



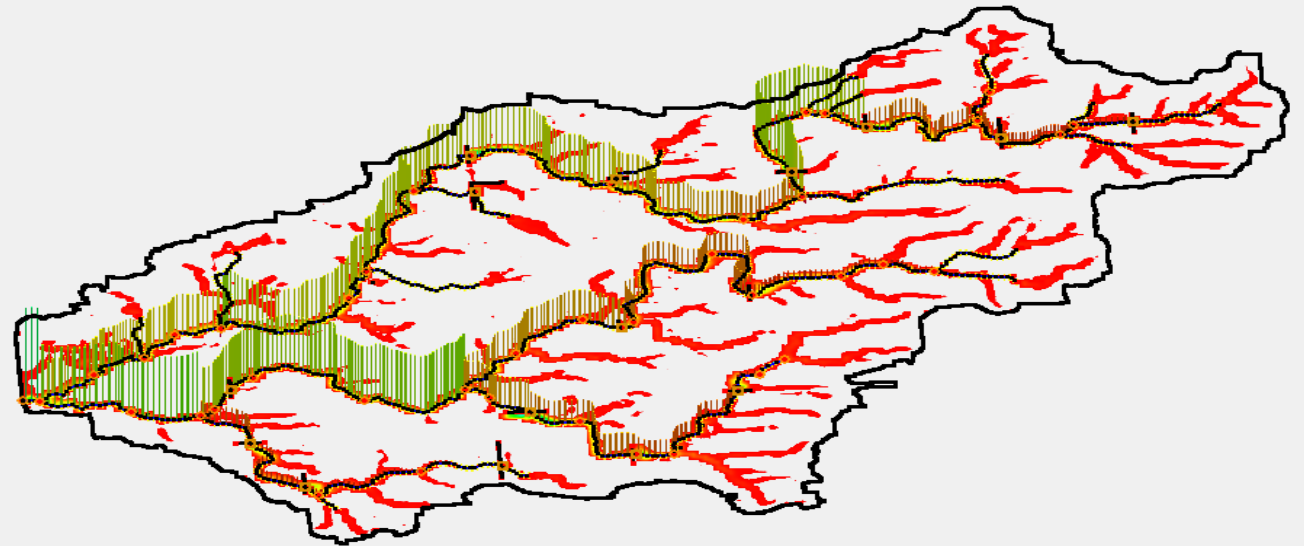
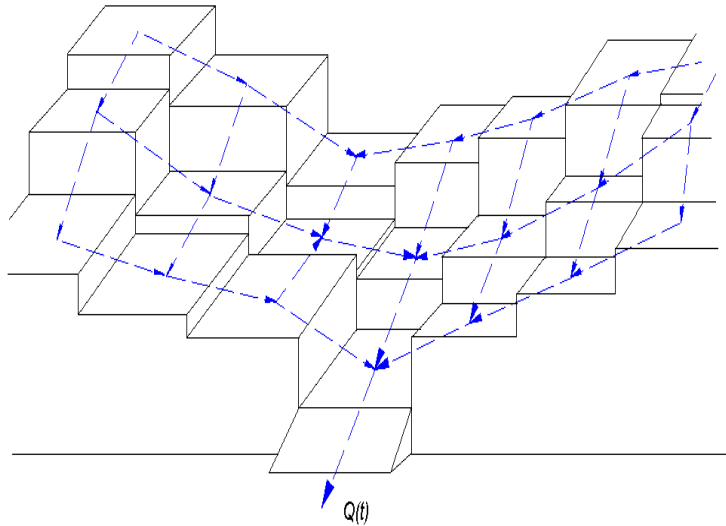
Altered Hydrology: Going Beyond Best Management Practices (BMPs) to Clean Water

Jim Solstad, Retired

Division of Ecological and Water Resources

Cedar River Watershed District – October 16, 2017

GSSHA – Gridded Surface Subsurface Hydrologic Analysis



Collaborative for Sediment Source Reduction Greater Blue Earth River Basin

Summary of Findings (March 2017):

- **“Achieving water quality standards will require priority investment in more temporary water storage to reduce high river flows and bluff erosion. This is a critical component of a strategy to reduce sediment in the Minnesota River.”**

Dr. Shawn Schottler Clean Water Council presentation (March 20, 2017):

So BMPs/Conservation Practices Don't Work?

Individually effective—Collectively not enough

And

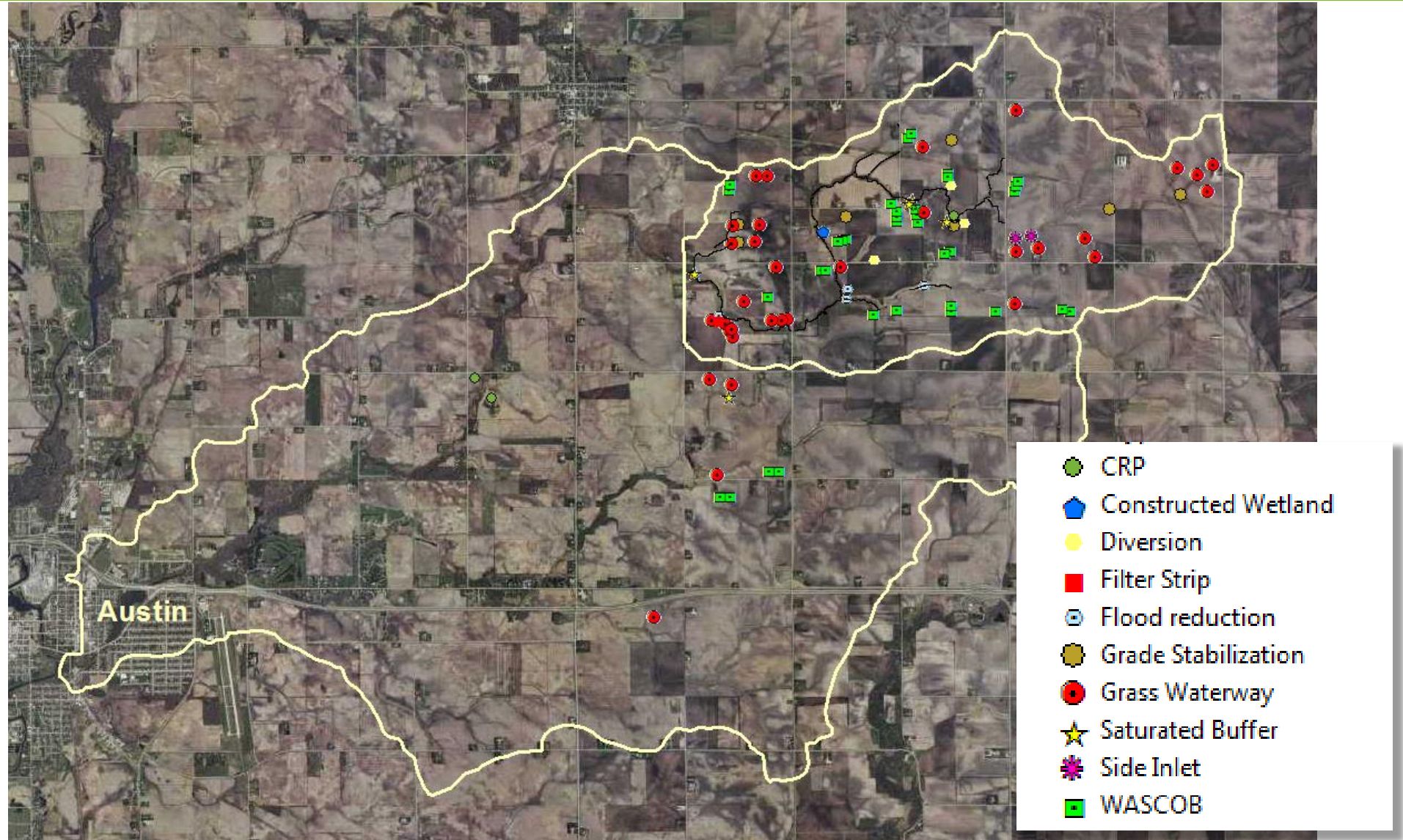
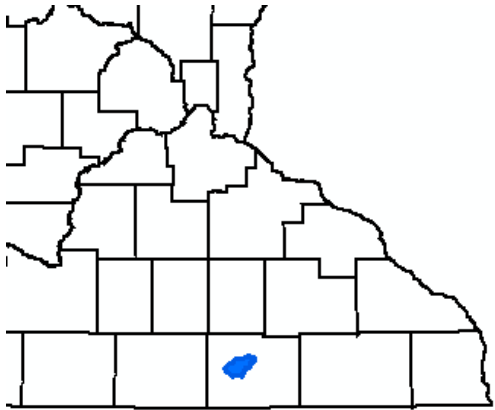
We are doing other practices that 'negate' conservation

Perennial Cover Cover Crops “Soil Health”

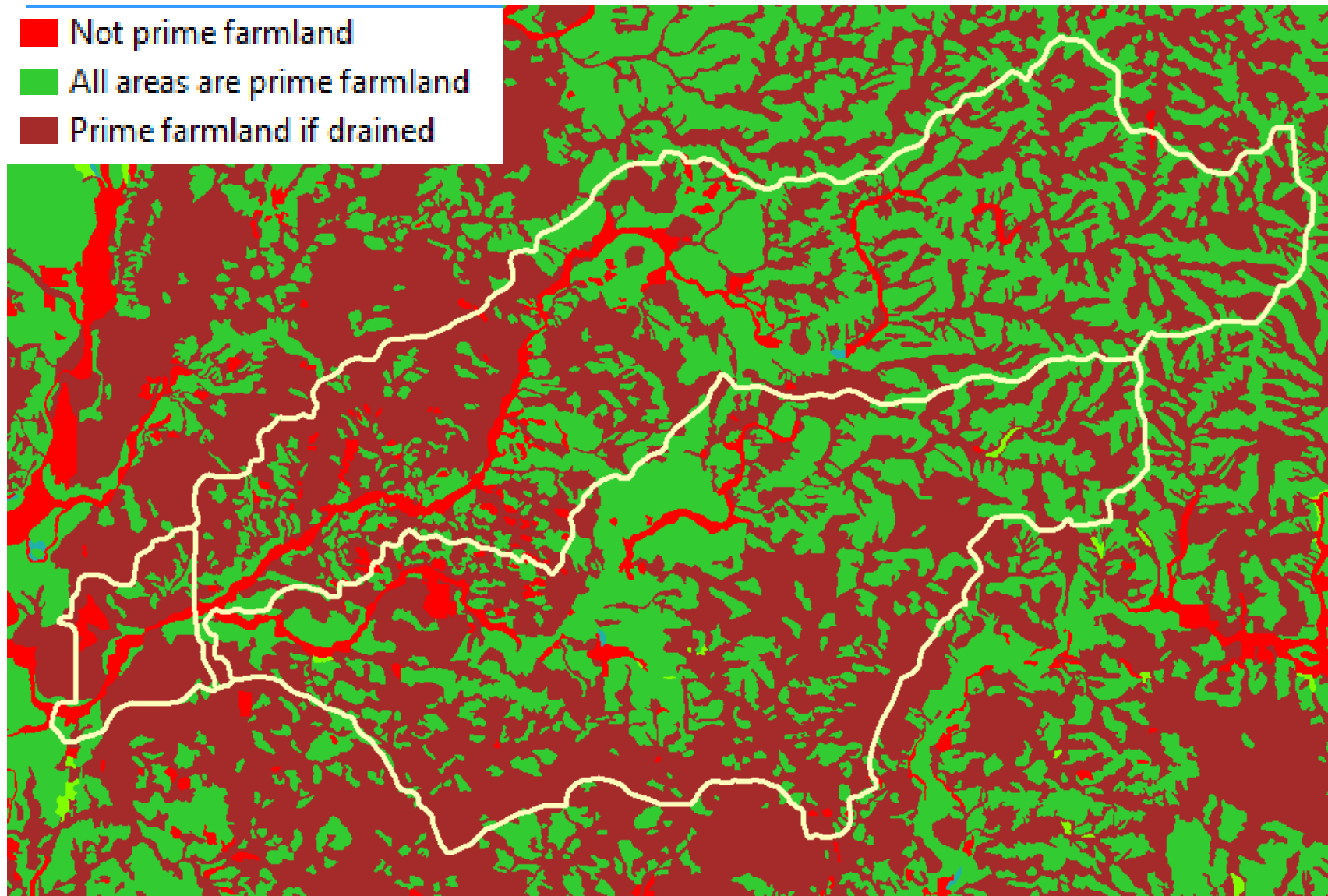


Miller, T. P. , J. R. Peterson, C. F. Lenhart,
and Y. Nomura. 2012. The Agricultural
BMP Handbook for Minnesota. Minnesota
Department of Agriculture.

BWSR Targeted Watershed Program: Dobbins Creek Cedar River Watershed District



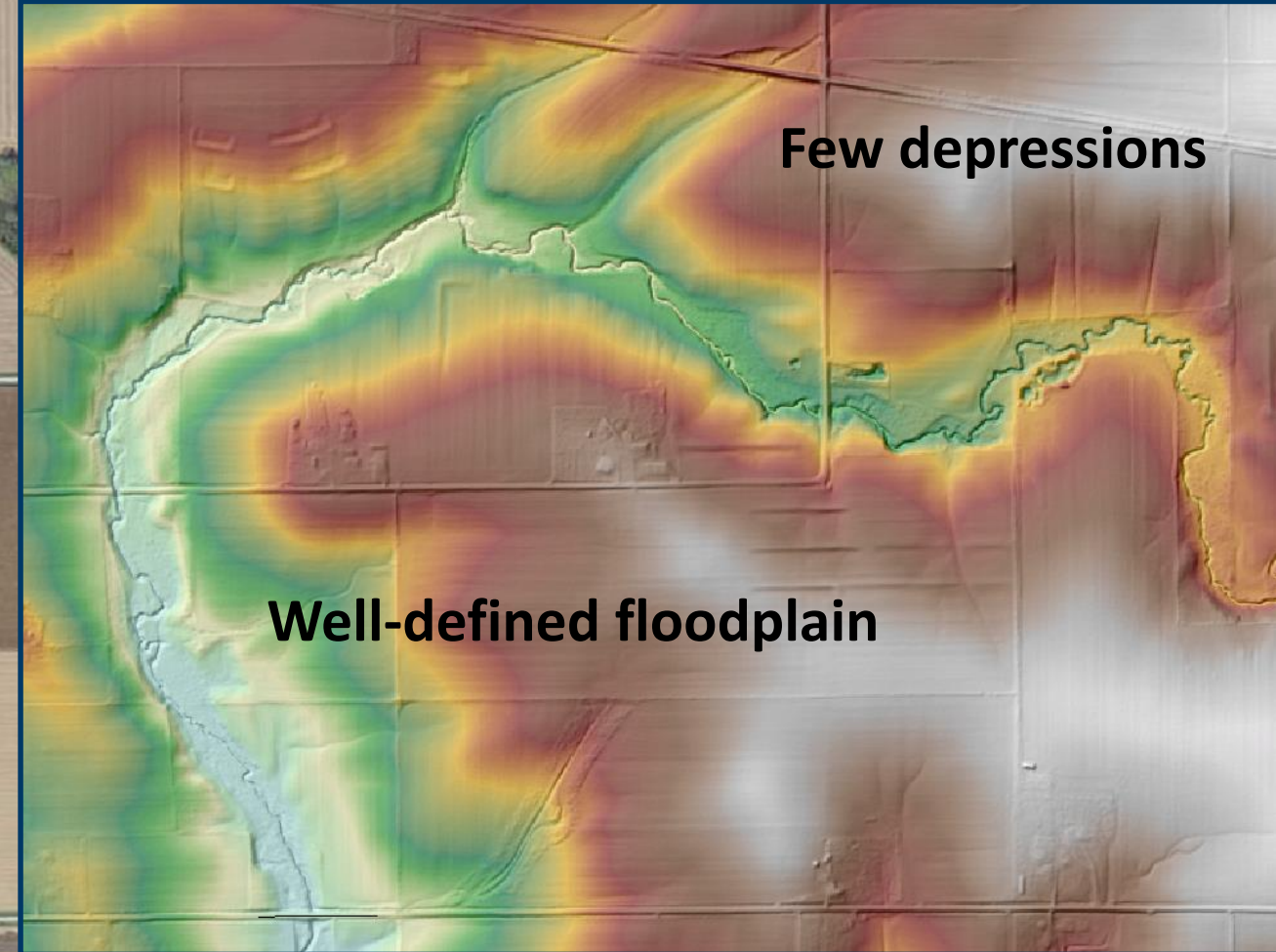
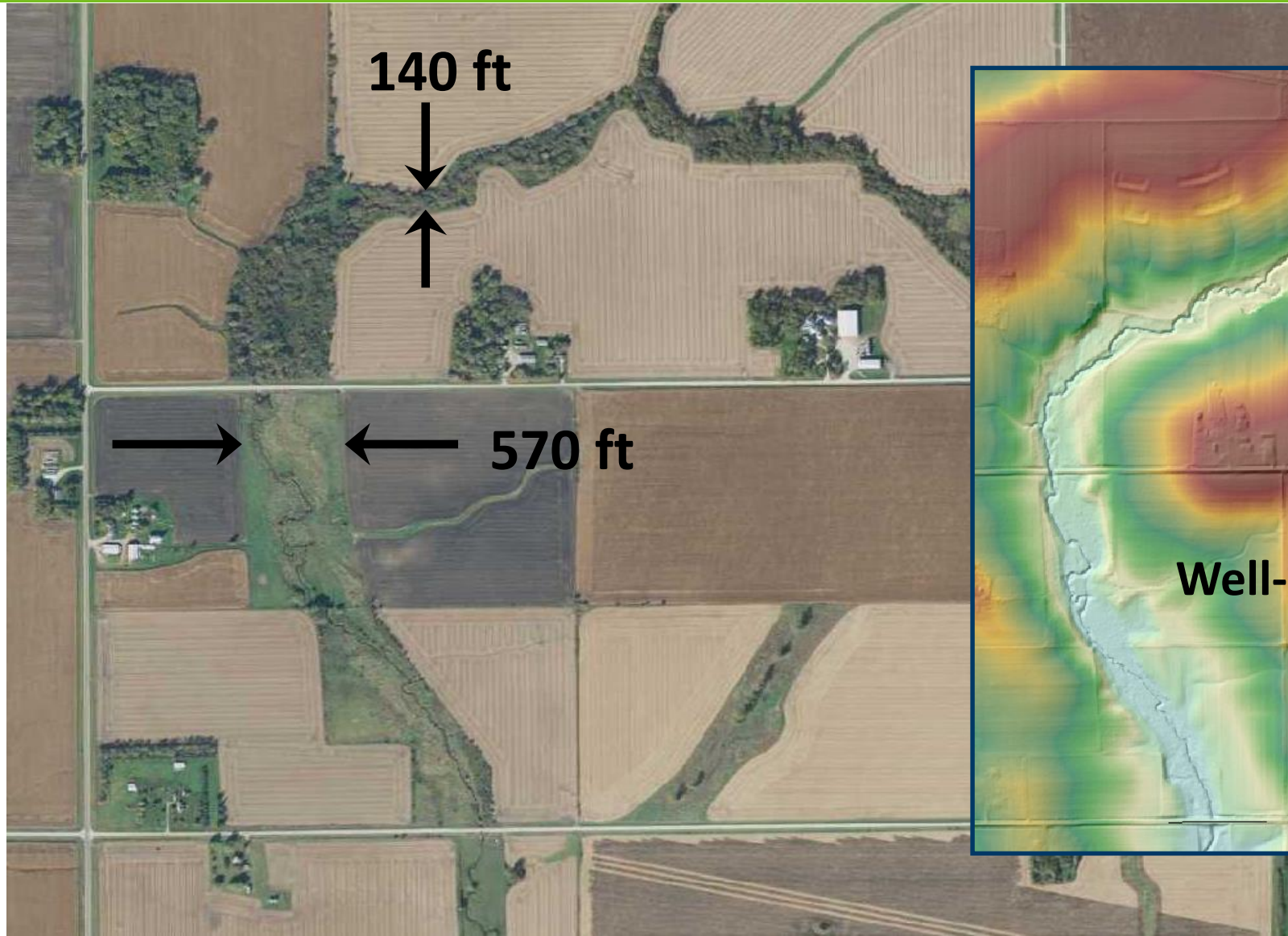
Prime Farmland if drained



High Water Table → Extensive subsurface drainage



Existing riparian corridor few depressions



BMPs of choice:

Water and Sediment Control Basins (WASCOBs)



Photo courtesy MN NRCS

Grassed Waterways



Photo courtesy USDA NRCS

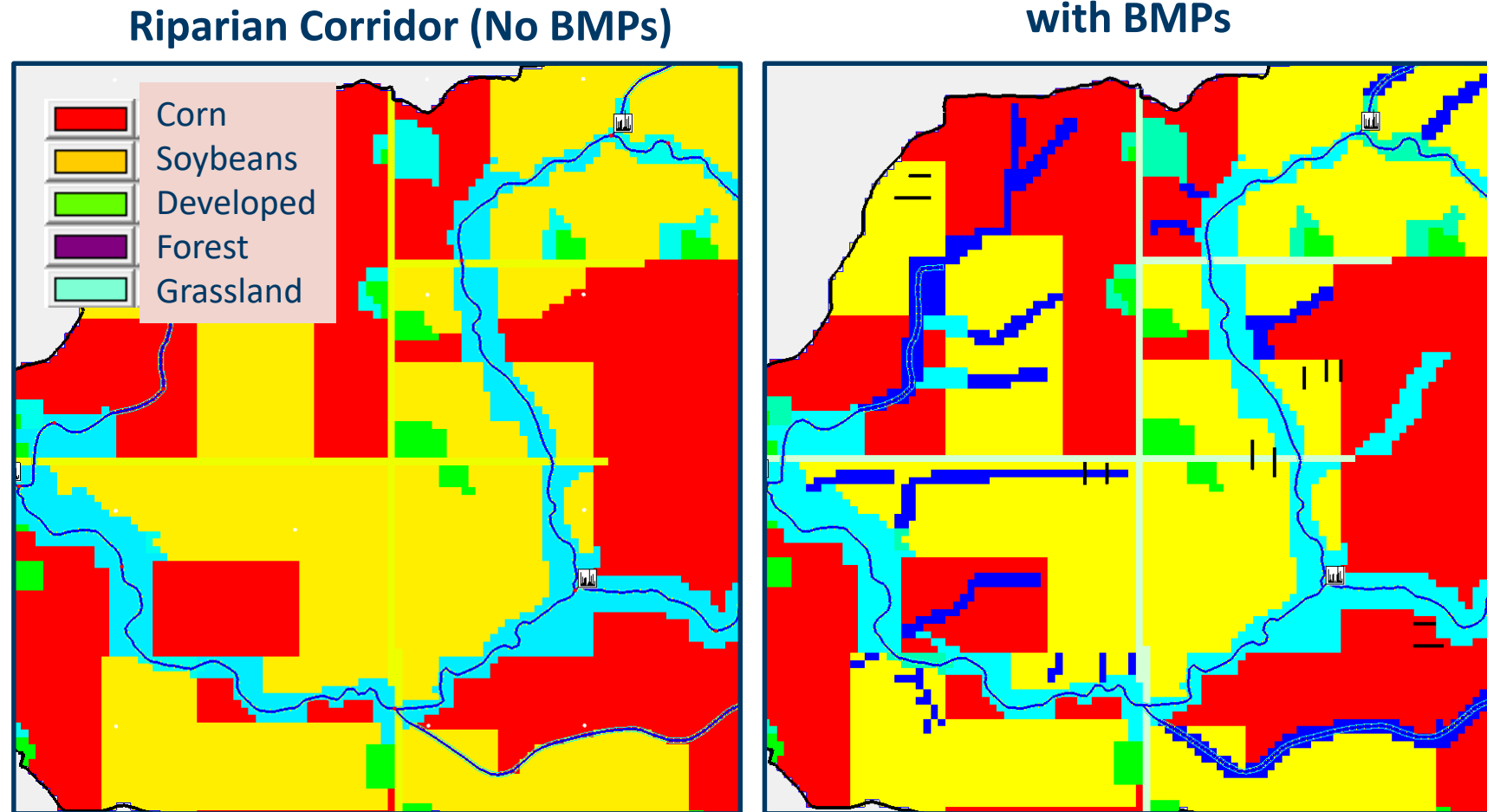
Buffers



Model Scenarios

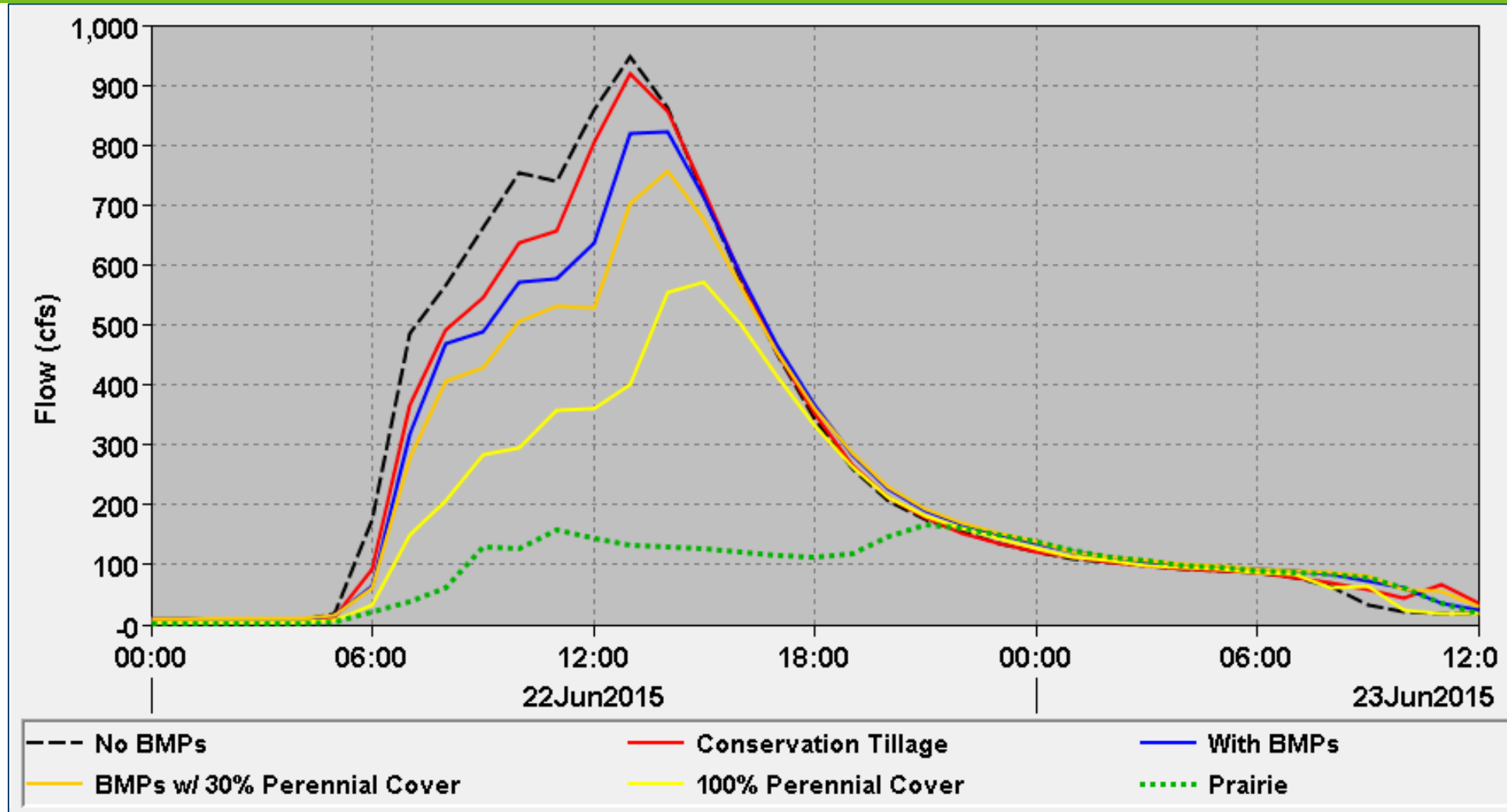
- Riparian Corridor (No BMPs)
- Conservation Tillage
- With BMPs
- BMPs w/ 30% Perennial Cover
- 100% Perennial Cover
- Prairie

Example Land Use Maps



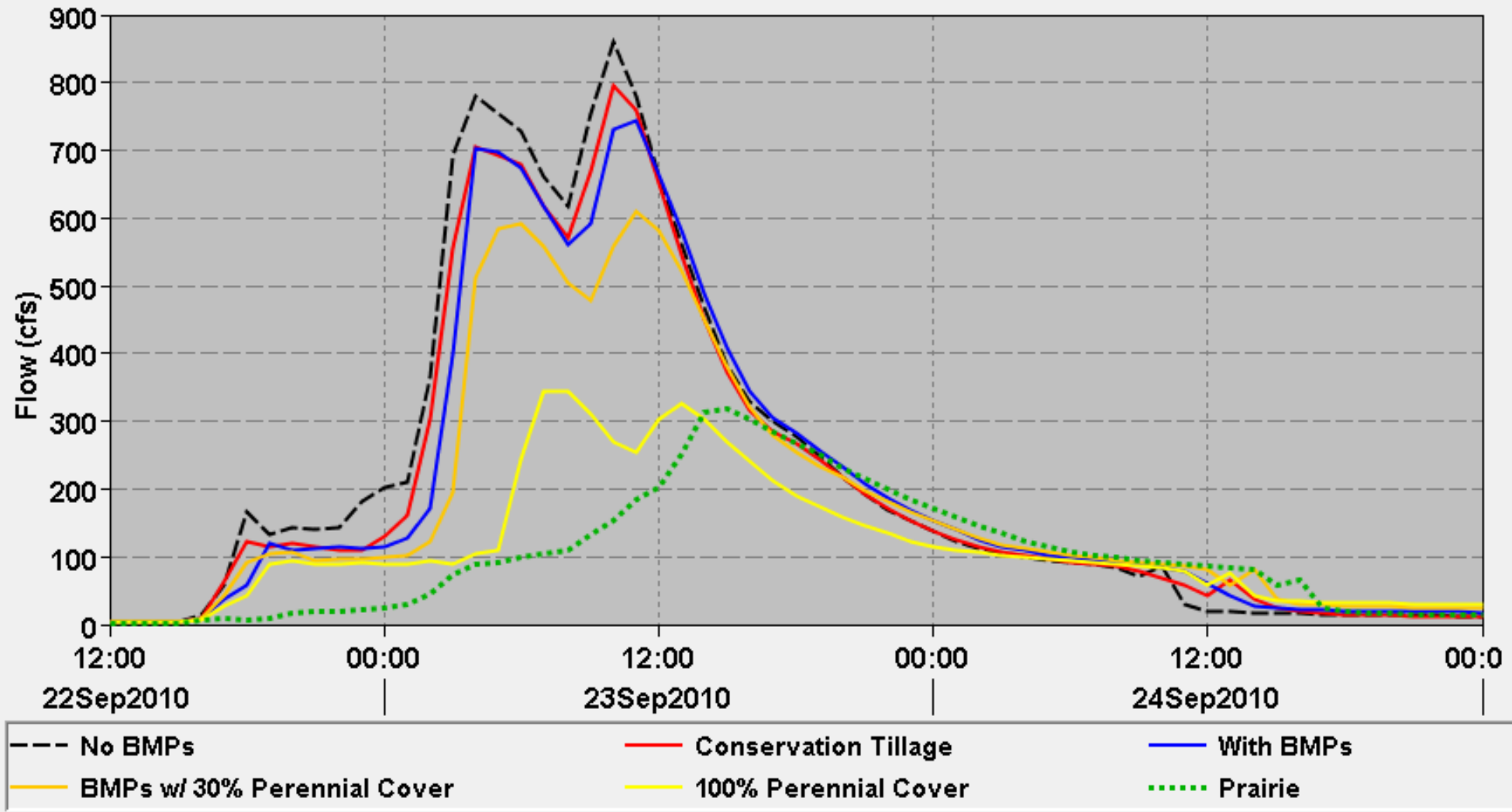
Computed Flows

(2.6" rainfall – June 2015)



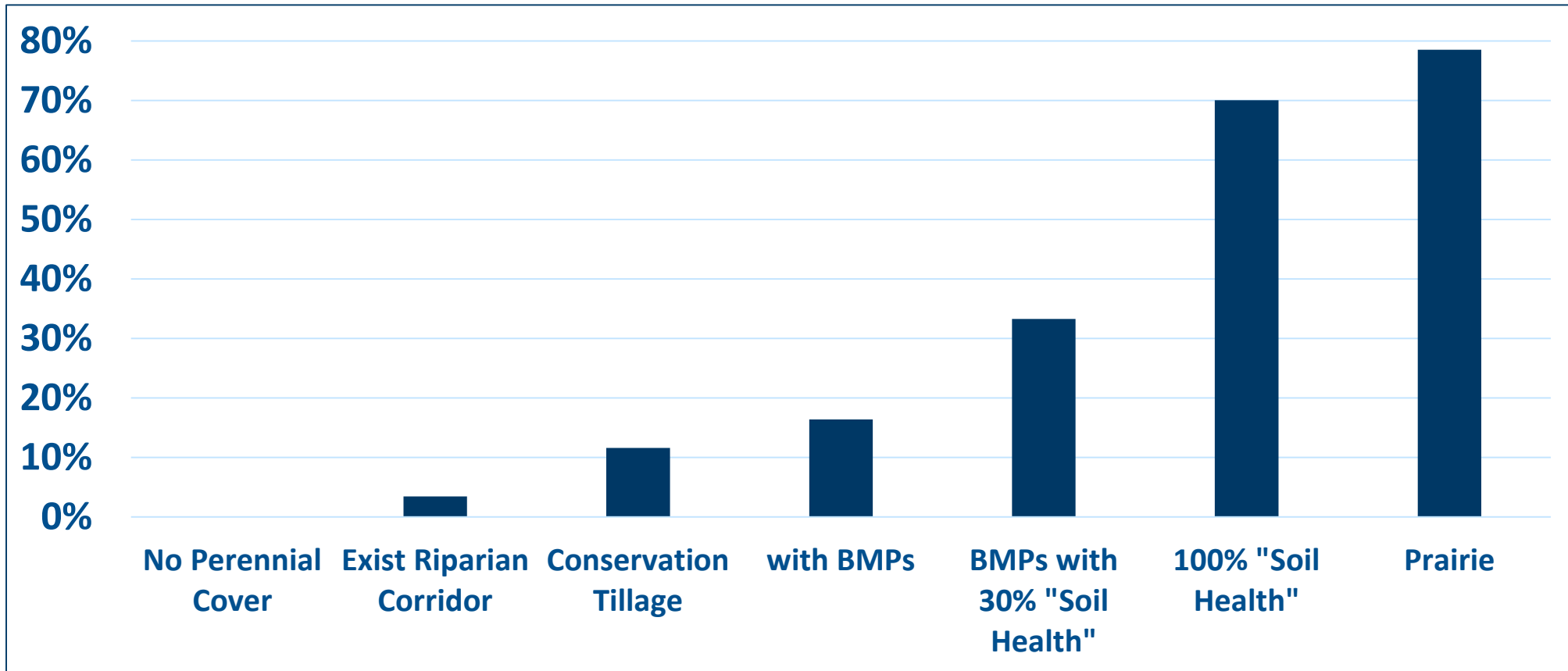
Computed Flows

(4.6" rainfall – September 2010)

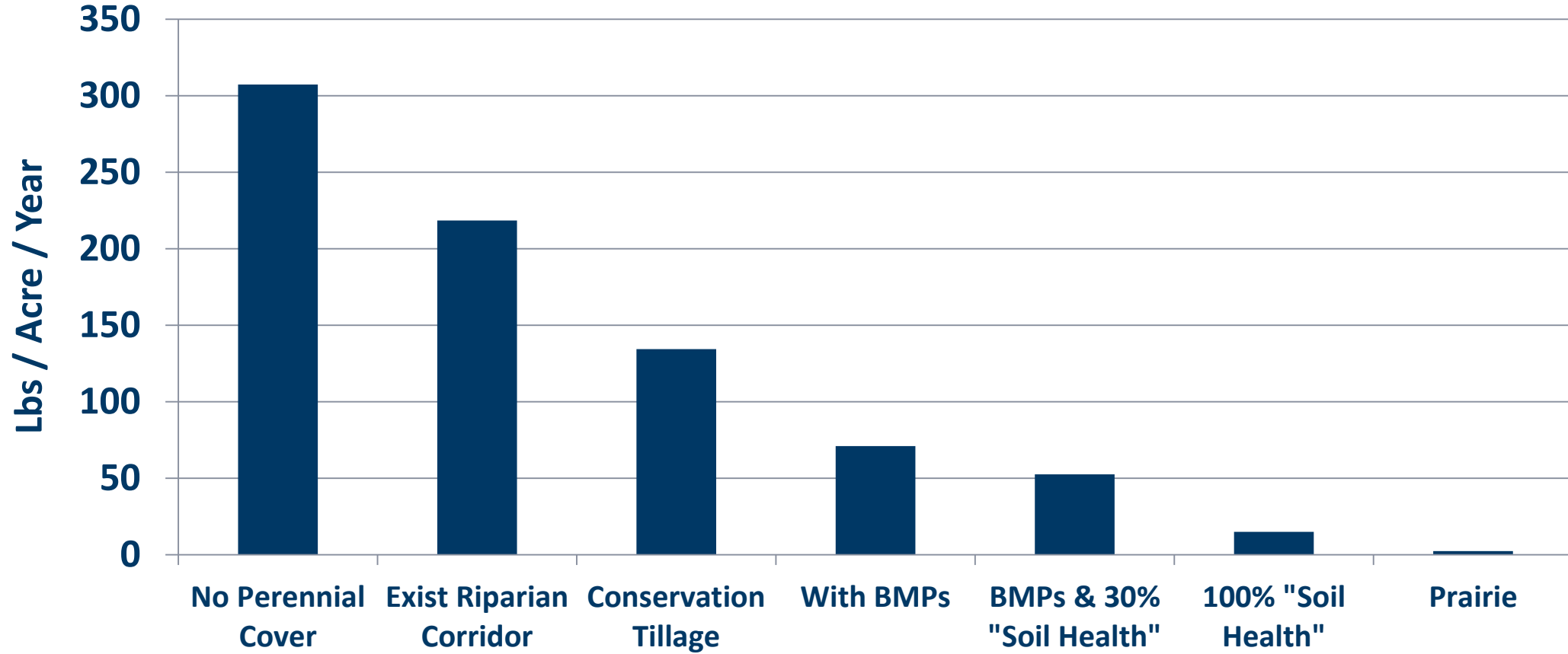


Average Peak Flow Reduction

8 summer rainfall events (2009-2015)



Sediment Entering Channels



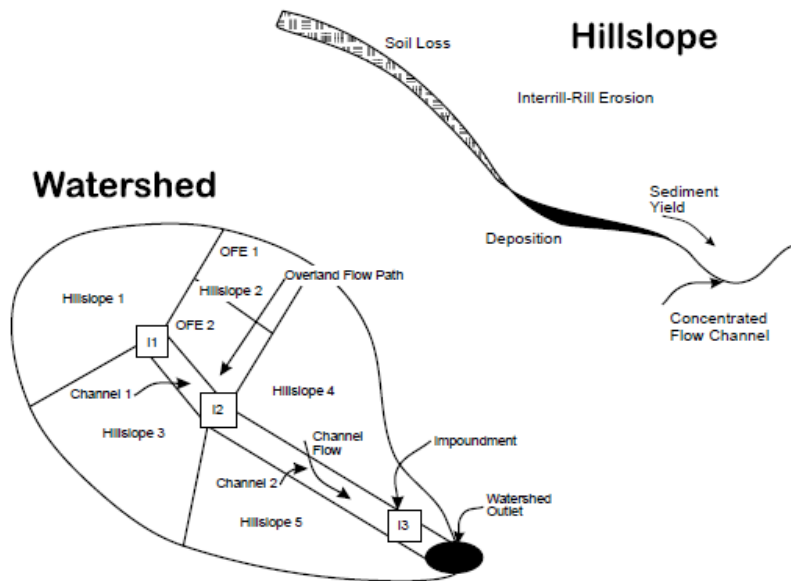
WEPP: Water Erosion Prediction Project



Technical
Documentation



USDA-Water Erosion Prediction Project (WEPP)



USDA - Agricultural Research Service
USDA- Natural Resource Conservation Service
USDA - Forest Service
USDI - Bureau of Land Management

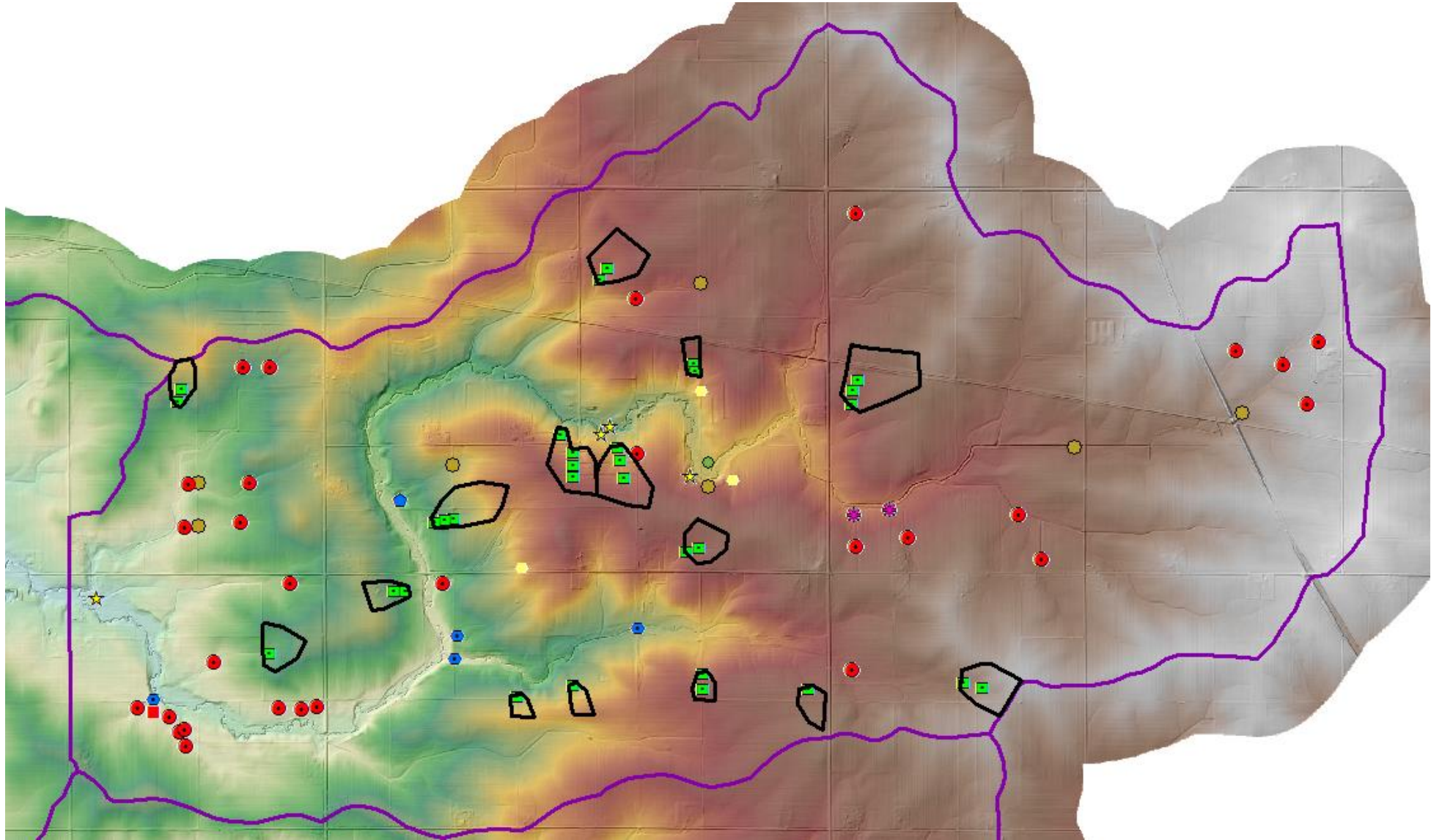
NSERL Report No. 10
National Soil Erosion Research Laboratory
USDA-ARS-MWA
1196 SOIL Building
West Lafayette, IN 47907-1196

	Hydrologic Soil Group		
	A	B,C	D
Fallow	1.00	1.00	1.00
Conv. Tillage - Corn	1.35	1.58	1.73
Conv. Tillage - Soybeans	1.39	1.70	2.00
Conserv. Till. - Corn	1.48	1.79	2.21
Conserv. Till. - Soybeans	1.50	1.91	2.49
Small Grain	1.84	2.14	2.48
Alfalfa	2.86	3.75	6.23
Pasture (Grazed)	3.66	4.34	5.96
Meadow (Grass)	6.33	9.03	15.5

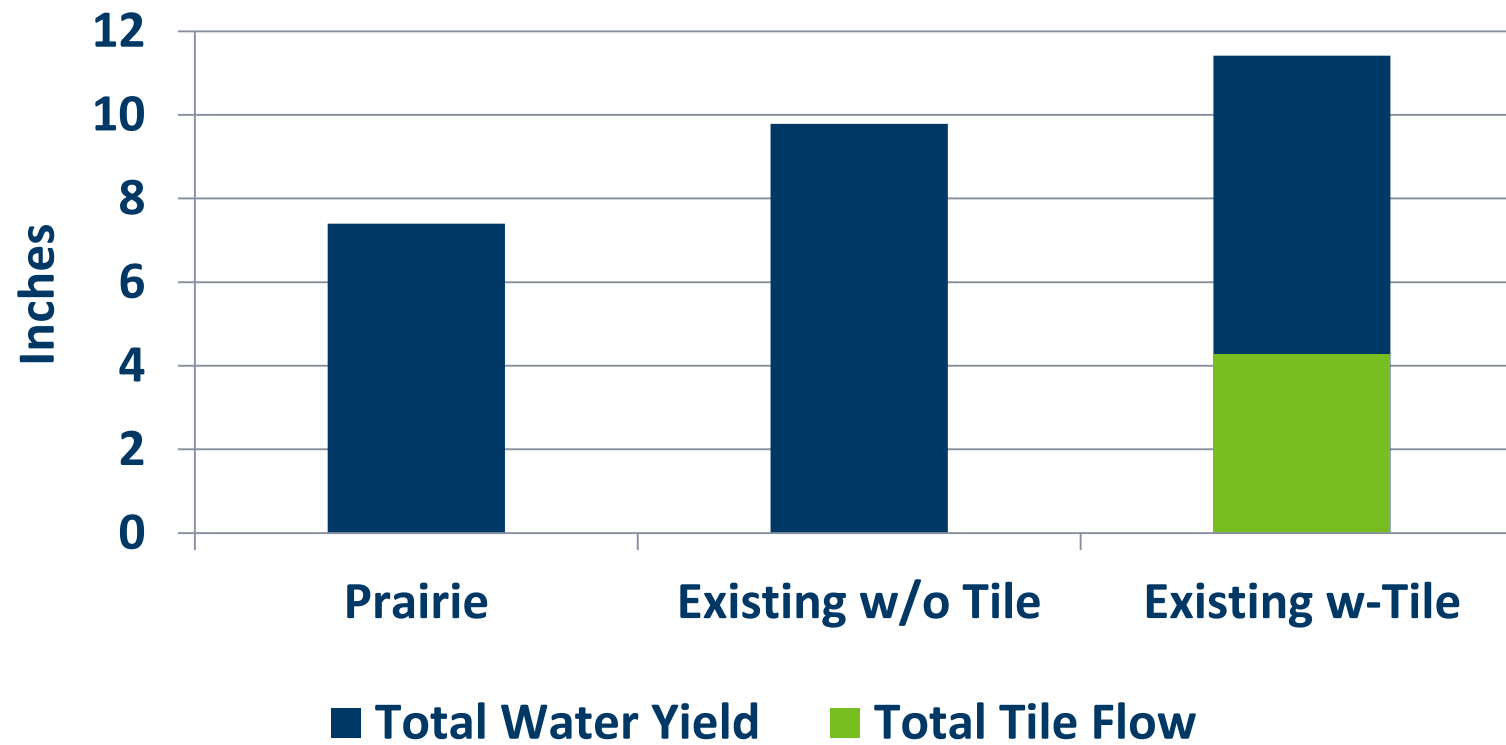
x 2.4

Chapter 7: Soil Component

A very small percent of the landscape controlled
by the proposed WASCOBs



Average Annual Flow



Cover Crops/Soil Health Subsurface Drainage



Increased infiltration

- Higher water table
- Increased tile flow

Partially Offset by

- Greater spring and fall plant transpiration
- Higher soil water holding capacity

Take Home Message re: Altered Hydrology

- **Traditional BMPs: “individually effective, collectively not enough”**
- **Widespread adoption of perennial cover (cover crops, 2nd crop; “soil health”) will move a long ways to achieving whatever “altered hydrology” goal is established.**
 - **Significant reduction in surface runoff and associated erosion**
 - **Potential increase in subsurface flow where tile are present**

Questions / Comments?

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