Conservation Drainage:

Managing Drainage for Yield and Water Quality Benefits

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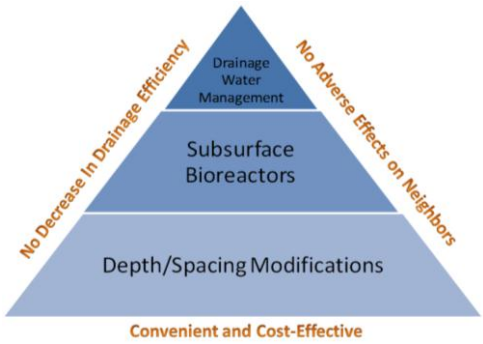
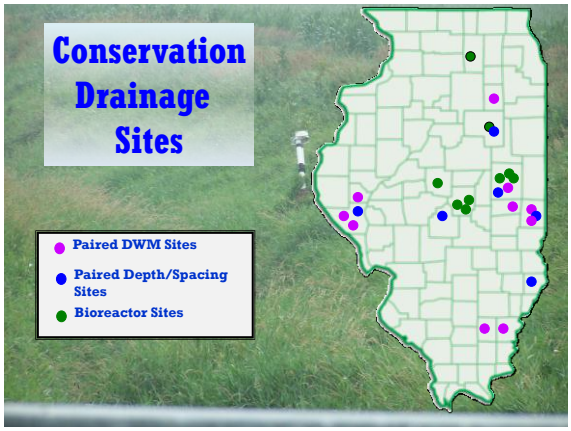
Conservation Drainage

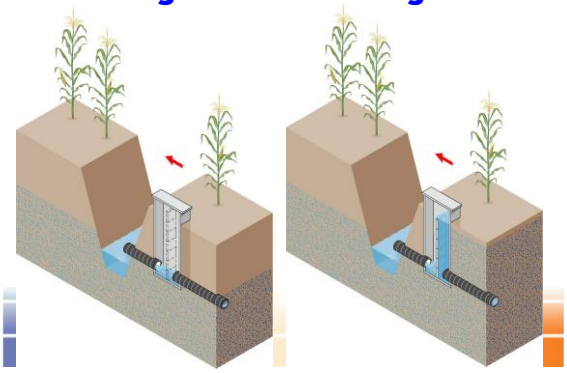
The optimization of drainage systems for crop production, water quality and water harvesting benefits

Conservation Drainage Practices

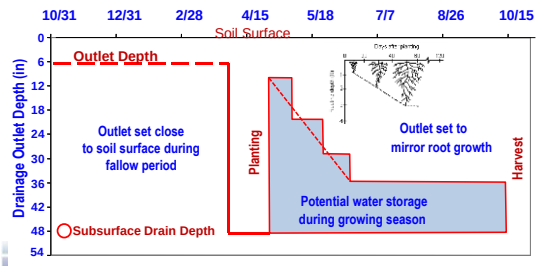




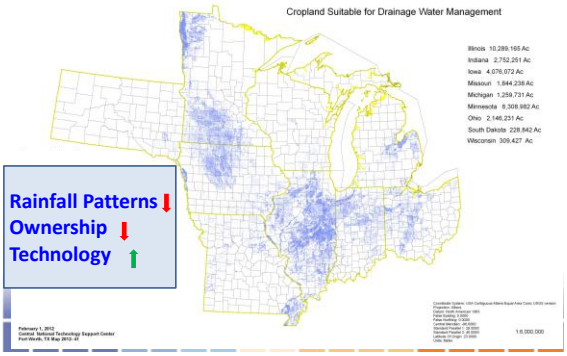
Drainage Water Management

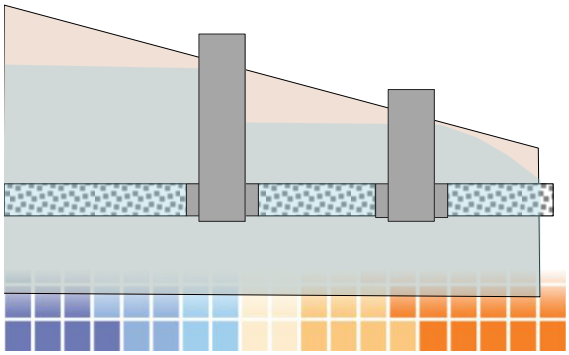


Drainage water management system operated for both water quality and yield benefits

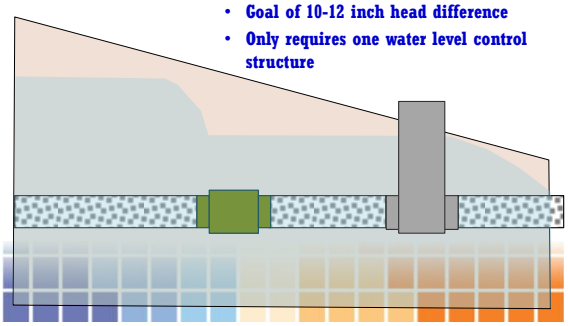


NRCS Midwest DWM Potential

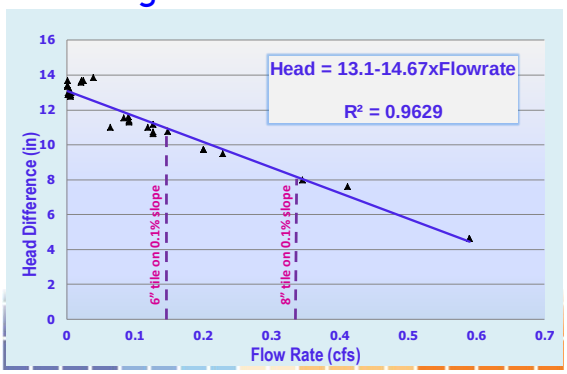




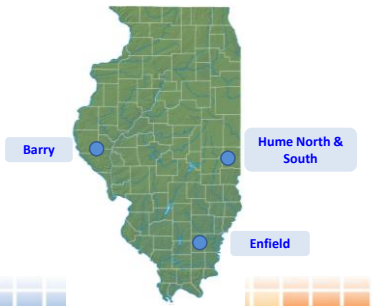
- Provide an increase in hydraulic head in tile lines
- Goal of 10-12 inch head difference
- Only requires one water level control structure



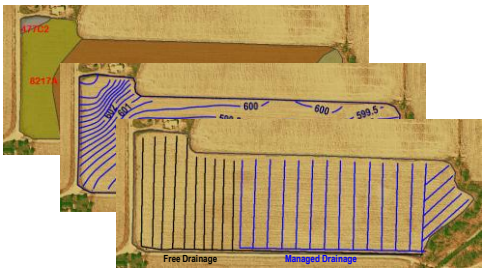
Watergate Performance Curve

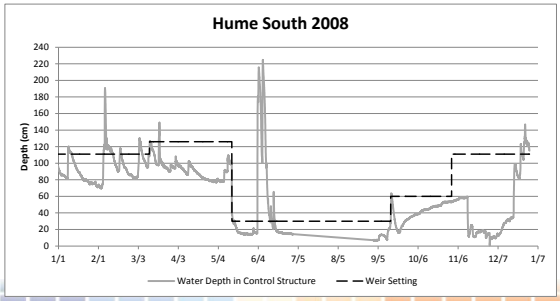


Five States Project

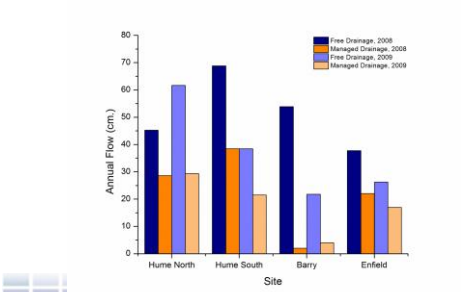


BARRY

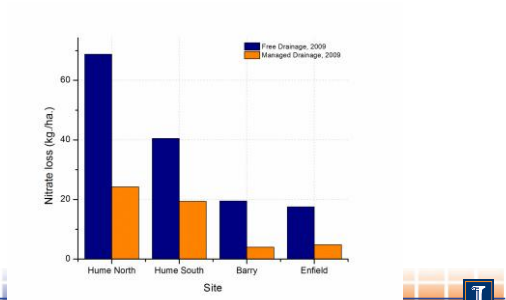




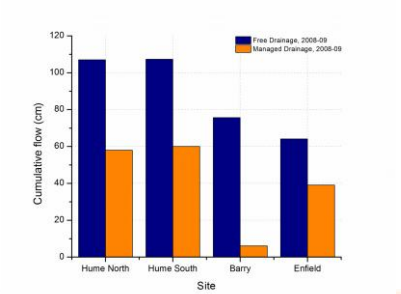
Annual Drain Outflow



Annual Nitrate-N Load Reduction



Cumulative Drain Outflow

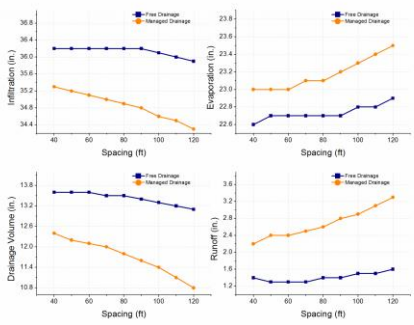


Where does the water go?
At what concentrations?

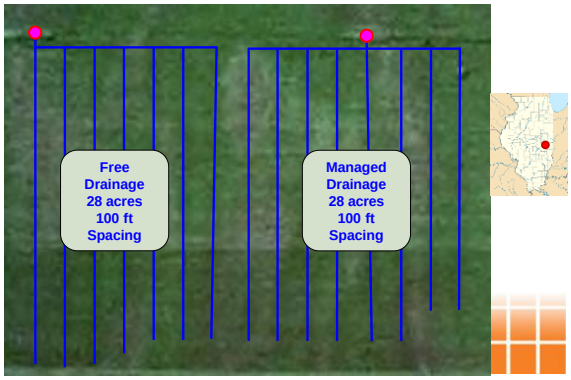
DRAINMOD SIMULATION

- **Drummer Silty Clay Loam**
- **30 Years of Urbana Weather Data**
- **Drains 4 feet deep**

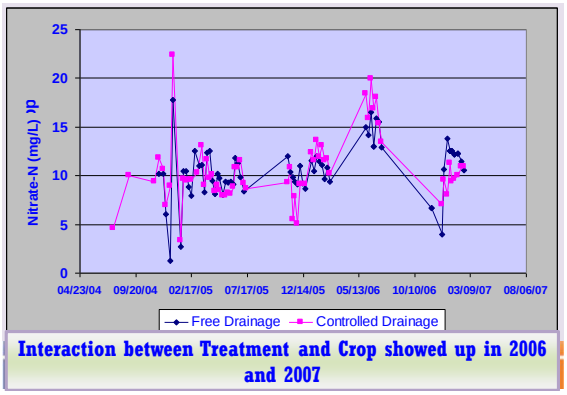
Water Partitioning



Murdock Site

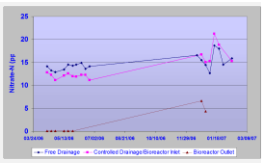


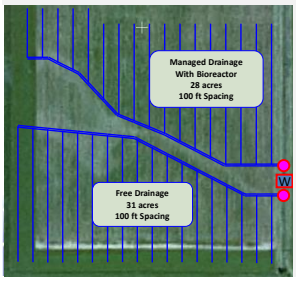
Murdock Site



Interaction between Treatment and Crop showed up in 2006 and 2007

DeLand Site



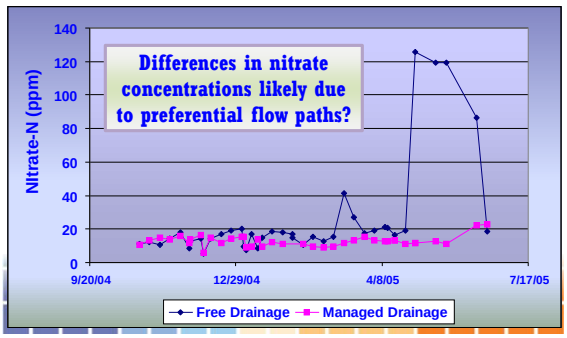


Nitrate concentrations were significantly lower in the managed system in 2005 - 2006.

Nitrate concentrations were significantly higher in the managed system in 2006 - 2007.

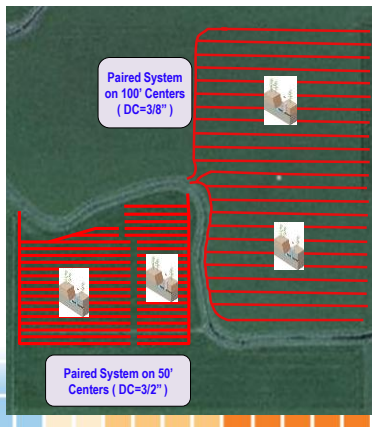
Kinderhook Site

Nitrate Concentrations at Kinderhook

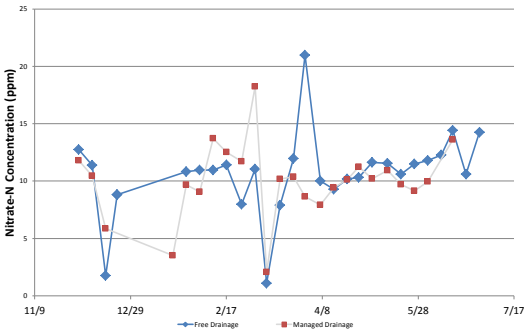


Differences in nitrate concentrations likely due to preferential flow paths?

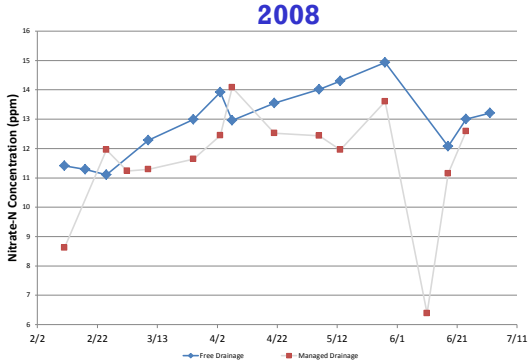
Hume Sites



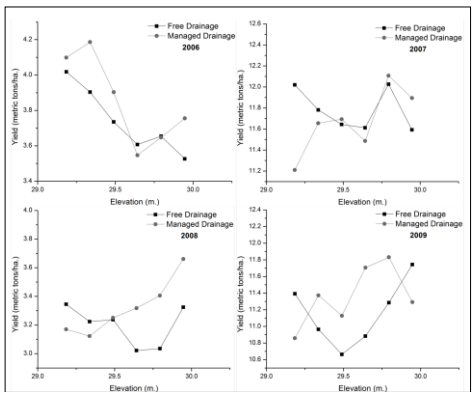
Nitrate Concentrations at Hume North 2005



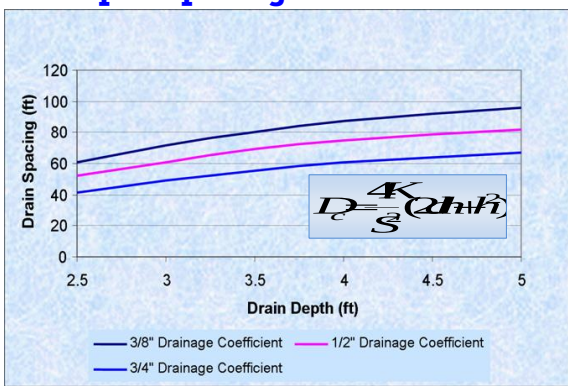
Nitrate Concentrations at Hume North 2008

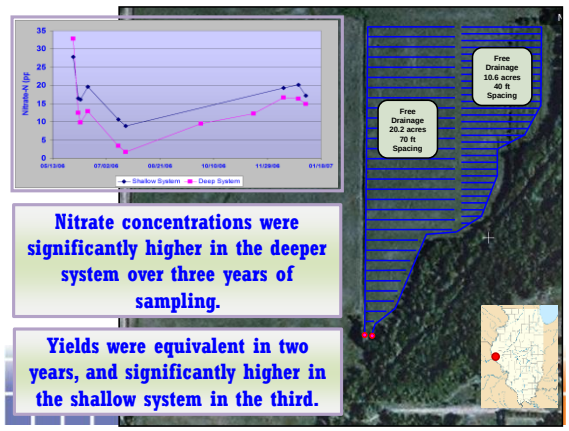


Yield as a Function of Elevation



Depth/Spacing Modifications



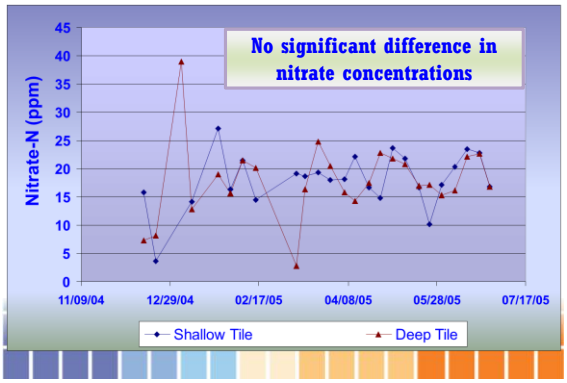


Nitrate concentrations were significantly higher in the deeper system over three years of sampling.

Yields were equivalent in two years, and significantly higher in the shallow system in the third.

Chatsworth Site

Chatsworth Site



South Farm Site

Summary

Drainage Water Management can be used to significantly lower nitrate loads from tile outflow without adversely affecting yield

However, there is a need to characterize concomitant nitrate loads from other pathways

Summary

Maps showing DWM Potential should be updated to include property boundaries and developments in technology

Summary

Changes in nitrate concentrations in managed drainage systems appear to be site specific and crop dependent.

Long-term studies are needed to explicate these interdependencies.

Ongoing Work

Representation of Conservation Drainage Practices in a watershed-scale model (SWAT)

Incorporation of field boundaries and Lidar data into a DWM Potential Map

Development of a GIS (MapWindow) plugin for laying out DWM systems


Tilepherus Decapodia Illinoisis
Thank You