Soil Erosion: How much is occurring, when and where?

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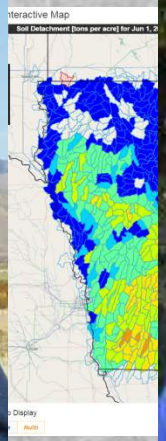
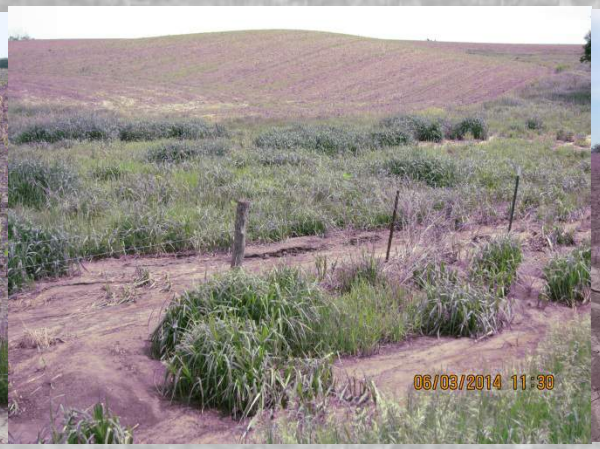
Iowa State University, ARS-USDA, University of Iowa, Colorado State University





Why worry about soil erosion?


05/29/2013 16:57


05/30/2013 17:40


05/29/2013 16:06


05/30/2013 1


05/31/2013 16:00


05/31/2013 17:14


05/30/2013 1


04/21/2013 10:31


05/11/2013 12:05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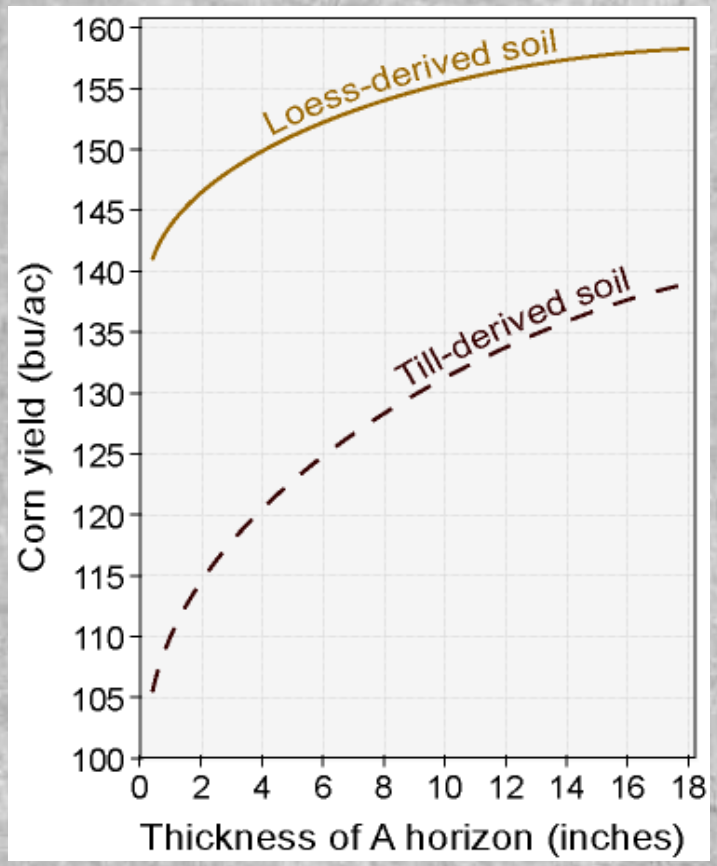
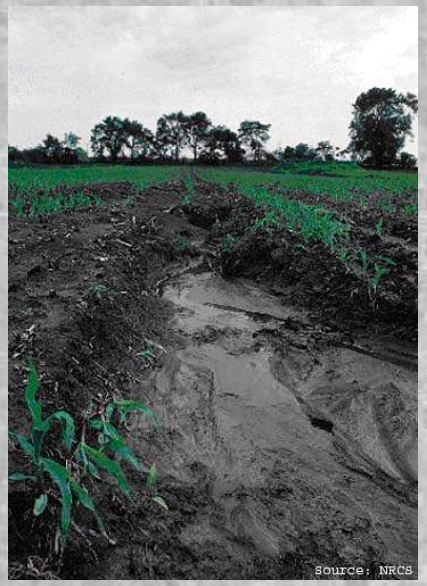
Wisconsin & Other States

- Some areas have greater erosion than others
  - Topography
  - Rainfall
- Within fields, some areas have greater erosion than others
  - Topography
  - Management

Does soil erosion affect soil productivity?



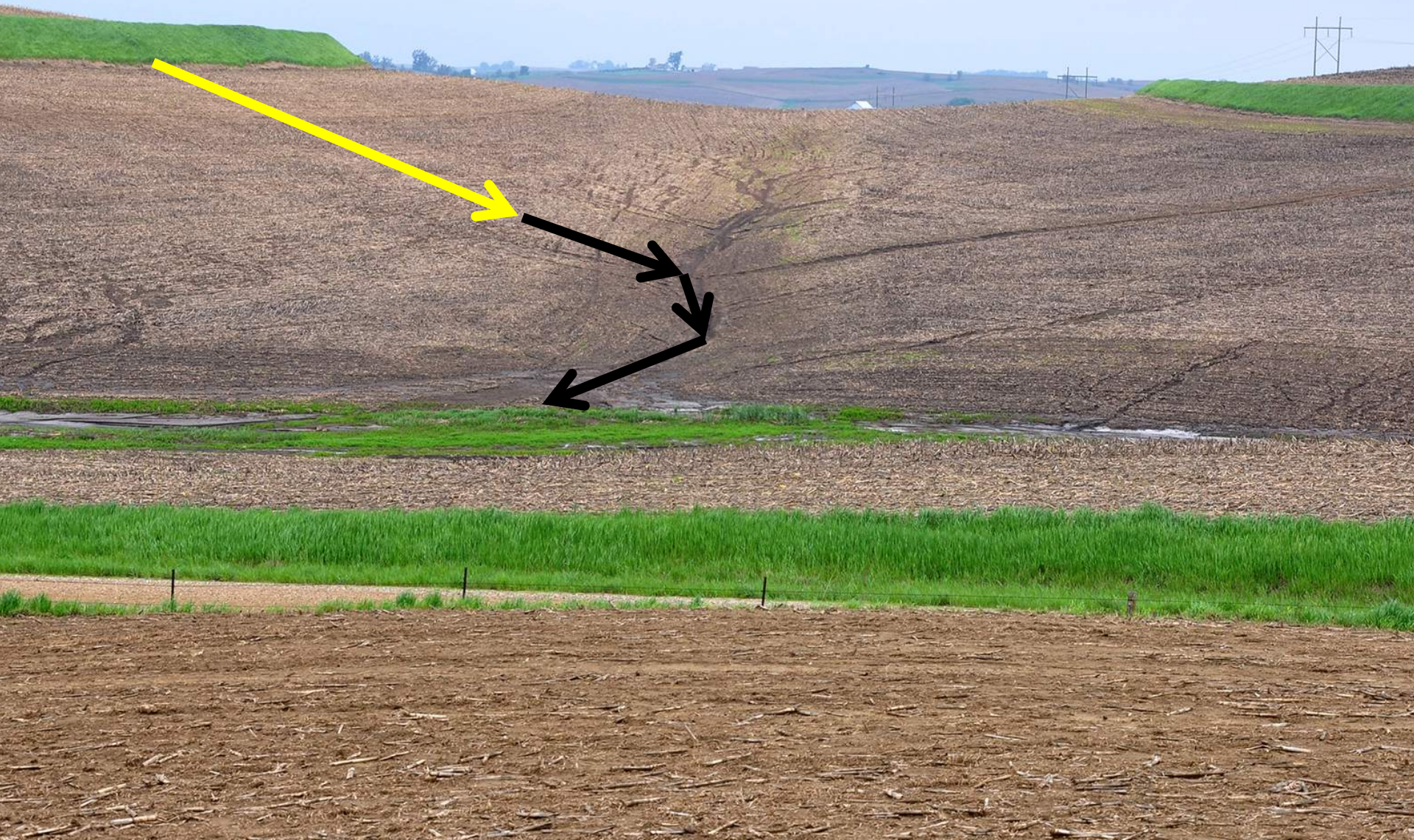


Kazemi, Masoud, L.C. Dumenil, and T.E. Fenton. 1990. Effects of accelerated erosion on corn yields of loess-derived and till-derived soils in Iowa. Final report for Soil Conservation Service, Agreement No. 68-6114-0-8, Des Moines, IA.

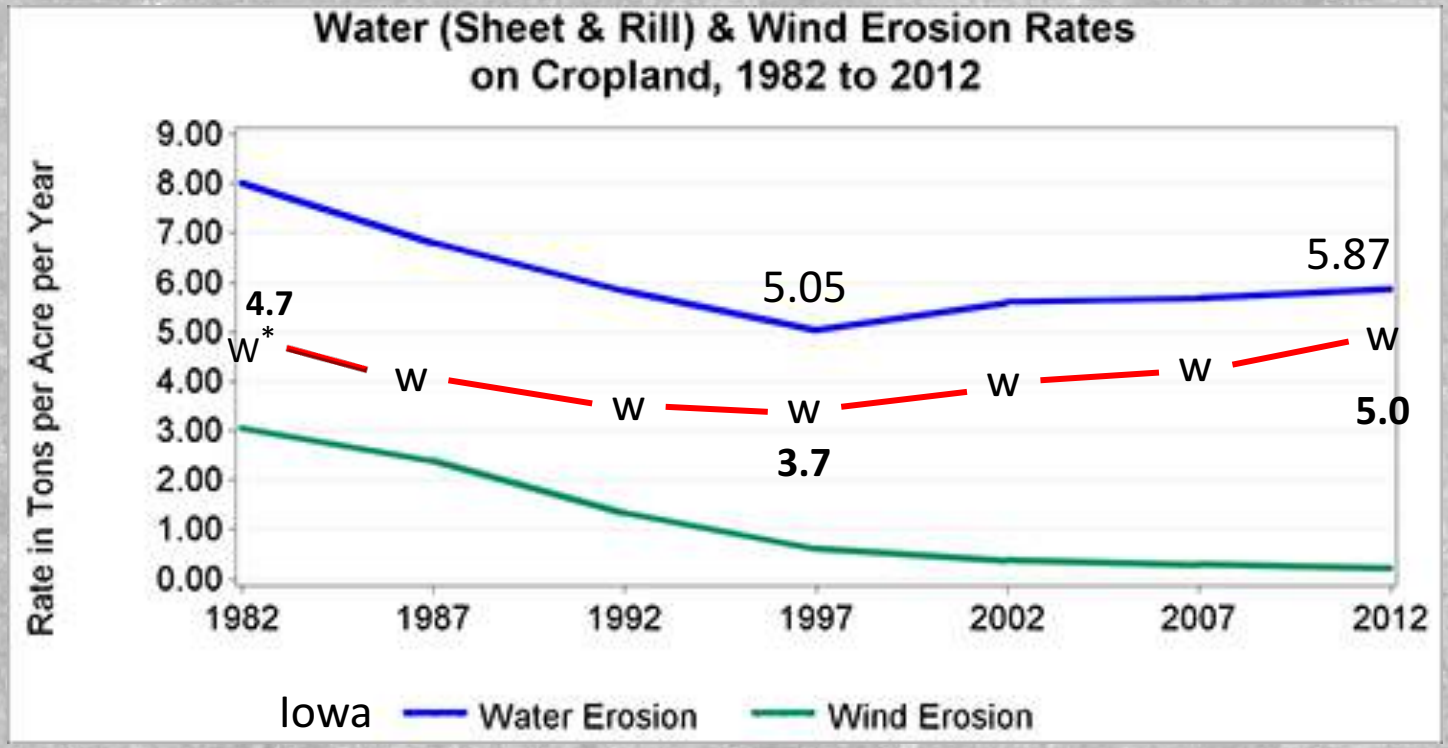
NRI – National Resources Inventory

- RUSLE technology – empirically based
- Randomly selected hillslopes (~18,000) in Iowa
  - Confidential
  - Stratified sample
  - Statistically valid estimates at **STATE LEVEL!**
- Site visits to get soil and management inputs
- ***Historical rainfall drives estimates***
- Conducted ~ every five years
- Land use and management barometer

What Is Being Estimated?



What Is NRI Telling Us?



W* - Wisconsin statewide cultivated cropland sheet and rill erosion estimate.

USDA/NRCS National Resources Inventory. 2015.

Daily Erosion Project

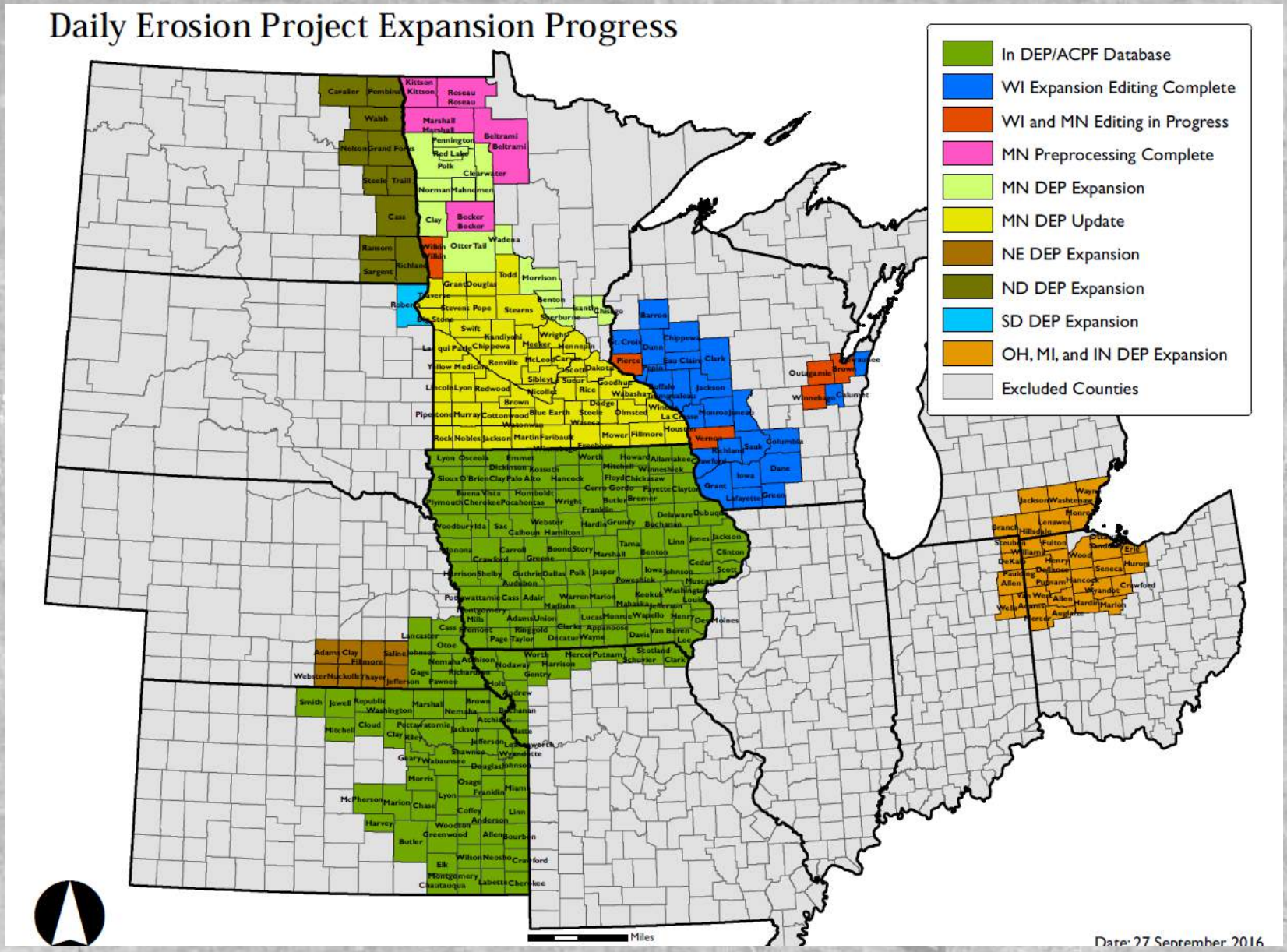
- Our mission:

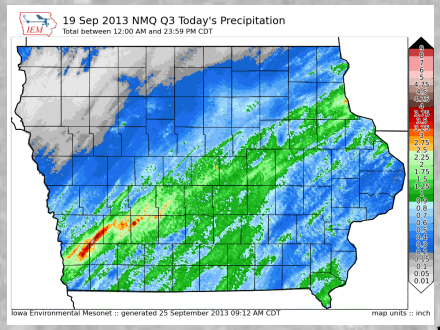
  To help farmers, land managers, and the public better understand the dynamics and magnitude of runoff and soil erosion.

- Our goal

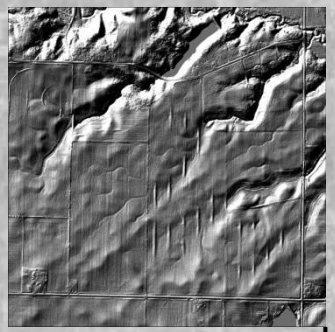
  Soil Erosion Monitoring and Inventory Center for Central US

Daily Erosion Project Expansion Progress

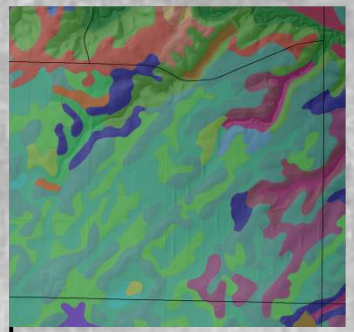




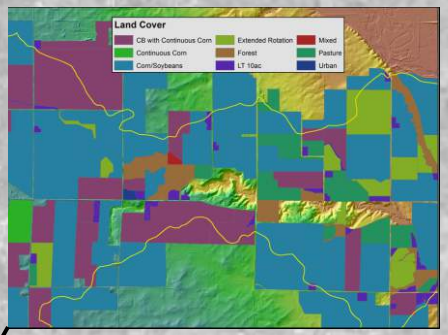
NEXRAD Precip



LiDAR Elevation

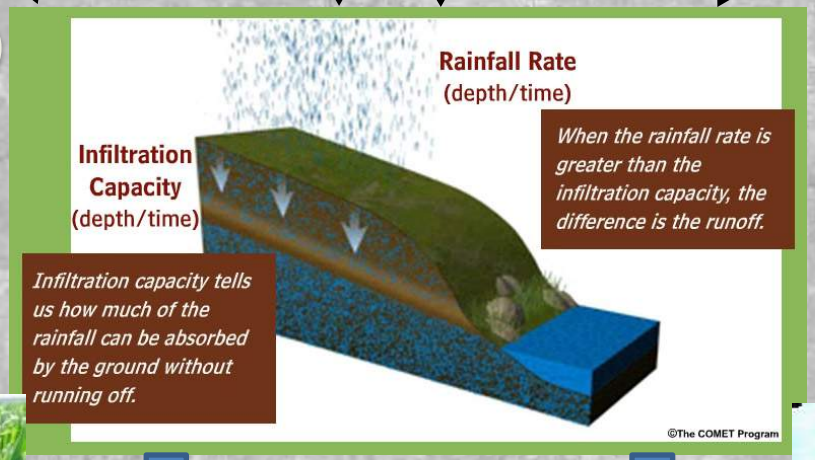


gSSURGO Soils



Field-scale Land-use & Management

WEPP

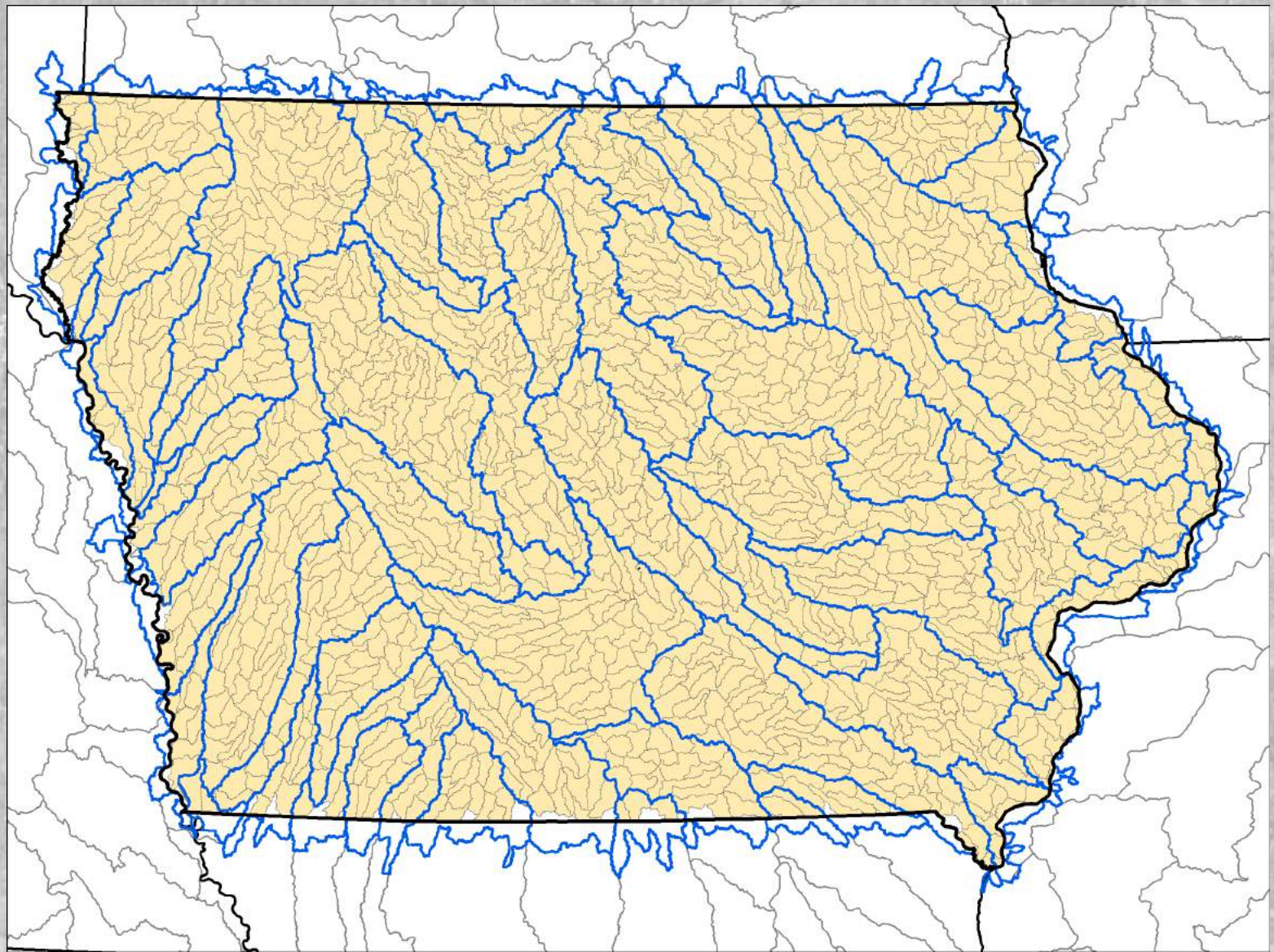


DEP Database

- 1,647 HUC12 watersheds
- 36,900,000+ Acres

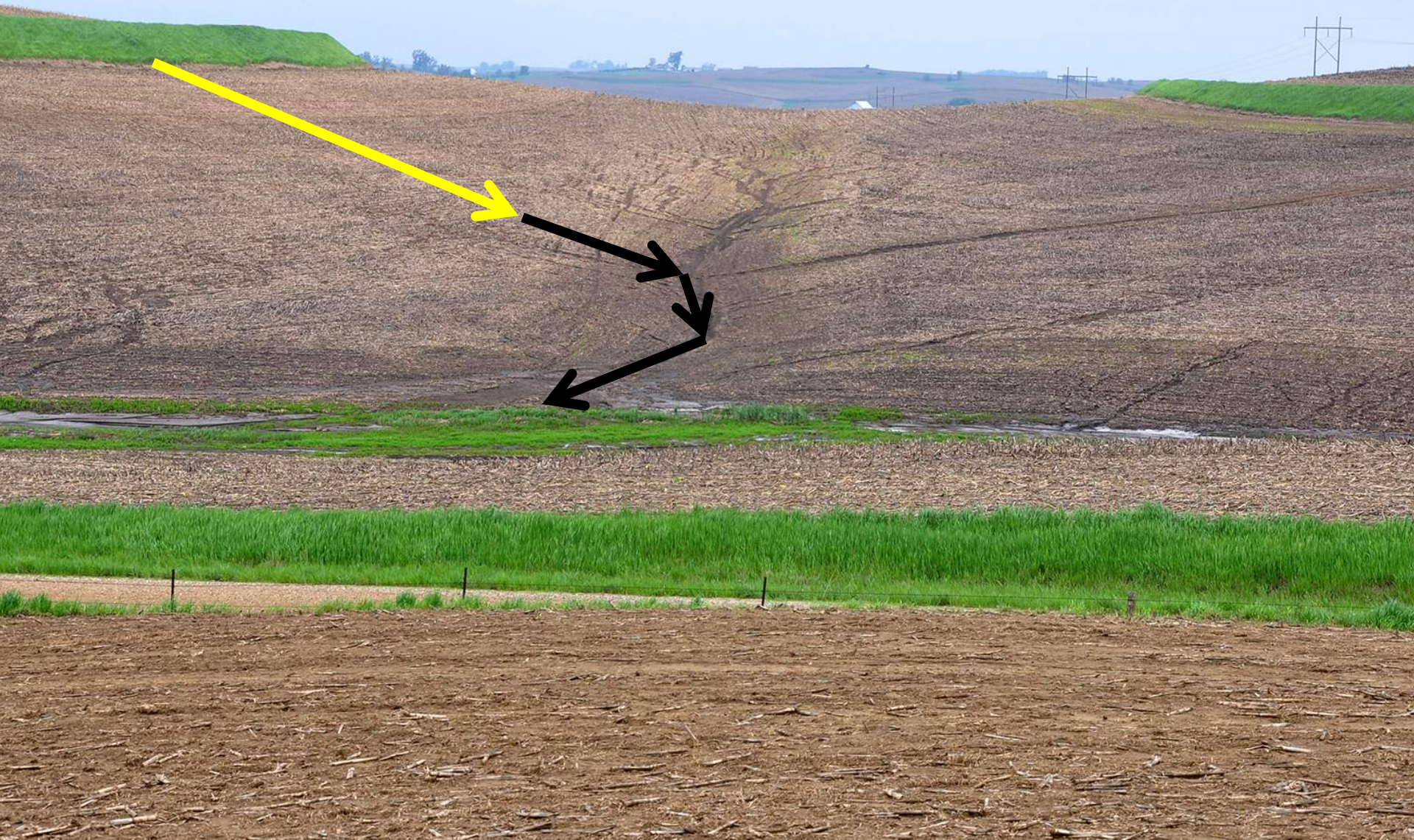
Major Geo-Spatial Components by HUC12

- Soils - gSSURGO – 10m raster
- Land Use - 2008-2013 NASS Crop Data Layer
- Elevation - LiDAR-based, 3m resolution
- 2009 crop-specific field boundaries



Catchments, Channels, & Flowpaths

What's It Like In the Field?

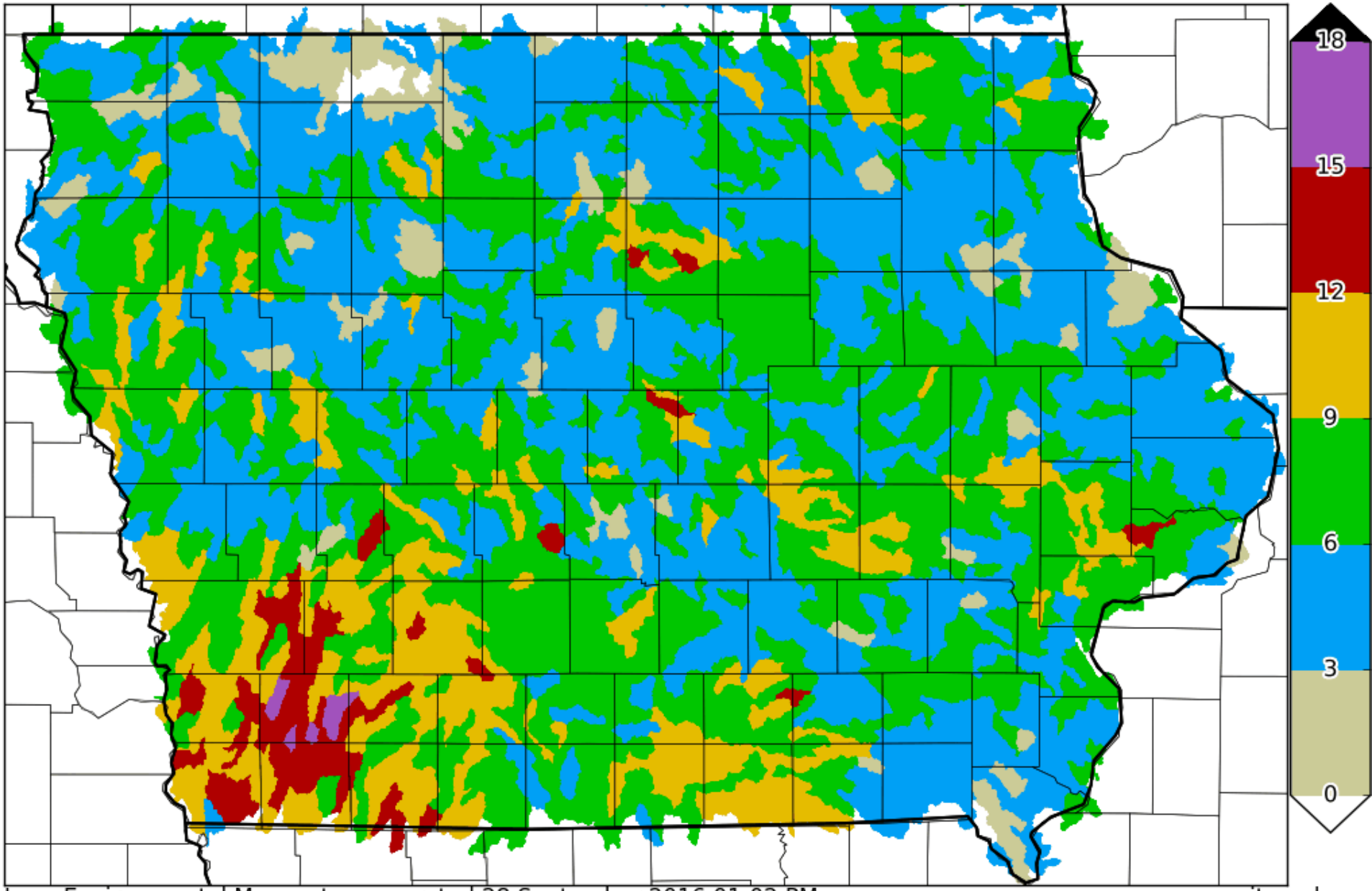



DEP Tours

Heavy rainfall distribution?

DEP Calendar Days with HUC12 Precip >= 2 inches

1 Jan 2013 thru 27 September 2016

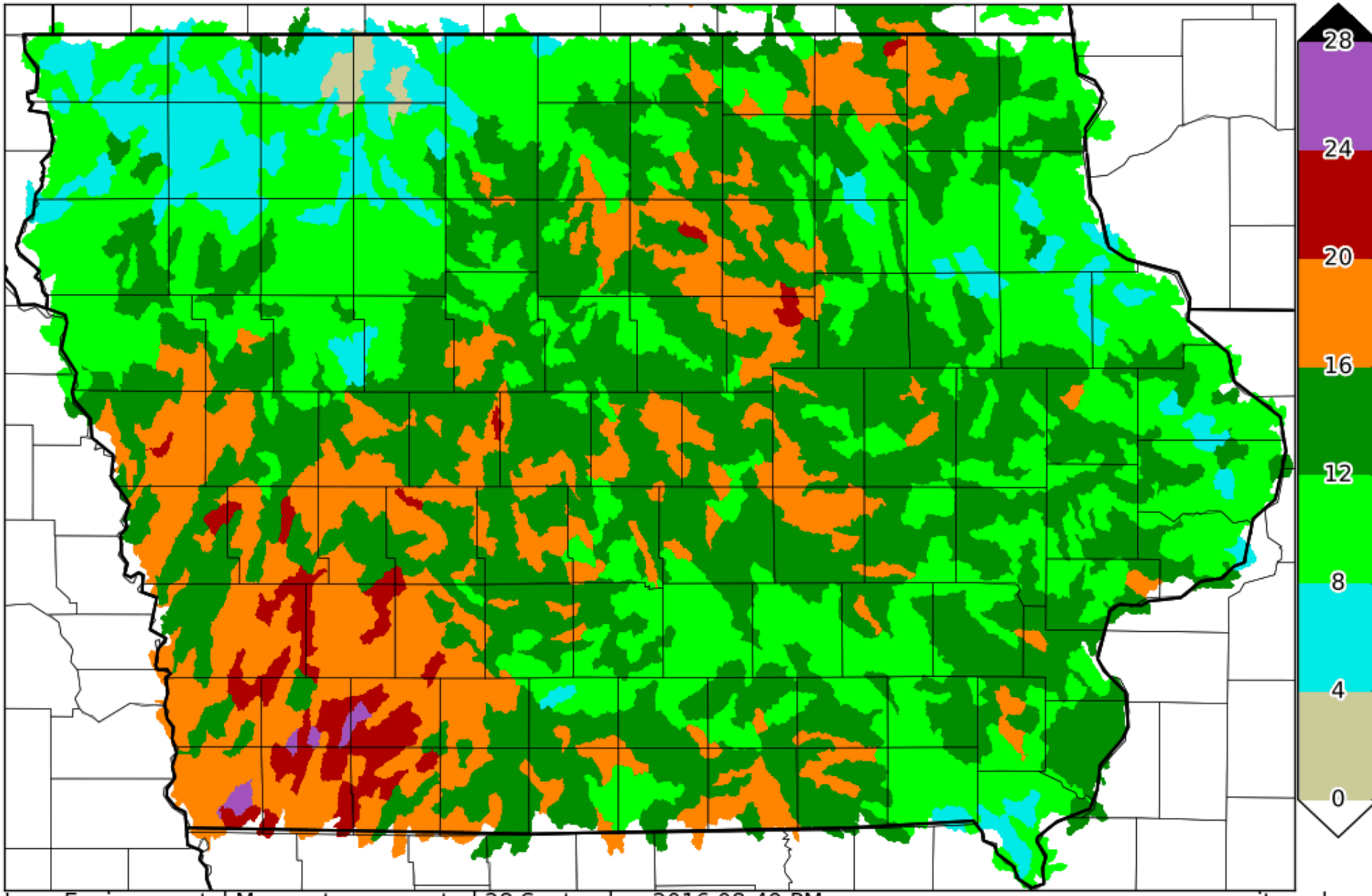


Iowa Environmental Mesonet :: generated 28 September 2016 01:02 PM

map units :: days

DEP Two Days with HUC12 Precip Total >= 2 inches

1 Jan 2013 thru 27 September 2016



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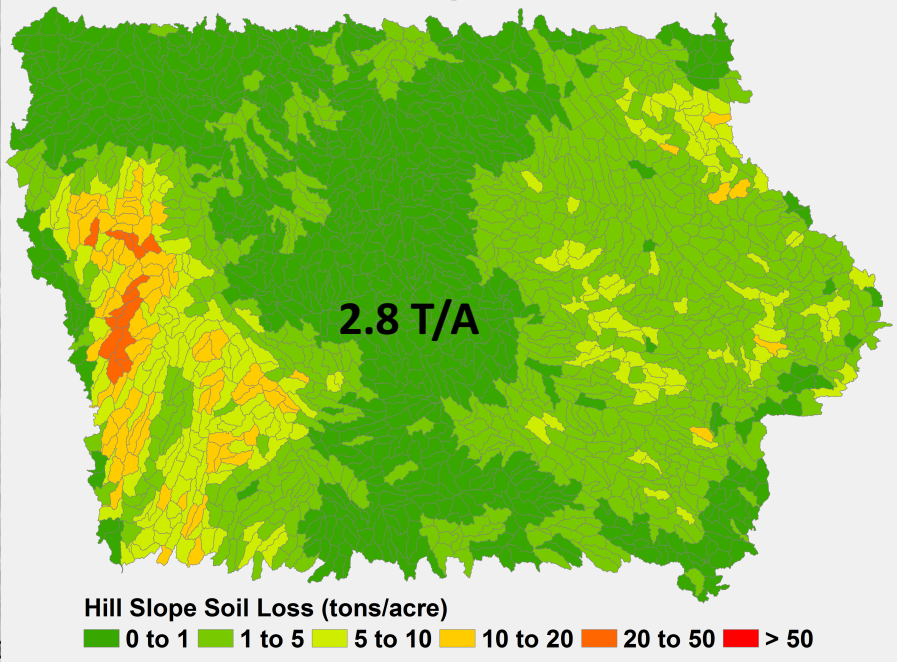
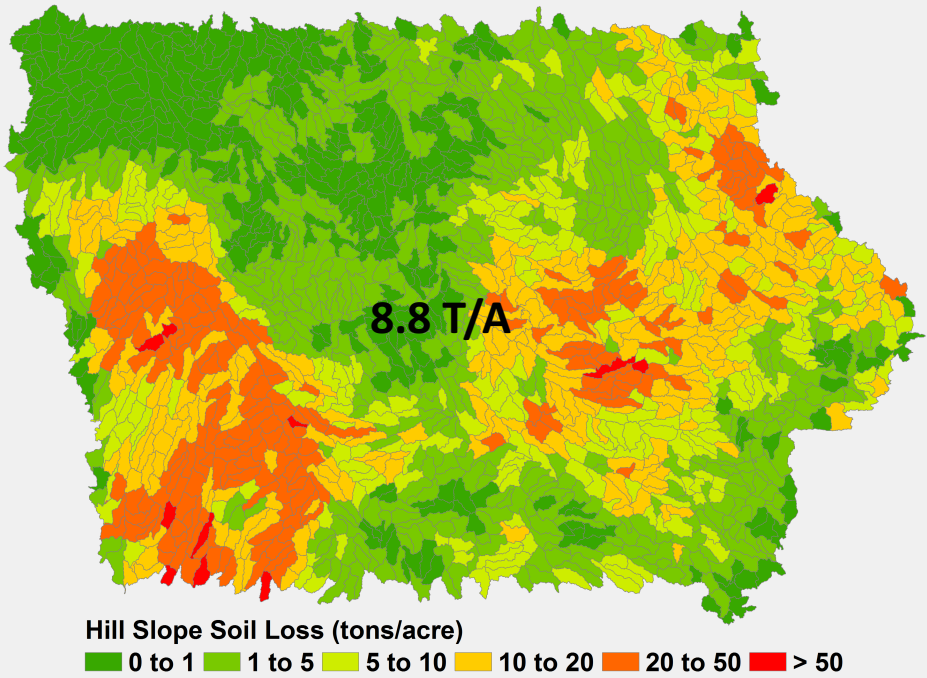
map units :: days

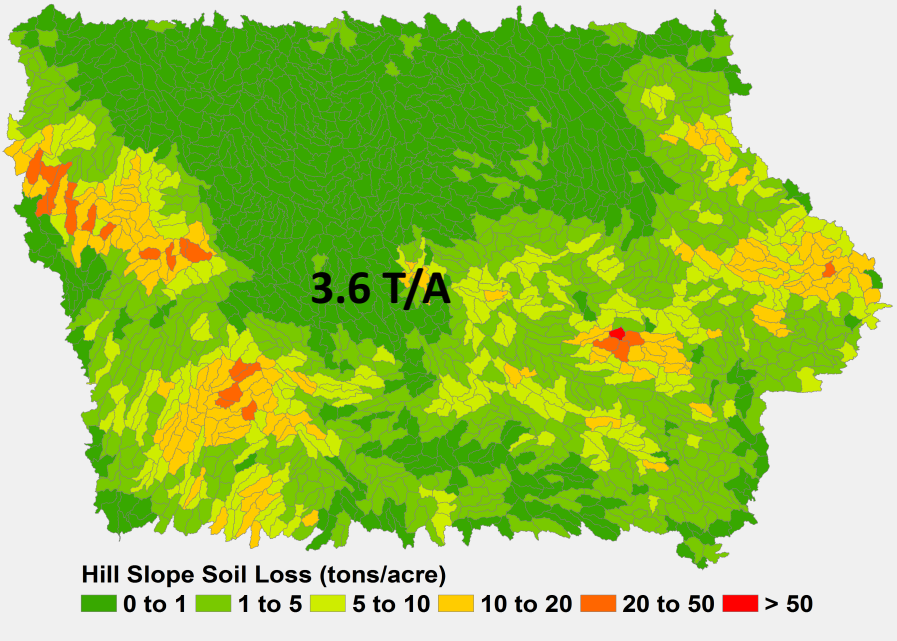
2007 Hill Slope Soil Loss



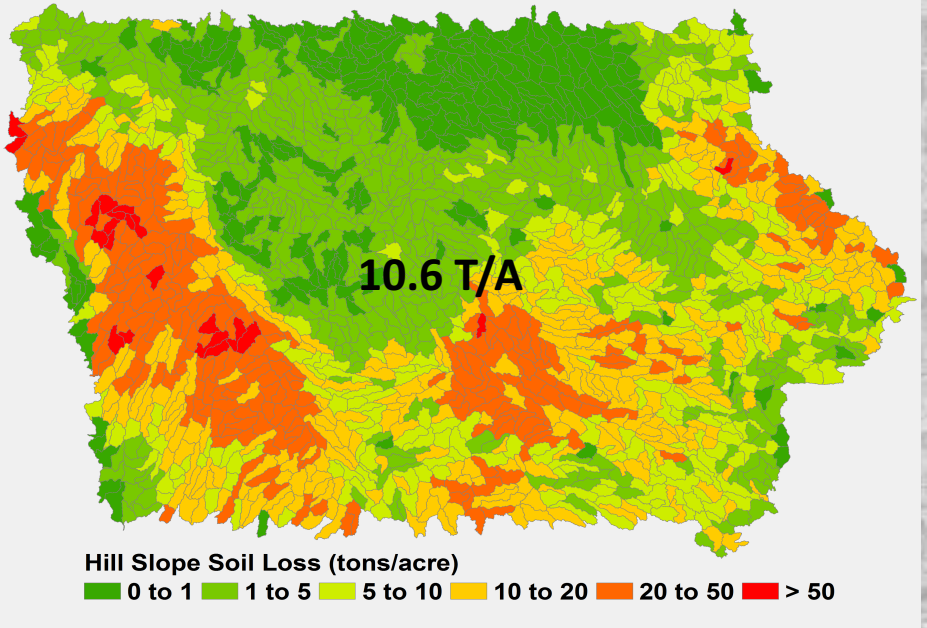
2008 Hill Slope Soil Loss



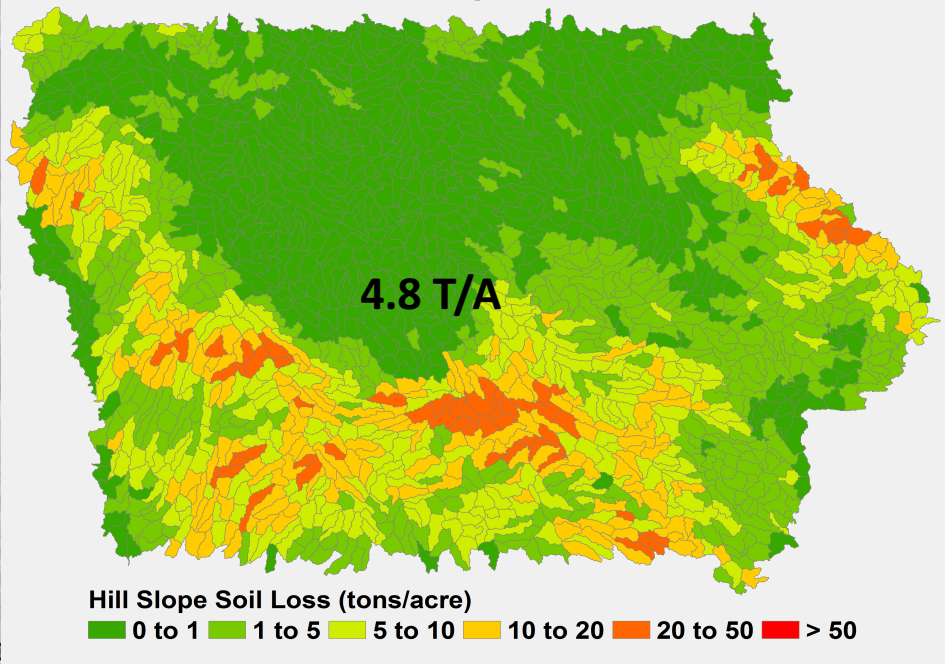
2009 Hill Slope Soil Loss



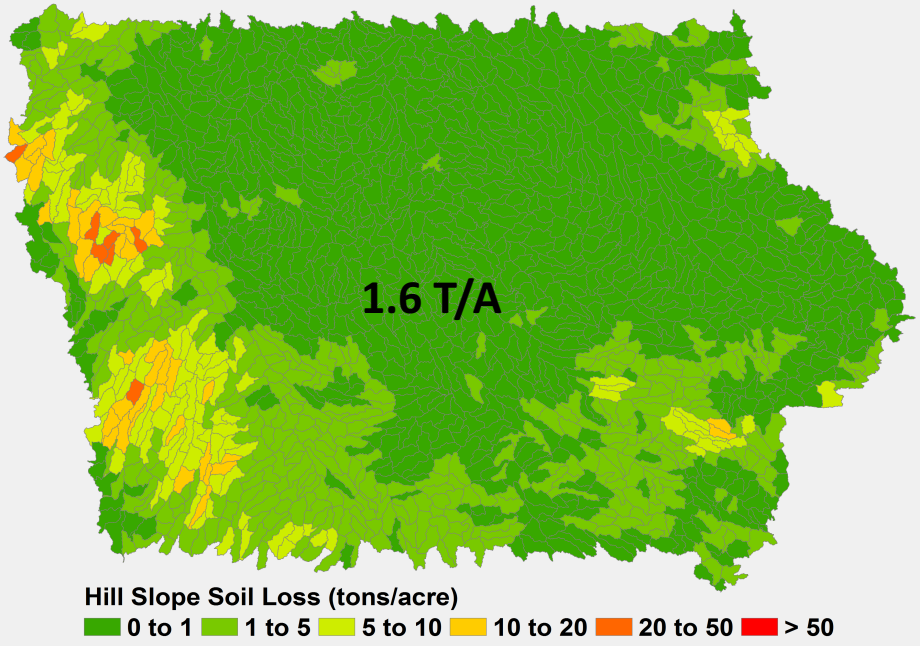
2010 Hill Slope Soil Loss



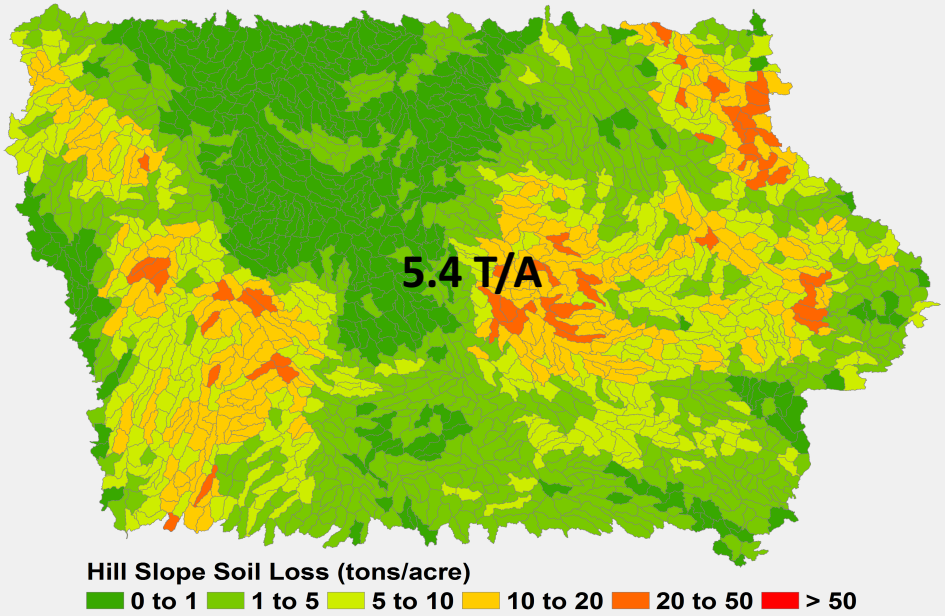
2011 Hill Slope Soil Loss



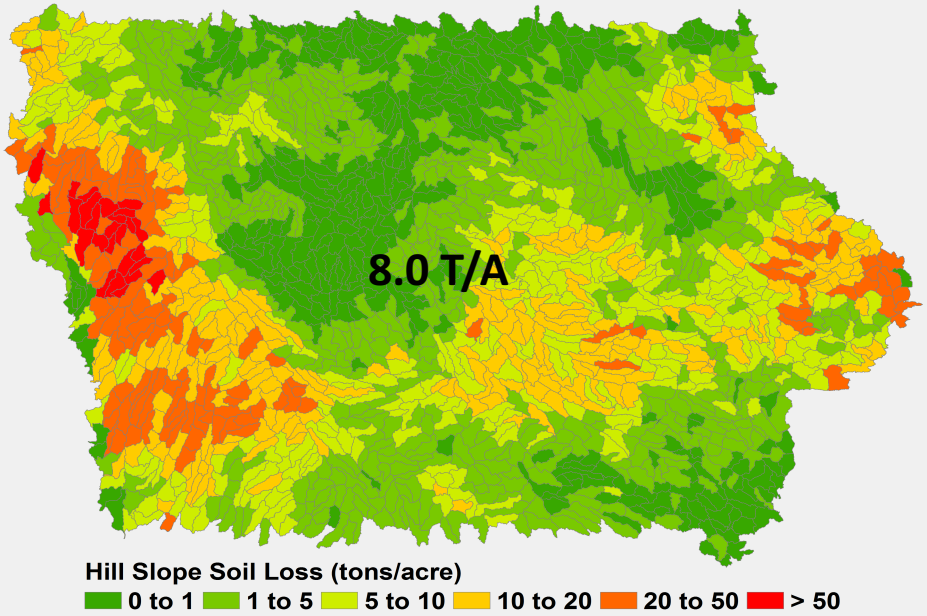
2012 Hill Slope Soil Loss



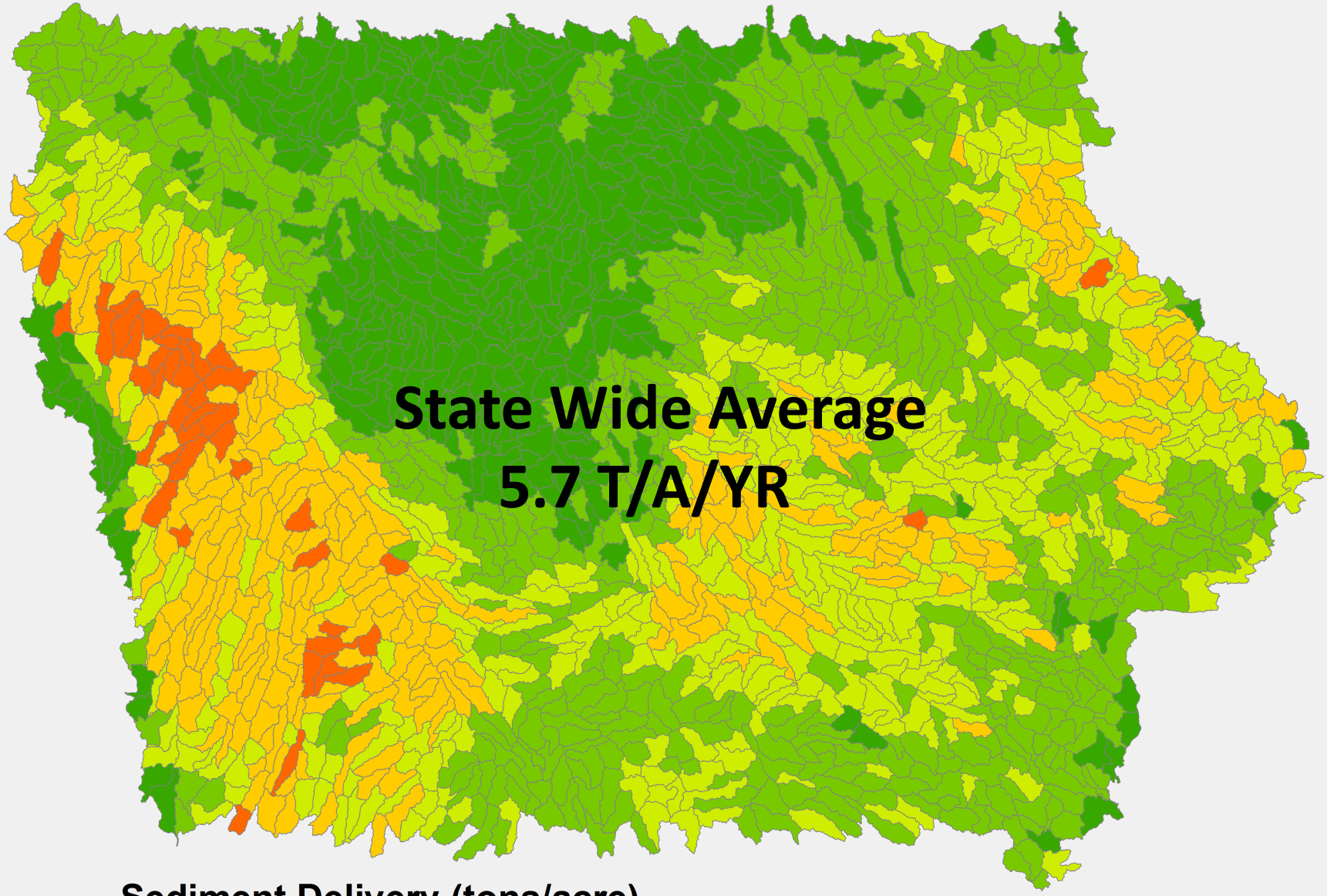
2013 Hill Slope Soil Loss



2014 Hill Slope Soil Loss



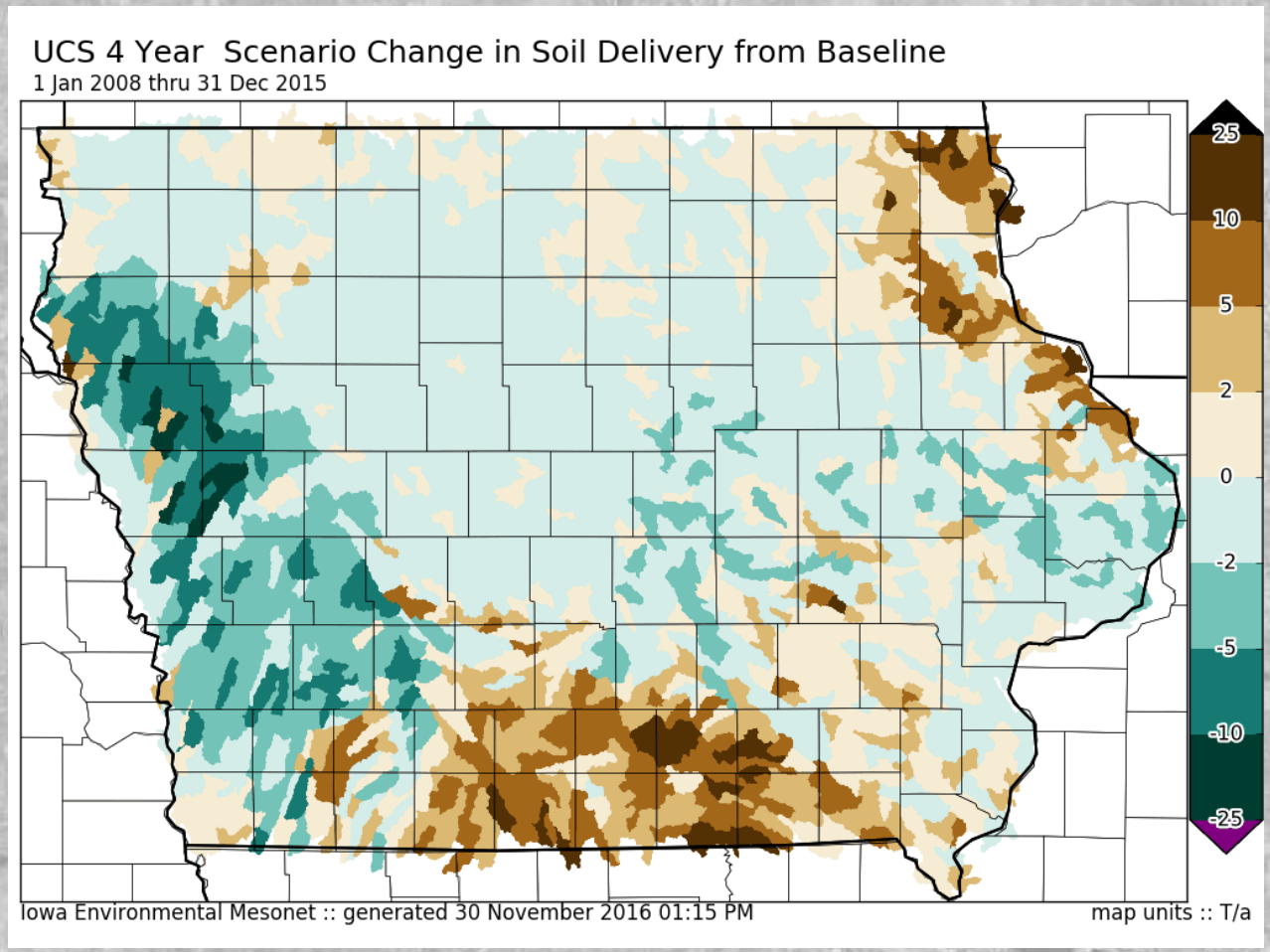
2007 to 2014 Average Soil Loss



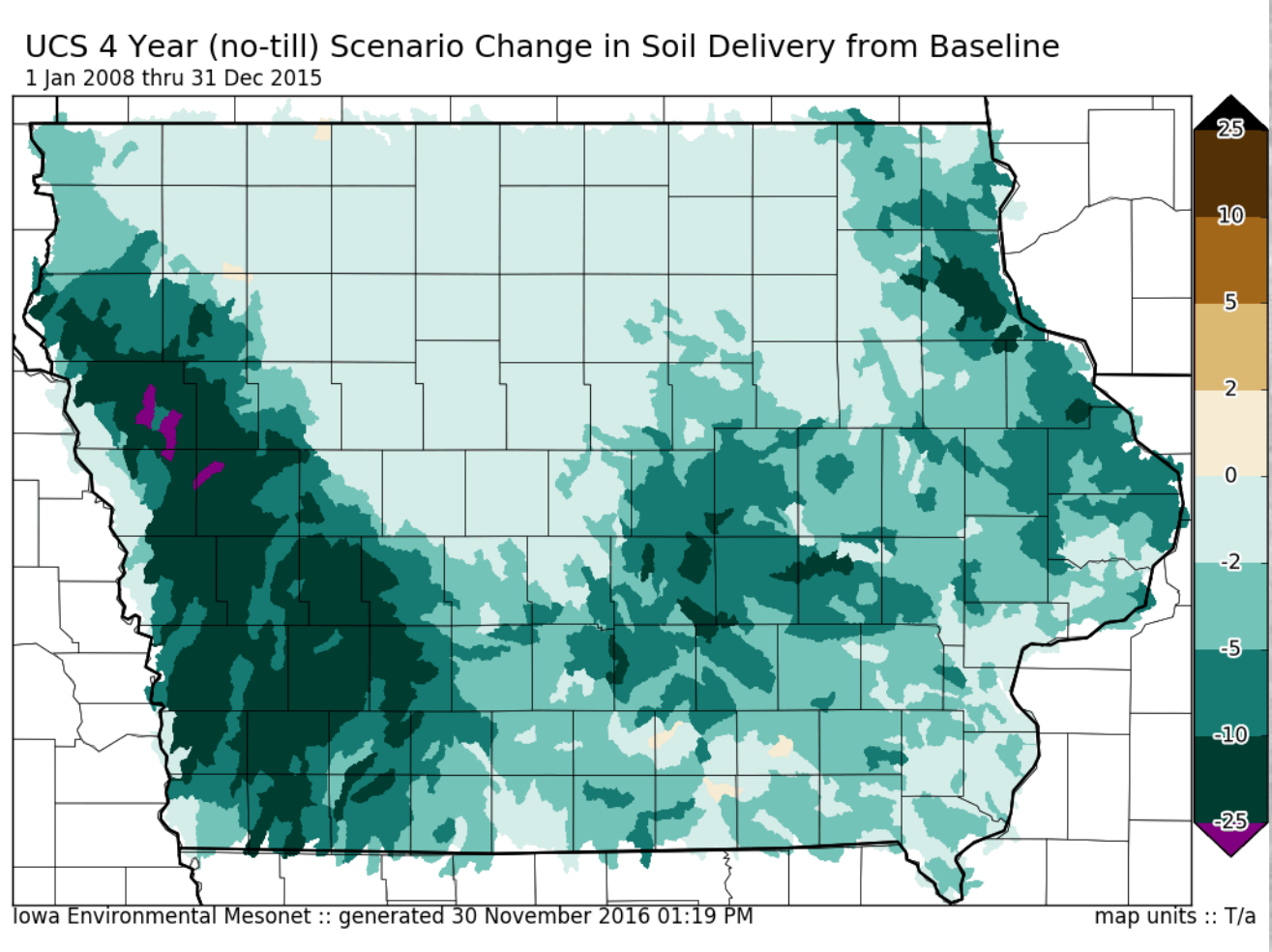
Daily Erosion Project Applications

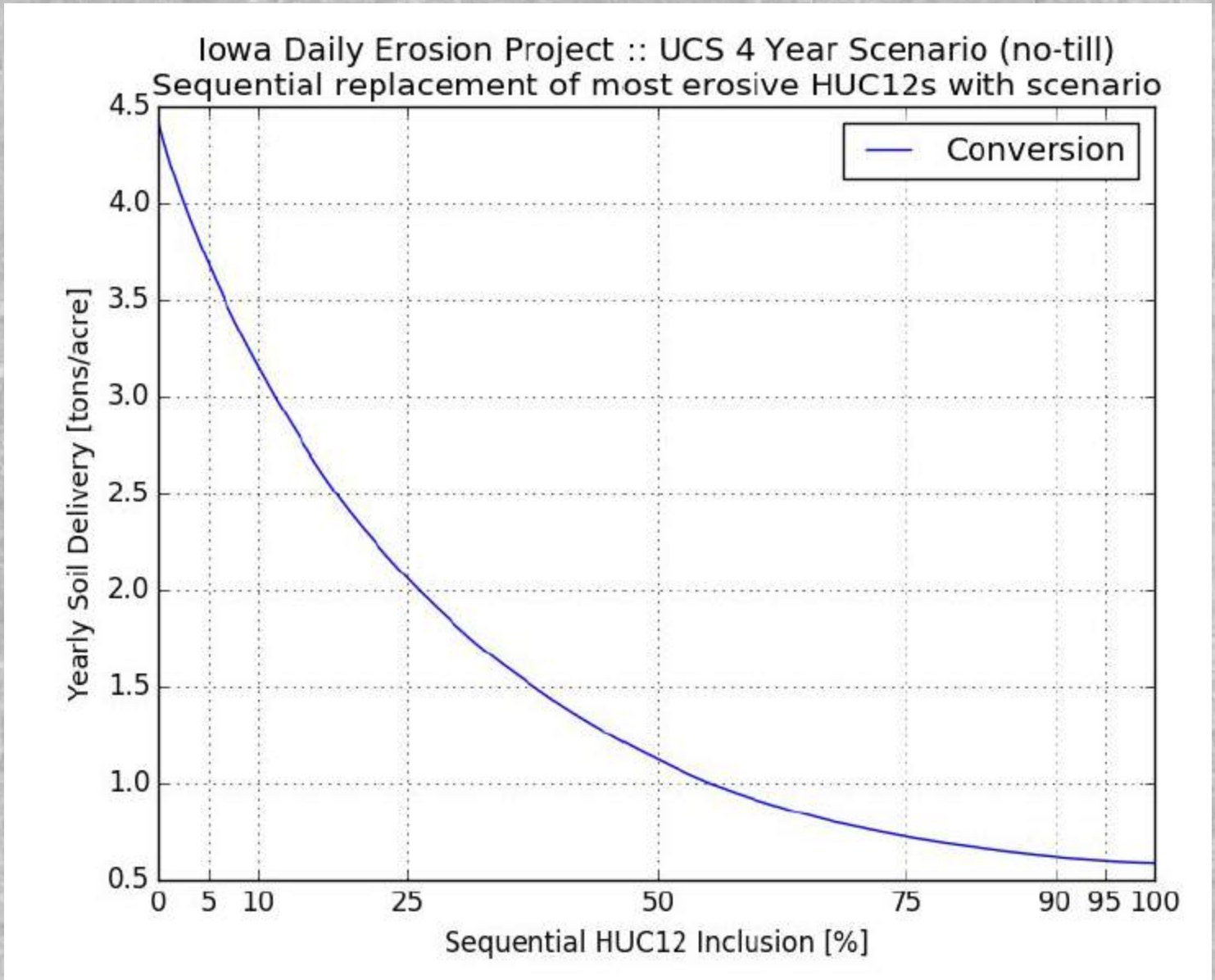
- Focus resources
- Water impairment source areas
- Scenario evaluation
- Initial step in routing delivery estimates
- Flooding

What happens to erosion rates if we convert existing cropping systems to a four crop rotation (C-Sb-SG-Clover)? Disking/field cultivation for all years except clover to corn (moldboard plowing, disking field cultivate).



What happens to erosion rates if we convert existing cropping systems to a four crop rotation (C-Sb-SG-Clover) – no-till management.




Iowa Daily Erosion Project :: UCS 4 Year Scenario (no-till)
Sequential replacement of most erosive HUC12s with scenario
Conversion
Yearly Soil Delivery [tons/acre]
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
5
10
25
50
75
90
95
100
Sequential HUC12 Inclusion [%]

Questions?

DEP Web Page Google Daily Erosion Project

dailyerosion.org

Acknowledgements:

- Iowa State University Agronomy Department Endowment
- USDA Agricultural Research Service
- Environmental Defense Fund

Iowa State University, ARS-USDA (National Laboratory for Agriculture and Environment, National Soil Erosion Laboratory), University of Iowa, Colorado State University