



# Sand County Foundation

When land does well for its owner,  
and the owner does well by his land;  
when both end up better by reason of  
their partnership, we have conservation.

When one or the other grows poorer, we do  
not.

- Aldo Leopold



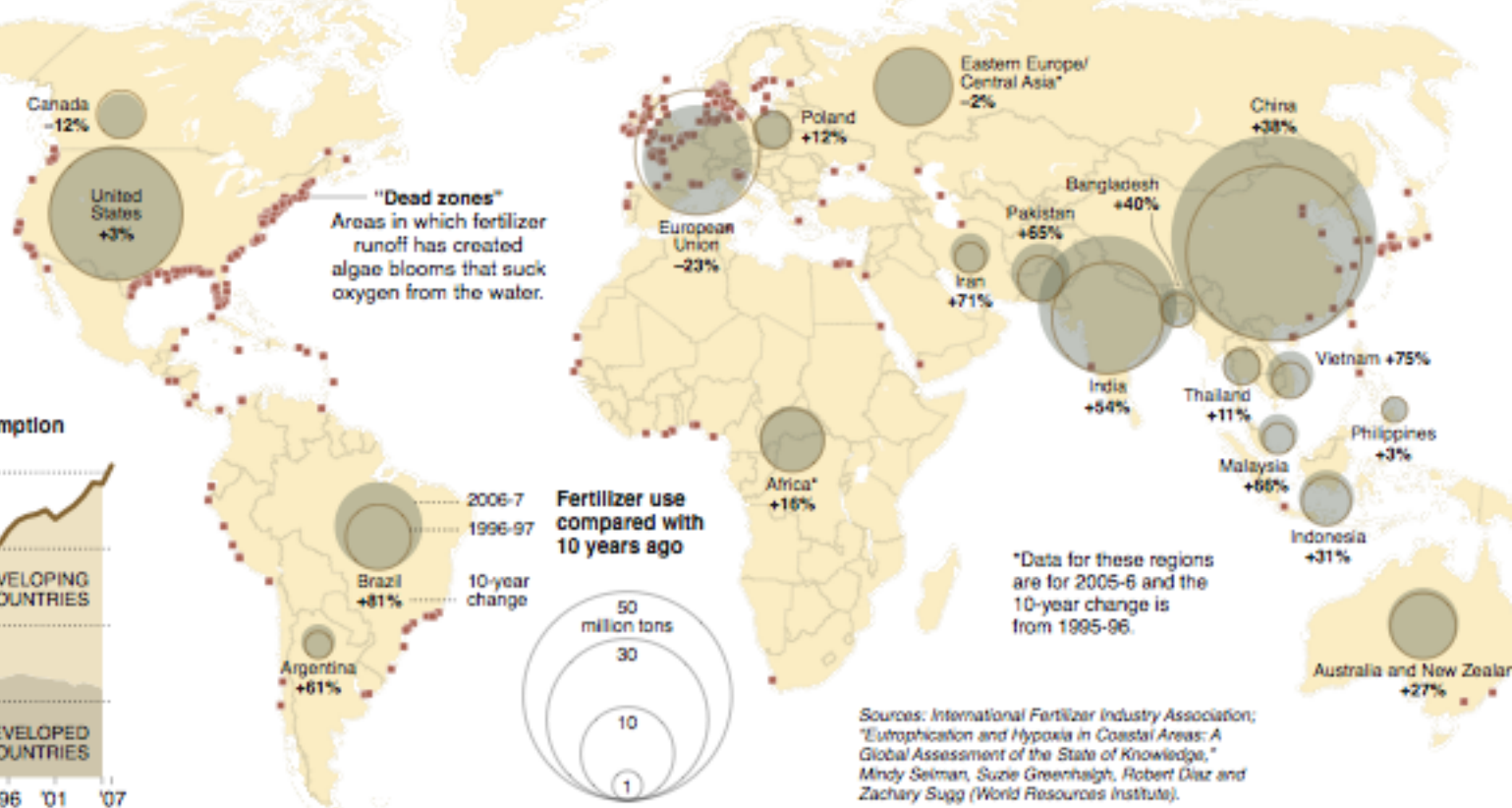
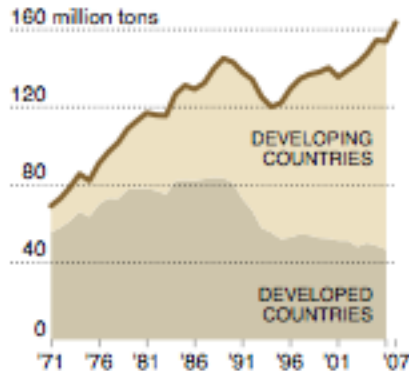
Tom Christensen  
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## Worldwide Growth in Fertilizer Use

Fertilizer use has been growing faster in developing countries than in the industrialized world in recent years. But rising demand has produced a big price jump. Increased fertilizer runoff is expected to worsen the problem of dead zones along ocean shores.

### Worldwide fertilizer consumption



KARL RUSSELL/THE NEW YORK TIMES

N.Y. Times News Service

Date: 04/29/08

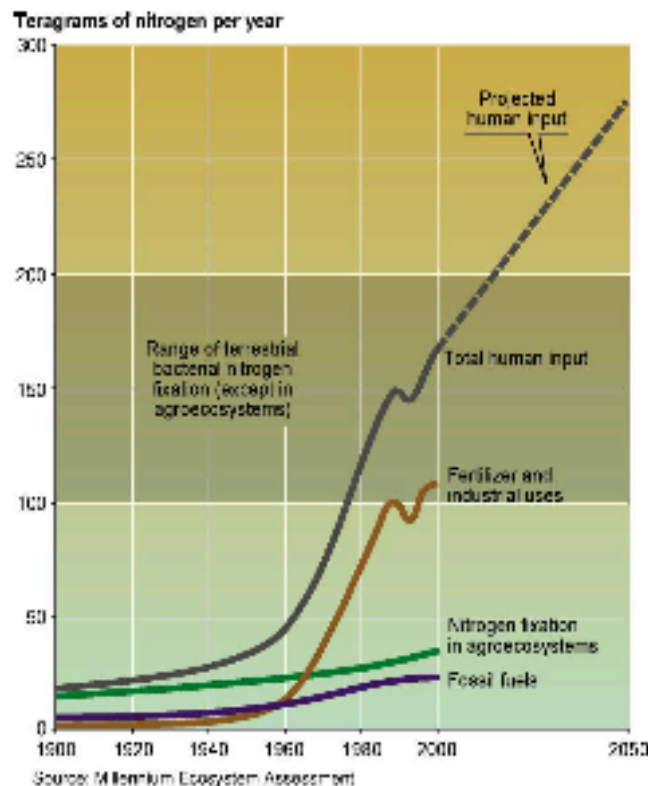
Graphic Slug: FERTILIZER\_Gas price

# Unprecedented change: Biogeochemical Cycles

Since 1960:

- Flows of biologically available nitrogen in terrestrial ecosystems doubled
- Flows of phosphorus tripled

**> 50% of all the synthetic nitrogen fertilizer ever used has been used since 1985**

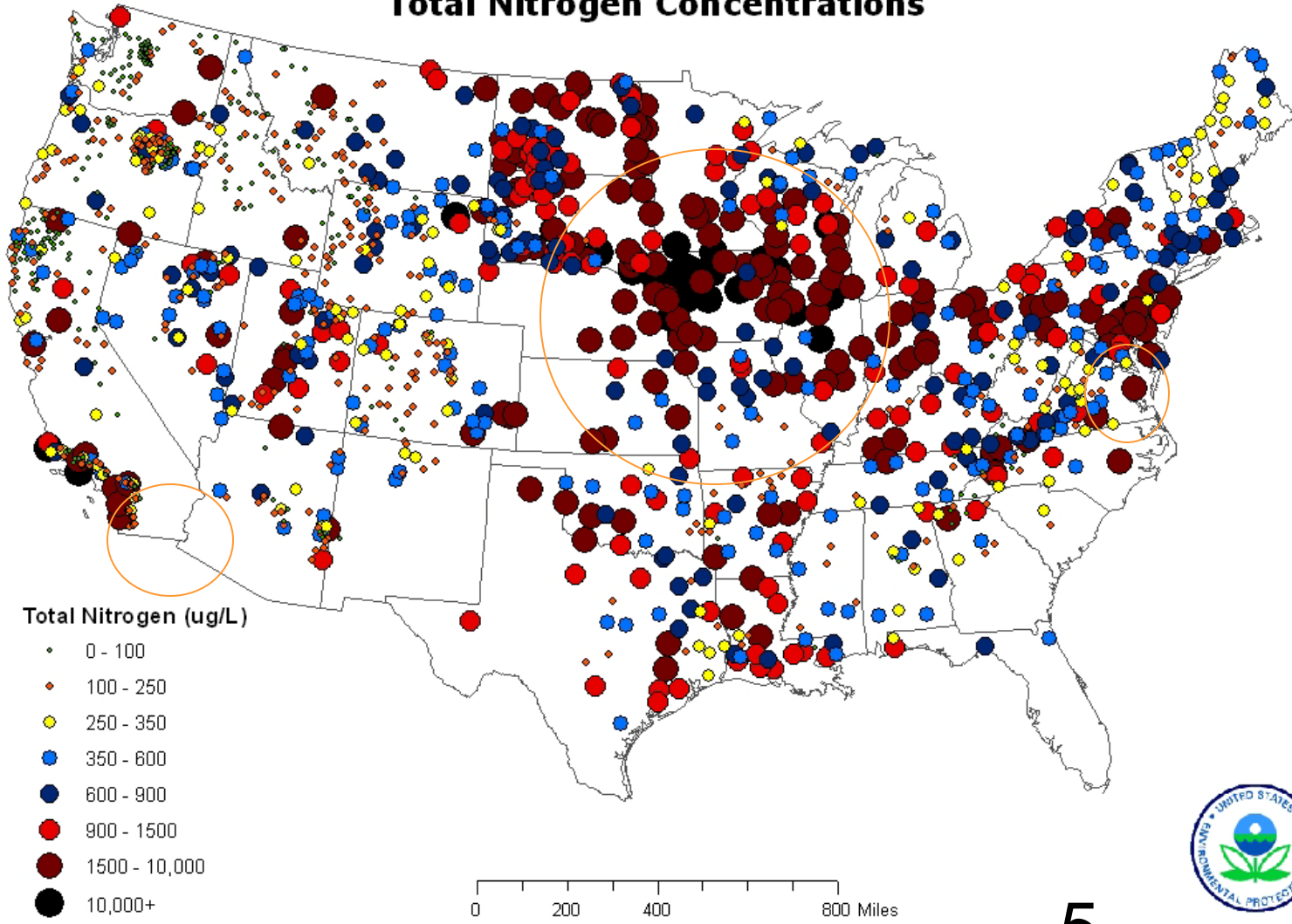


## Human-produced Reactive Nitrogen

Humans produce as much biologically available N as all natural pathways and this may grow a further 65% by 2050

# Concentrations of Nitrogen Nationally

**WSA Survey Results:  
Total Nitrogen Concentrations**



# What is CEAP?

CEAP is a multi-agency effort to quantify the environmental effects of conservation practices and programs and develop the science base for managing the agricultural landscape for environmental quality.



# CEAP Significance

Unprecedented capacity for natural resource assessment and analysis has been developed through CEAP—integrating for the first time investments such as the National Resources Inventory (NRI), geospatial databases, conservation practice implementation data, and partner monitoring data—with powerful and improved analytical models and methods.



# CEAP Findings Upper Mississippi Basin

## Conservation Practices Work!

Compared to no conservation practices:

- Sediment loss reduced by 69%
- Total phosphorous loss reduced by 49%
- Total nitrogen loss reduced by 18%
- Pesticide risks to human health reduced



## Comprehensive Planning is Needed

- Surface nitrogen losses reduced by 46% **BUT subsurface losses are reduced by only 9%**
- Without nutrient management practices, erosion control practices can increase subsurface nitrogen losses by re-routing surface water to subsurface flow pathways



# Addressing CEAP Finding

- Surface nitrogen losses reduced by 46%  
BUT subsurface losses are reduced by only 9%

## Answer:

Increase the adoption of the Management of Ag Drainage Water and associated conservation practices for conservation benefits

## Question:

- How do we get that done?????

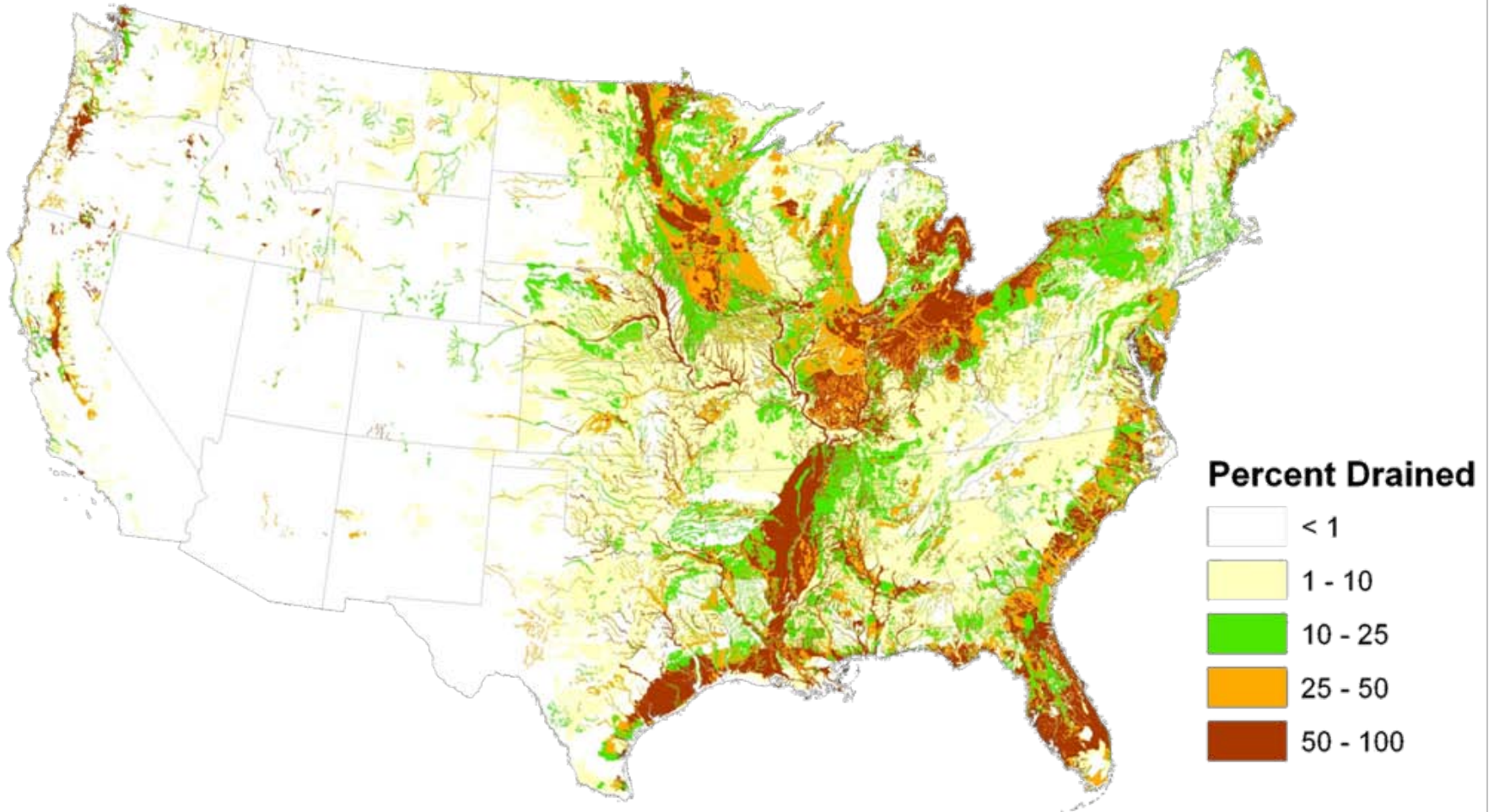
## Answer:

- NRCS is taking action to focus on this opportunity with our partners



# Video

# Agricultural Drainage

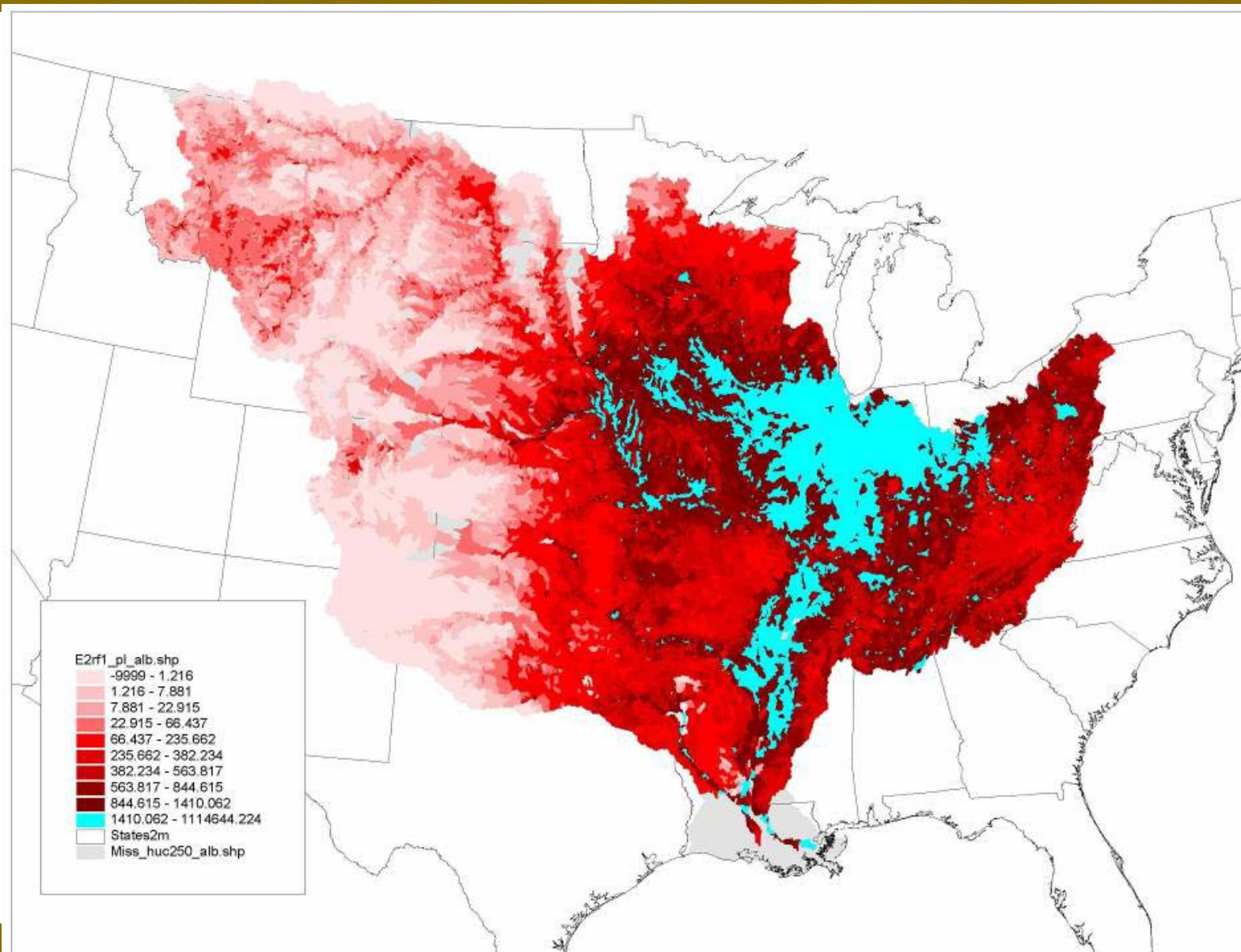


(Jaynes and James 2008)

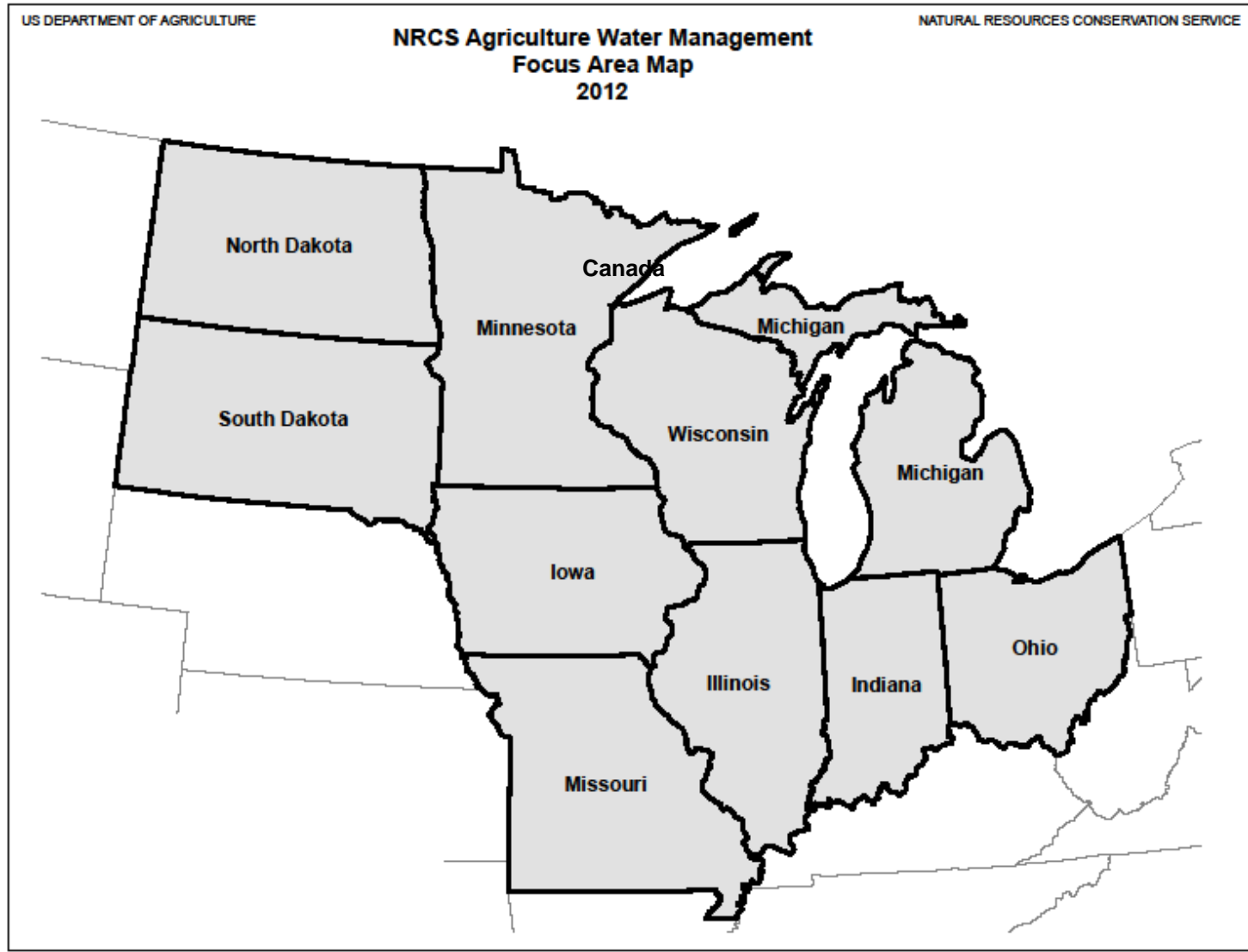
# Disconnect Riparian Functions



# Top 10% Nitrogen Contribution



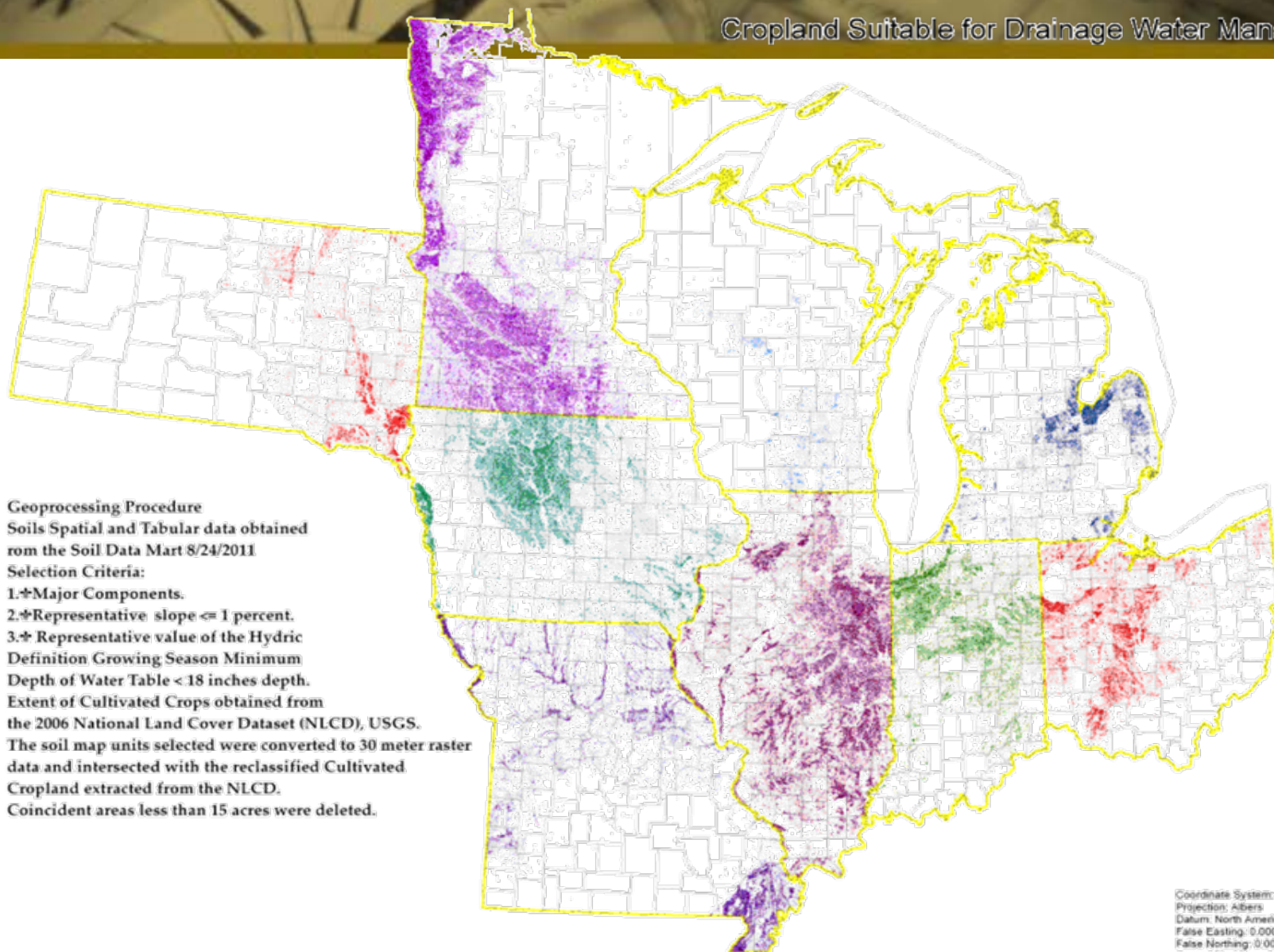
# Priority Areas for Management of Drainage Waters



USDA NRCS GIS Staff, Des Moines, IA 50309

# Cropland Suitable For Drainage Management

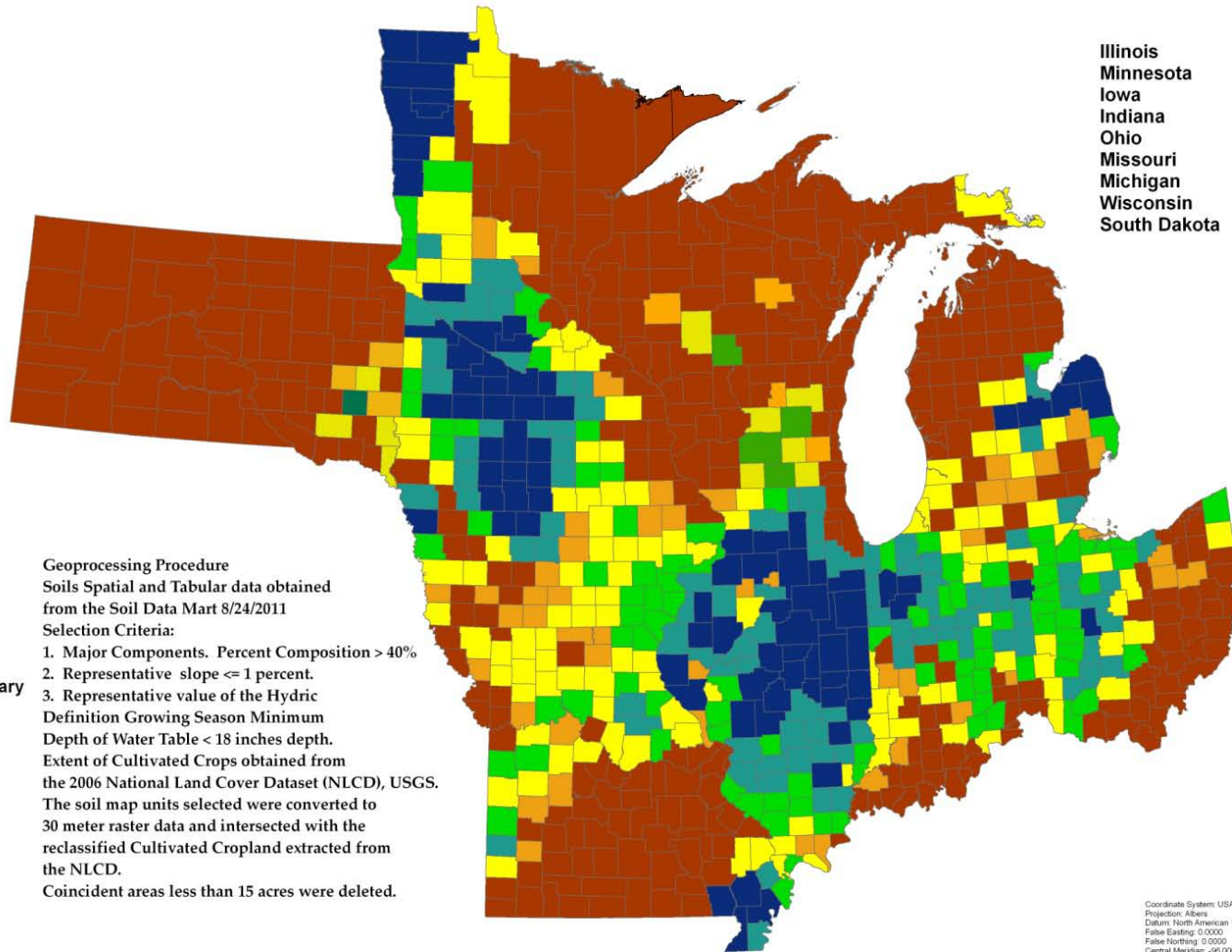
Cropland Suitable for Drainage Water Management



Coordinate System: USA Contiguous Albers Equal Area  
Projection: Albers  
Datum: North American 1983  
False Easting: 0.0000  
False Northing: 0.0000  
Central Meridian: -96.0000  
Standard Parallel 1: 29.5000  
Standard Parallel 2: 40.5000  
Latitude of Origin: 38.0000  
North Arrow

# Identification of Regional Priorities Areas

## Cropland Suitable for Drainage Water Management



Illinois	10,289,165 Ac
Minnesota	6,308,982 Ac
Iowa	4,076,072 Ac
Indiana	2,752,251 Ac
Ohio	2,146,231 Ac
Missouri	1,844,238 Ac
Michigan	1,259,731 Ac
Wisconsin	309,427 Ac
South Dakota	228,842 Ac

### Geoprocessing Procedure

Soils Spatial and Tabular data obtained from the Soil Data Mart 8/24/2011

### Selection Criteria:

1. Major Components. Percent Composition > 40%
2. Representative slope <= 1 percent.
3. Representative value of the Hydric Definition Growing Season Minimum Depth of Water Table < 18 inches depth.

Extent of Cultivated Crops obtained from the 2006 National Land Cover Dataset (NLCD), USGS. The soil map units selected were converted to 30 meter raster data and intersected with the reclassified Cultivated Cropland extracted from the NLCD.

Coincident areas less than 15 acres were deleted.

### County Acres Summary

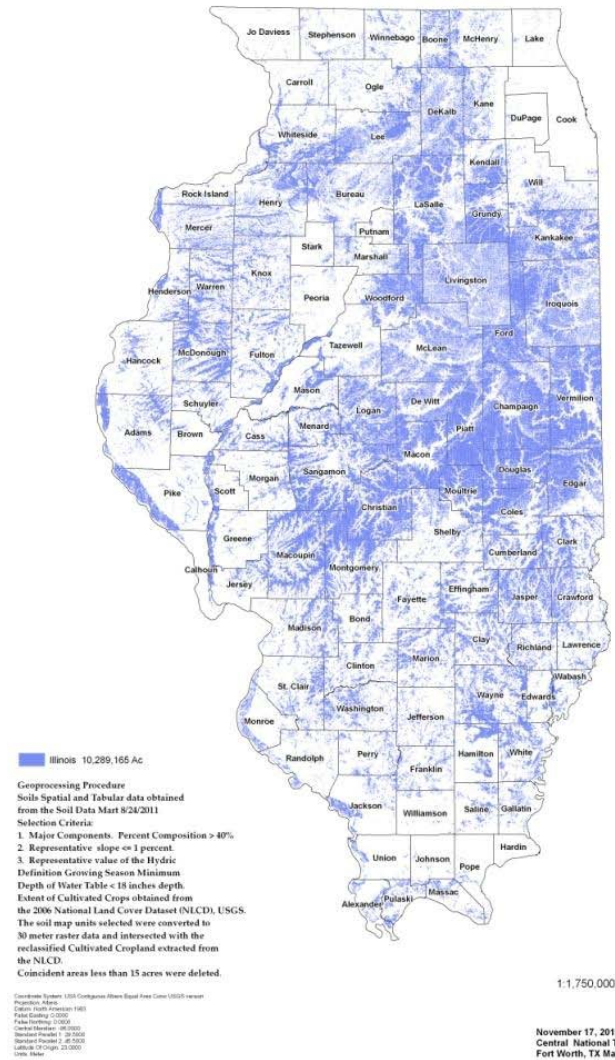
Acres	
Dark Brown	0 - 5000
Light Brown	5001 - 10000
Yellow	10001 - 25000
Light Green	25001 - 50000
Dark Green	50001 - 100000
Dark Blue	100001 - 500000



# Identification of Priority Areas in States



Suitable Soils for Drainage Water Management  
Illinois (Corrected)



# Web Application for Land with 'Potential for Drainage Water Management' map

ArcGIS - My Map - Windows Internet Explorer

[http://gisdev1.ftw.nrcs.usda.gov/Apps\\_ArcGIS\\_Silverlight/Ag%20Water%20Management/](http://gisdev1.ftw.nrcs.usda.gov/Apps_ArcGIS_Silverlight/Ag%20Water%20Management/)


ArcGIS My Map New Map My Content Help Sign In

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Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, and the GIS User Community

Done Internet 100%

Start | Inbox - Microsoft Out... | Office Communicator | Dubendorf, Jennifer - ... | Presentation1.pptx | Partner\_Forum\_June... | ArcGIS - My Map - ... | G:\Ag Drainage Mgt\P... | 2:28 PM



# Producer Assistance

## **Conservation Technical Assistance**

- Site Assessment

- Conservation Planning

## **Environmental Quality Incentives Program**

- Conservation Activity Plan (130)

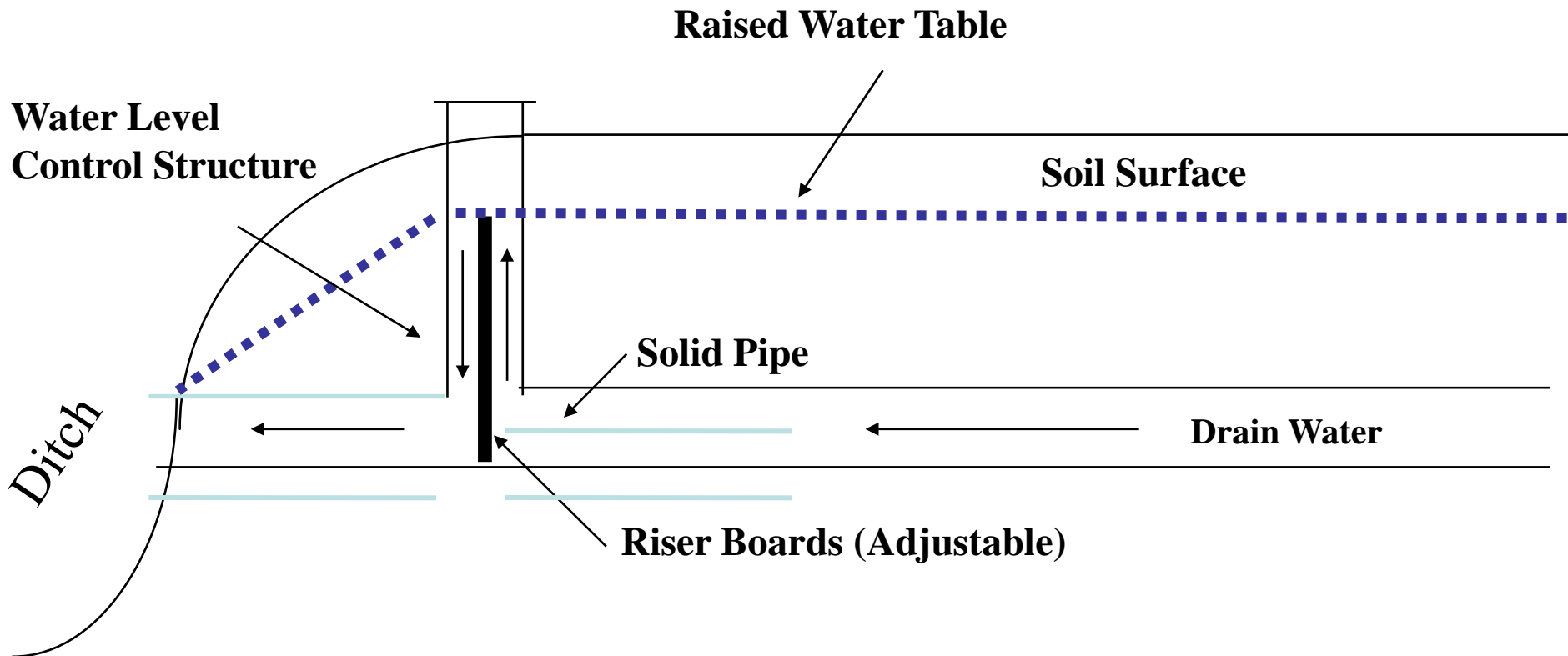
- Conservation Implementation

  - Drainage Water Management

  - Water Control Structures

  - Bio Reactors

# Sink: Drainage Management



The water level control device is installed in the tile drain near the outlet and at various locations within the field depending on topography

# Nitrogen Management Potential Discharge Reductions

- Agronomic Practices 20 - 30%
- Cover Crops 10 - 40%
- Drainage Management 20 - 50%
- Bioreactors 20 - 40%
- Bioreactors w/ Drainage Mgt. 50 - 80%
- Wetlands 5 - 60%
- Minimize drainage intensity 5 - 35%  
(for replacement systems)



“We cannot depend on windshield surveys and office planning to carry out a job of the complexity and magnitude of safeguarding our farmland and controlling floods.

*- Hugh Hammond Bennett*

# Our Hero



Questions ?