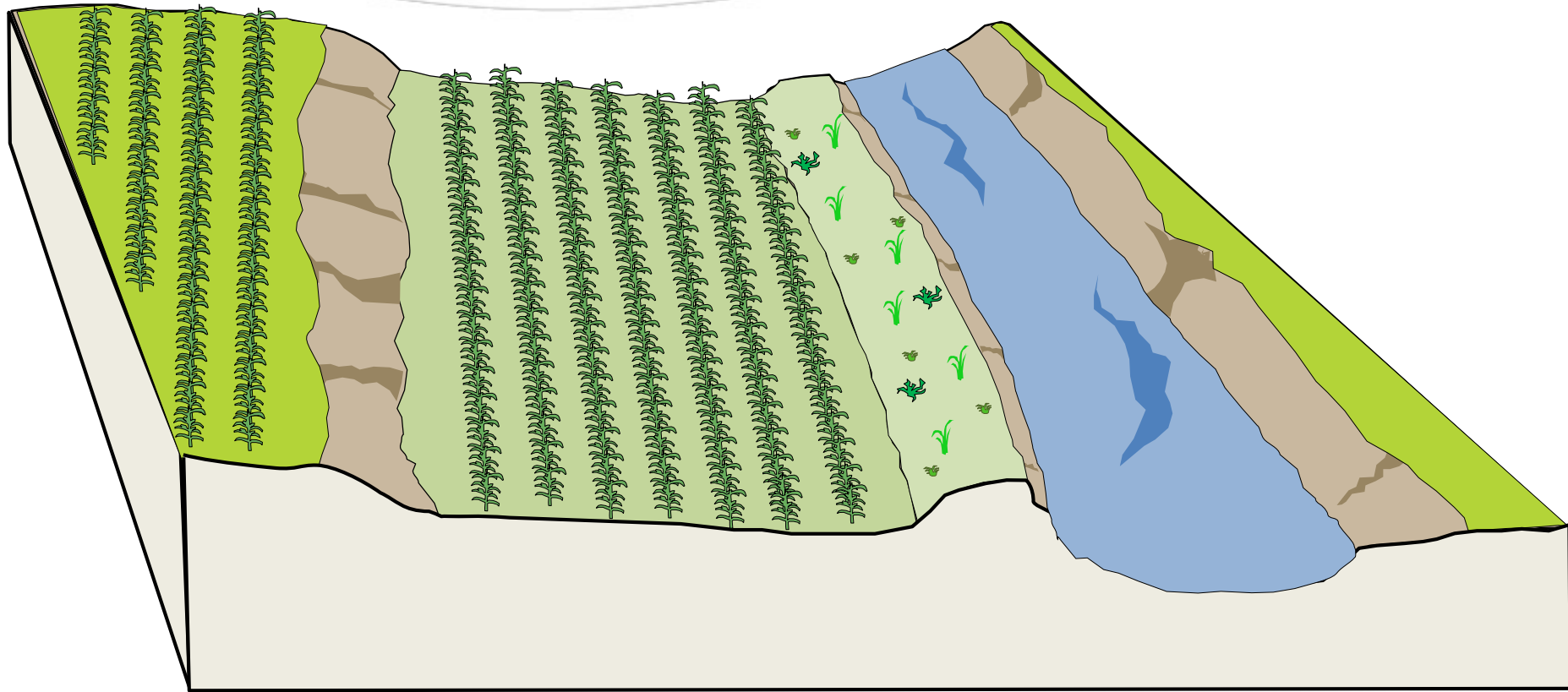
Nutrient Removal: Preliminary Results

Conservation Practices in the Iowa Nutrient Reduction Strategy



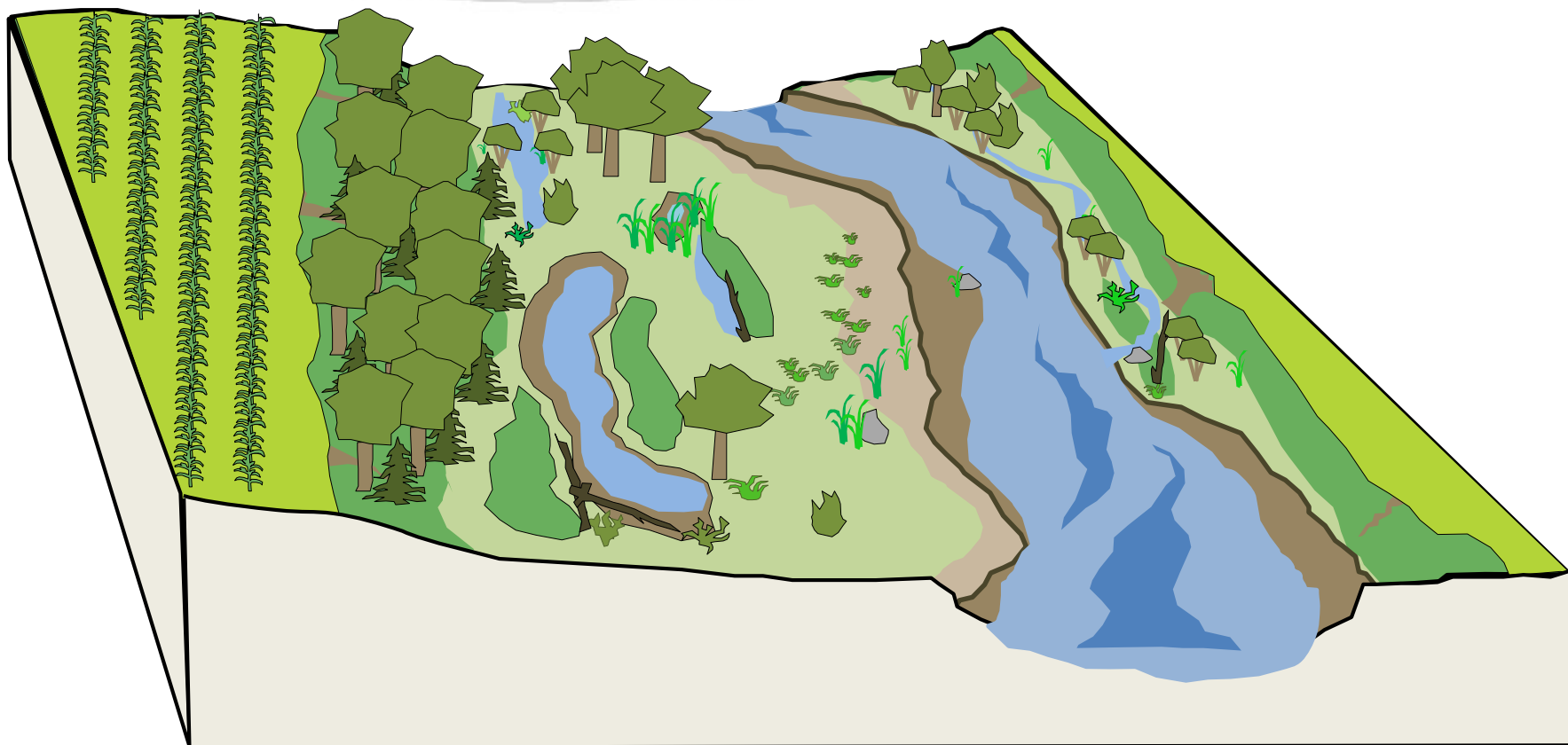


What should we restore for better nutrient removal?





What should we restore for better nutrient removal?



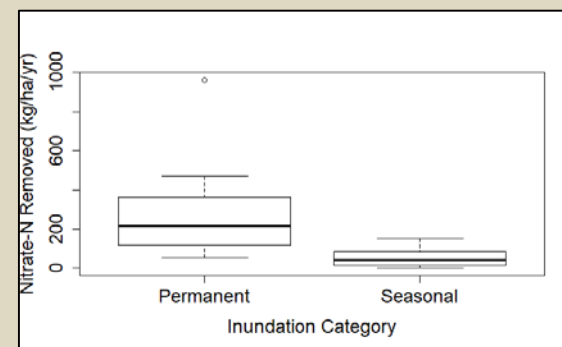


**Target river & stream reaches
with higher concentrations of
nitrogen and phosphorus.**



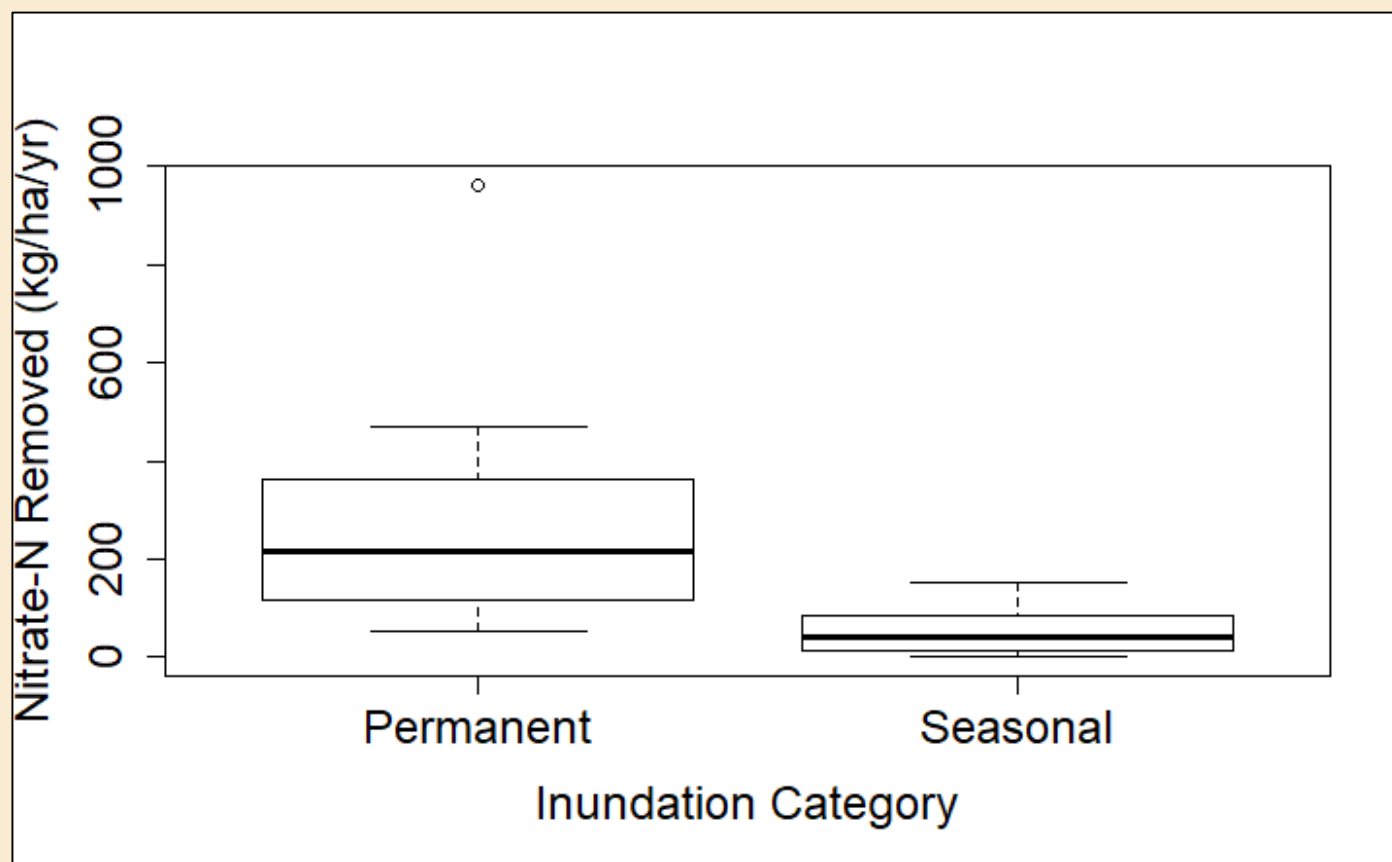


**Having permanent pools
improves nitrate removal.**





Having permanent pools improves nitrate removal.





**Denitrifying bacteria seem to
be more active during fluxes
of fresh flood water.**



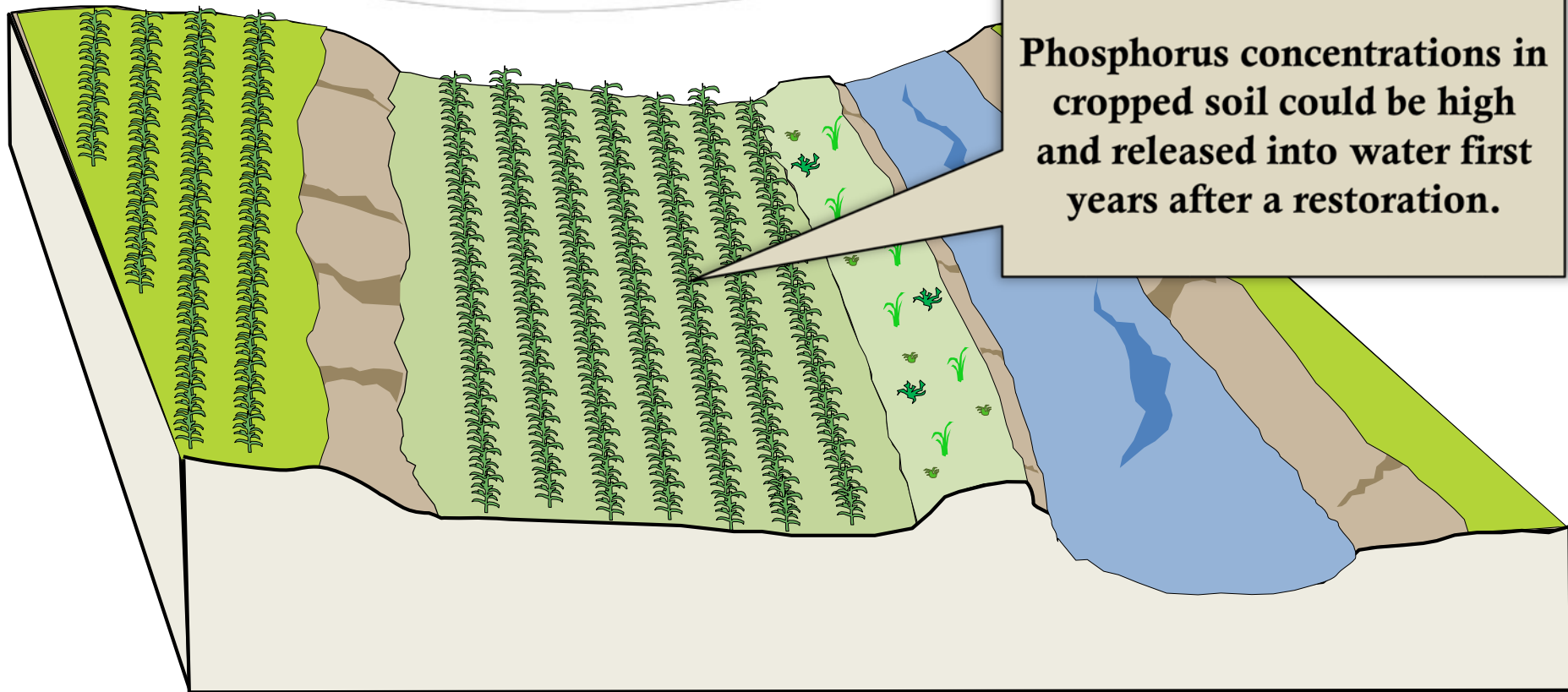


Restore diversity!





Legacy Phosphorus



Phosphorus concentrations in cropped soil could be high and released into water first years after a restoration.



Having vegetation and topography that improve sedimentation and accretion could be best for both nutrients' particle-bound forms.





Nutrient Removal: Harvesting Nutrients

- 💧 Harvesting vegetation could help to remove phosphorus
 - 💧 Harvesting depends on the goals of the restoration



Cattail Biomass to Energy:

Commercial-scale harvesting of cattail biomass for biocarbon and solid fuel

Richard E. Grosshans, IISD and Lorne Grieger, PAMI

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IISD REPORT
March 2013



Design conclusions

- 💧 It's about the Microbes!
- 💧 Permanent wetland somewhere on the floodplain
- 💧 Diverse geomorphology- maximize transition zones
- 💧 Set realistic expectations for first few years



Policy Takeaways

- 💧 Two requirements for spending nutrient reduction funds on floodplain restorations:
 - 💧 Quantify potential reductions
 - 💧 The data are becoming more available
 - 💧 Provide good demonstration sites
 - 💧 We still need more demonstration projects!!!



Restoration Project: Floodplain Easement Policies

- 💧 **Goal:** restore thousands of flood-prone acres to natural floodplain
- 💧 **Driver:** many farmers are tired of the repetitive flooding and are open to restoration
- 💧 **Barrier:** funding is difficult to access for easements or land purchases





Restoration Project: Floodplain Easement Policies

- 💧 Best easement funds for this project
 - 💧 ACEP- Wetland Reserve Easements
 - 💧 CREP Wetlands
 - 💧 FEMA disaster mitigation
 - 💧 EWP Floodplain Easements



Photo by Chris Young

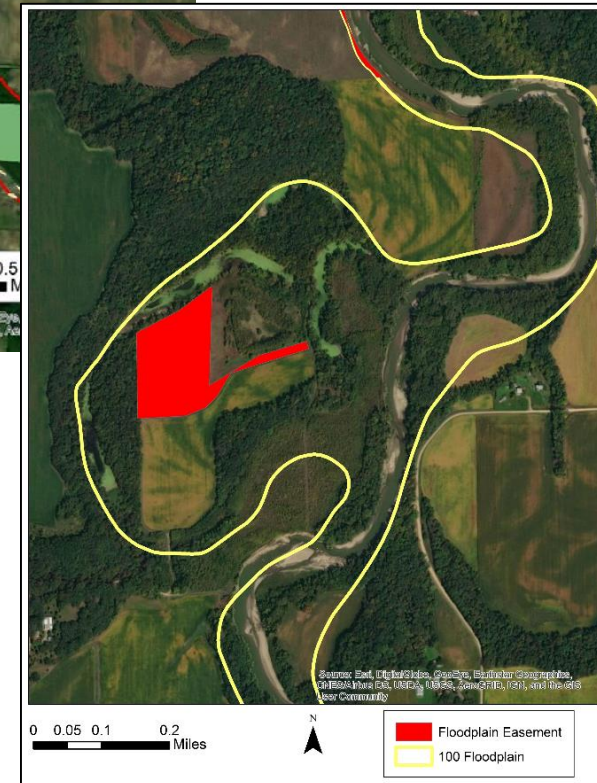
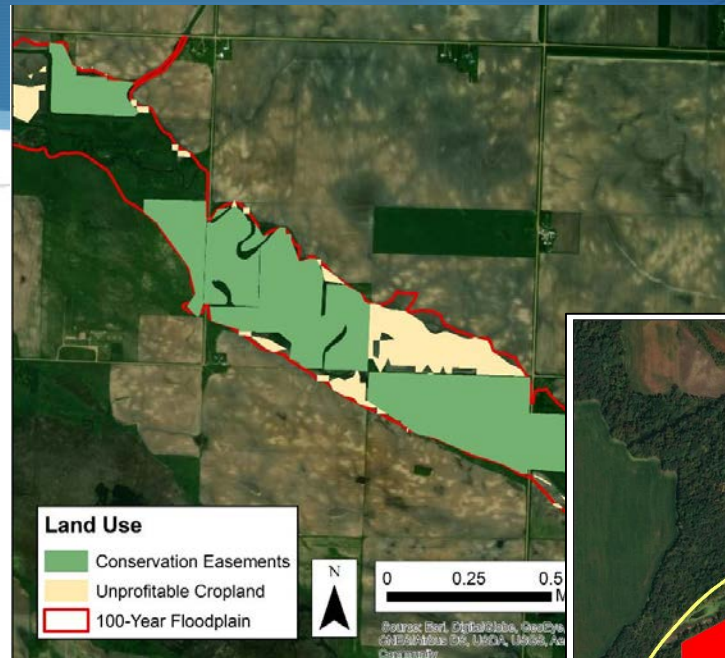


United States Department of Agriculture
Natural Resources Conservation Service



Ground-Level Perspective: Farming in Floodplains

- **Goal:** help landowners dealing with flooding and reconnect isolated floodplain easements
- **Driver:** farmers are tired of the flooding
- **Barriers:** it's difficult deciding whether to restore floodplains and finding the right program

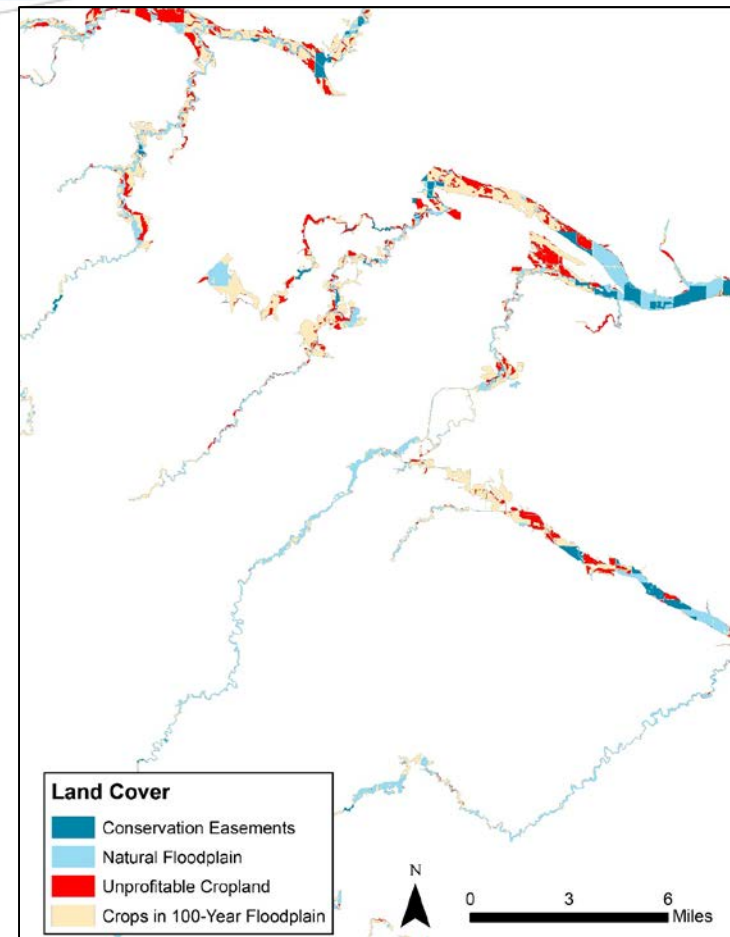




Ground-Level Perspective: Farming in Floodplains

Preliminary Results:

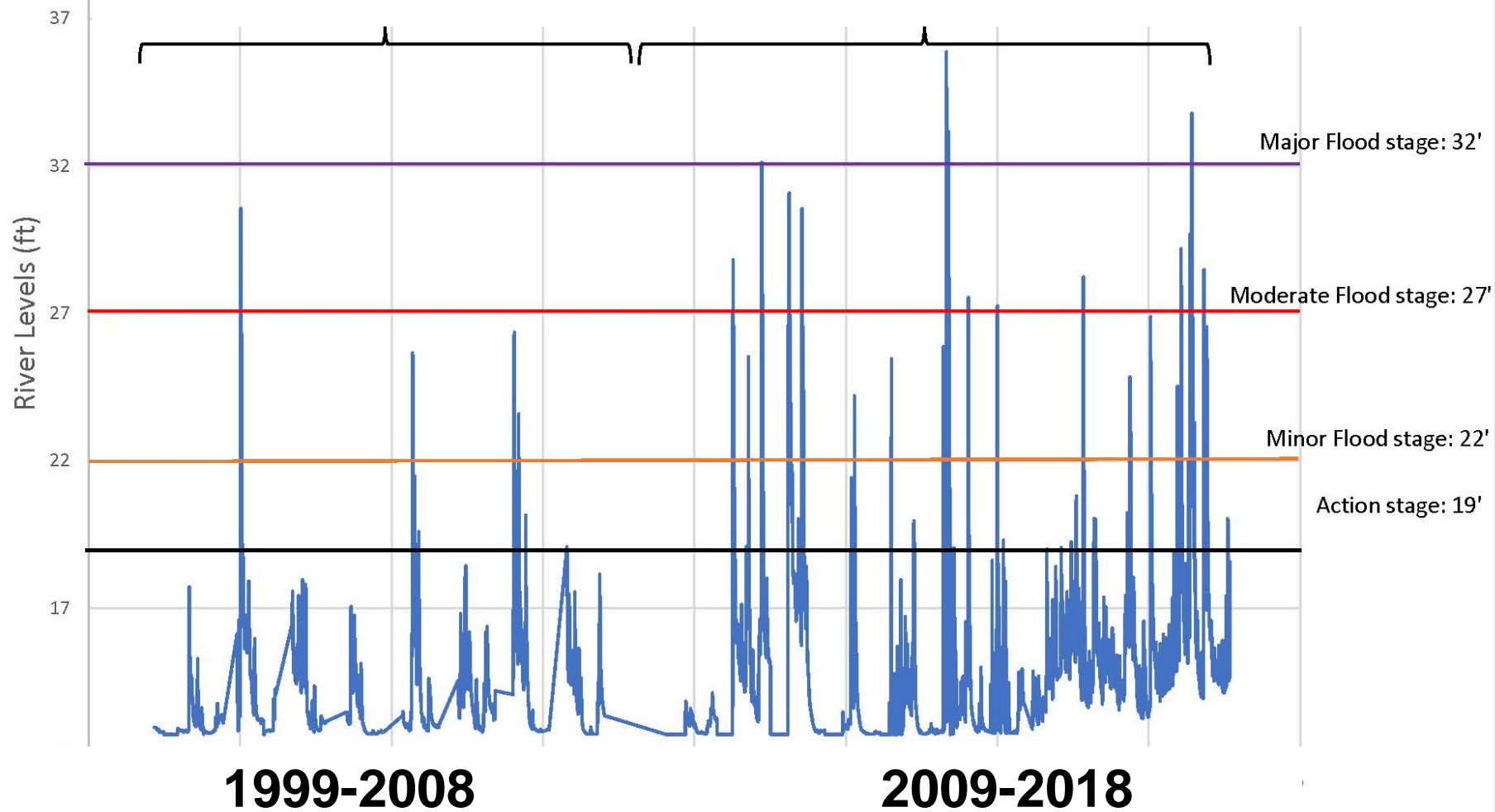
- In 2018, 50% of corn and 16% of soybeans grown in floodplains lost money – assuming farmer ownership.
- ~99% of rented floodplain cropland lost money





4 Floods

20 Floods





Ground-Level Perspective: Farming in Floodplains

More research for alternative practices
in the floodplain

- Perennial crops for wet areas?
- Hunting leases?



Photo by Chris Young



Photo by Chris Young



brewpublic.com



Overview

Annual sunflower (*Helianthus annuus*) is a valuable oilseed crop, which is also grown for ornamental purposes. In agricultural systems, perennial sunflower may allow farmers to diversify their operations while improving profits and providing on-farm environmental benefits. Compared to annuals, perennial crops provide long-term ground cover for longer periods during the year to protect against soil erosion, work in the growing season and are often less susceptible to frost. Additionally, fall-planted perennial crops provide superior soil retention and improve water use. During the perennial growing season, plants take up soil moisture, decreasing groundwater recharge and the risk of nitrogen from the soil. Our team combines traditional and modern breeding techniques to develop a perennial sunflower that is as productive as current commercial varieties but offers superior profit potential and ecosystem services for Minnesota farmers.



PILOT STUDIES

Most of our work will be conducted at the University of Minnesota greenhouse and on the Minnesota Agricultural Experiment Station (MAES). As a result of Minnesota's northern position in the northern part of the state, we have developed close collaborations with the Southern and Plant Biology Research Unit of the USDA in Fargo, ND and other on-farm experimental studies in the Great Plains. We believe that climate-resilient buffer crops around farms, orchards, and wetlands provide an excellent opportunity for us to introduce this new perennial crop to landowners. Depending on the success of the buffer crop pilot studies we hope to work with landowners to develop regional perennial sunflower trials in Minnesota.

**Forever Green Initiative:
PERENNIAL SUNFLOWER**

Potential as an oilseed crop

More information:
Don Wynn: wynn001@umn.edu
www.forevergreen.umn.edu



College of Food, Agricultural
and Natural Resource Sciences
UNIVERSITY OF MINNESOTA



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Conclusions

- 💧 **Solutions for overcoming the barriers**
 - 💧 More demonstration projects for nutrient removal
 - 💧 More emphasis and involvement in EWP Floodplain Easements
 - 💧 More options and ideas for farmers

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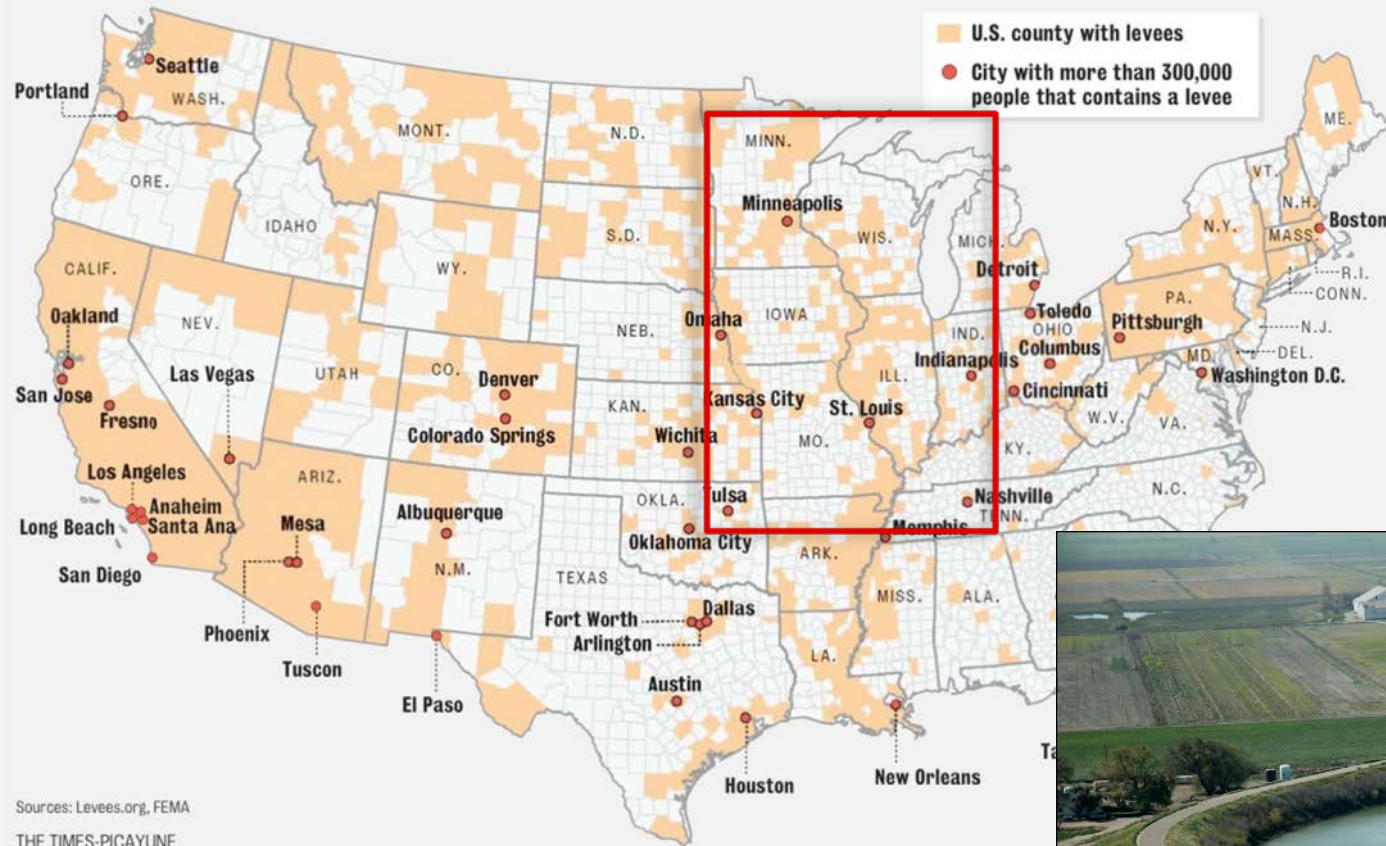
IT'S CALLED FLOOD
PLAIN BECAUSE IT
IS PLAIN THAT IT
FLOODS!!
REMEMBER "93"
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AMERICAN RIVERS

Floodplain Disconnection

LEVEES EVERYWHERE There are 881 counties in the U.S. with levees. Those counties contain more than 50 percent of the nation's population.



~8,000 miles of levees in the
Upper Mississippi River Basin
(Galloway Report, 1995)



Rivers Flood

Floods drive natural processes and ecosystem functions that sustain rivers and create floodplains.



Floodplains support natural functions