

Wetland Restorations

For Hydrology and Water Quality



Water Quality Program

A Collaborative Effort Supported by the McKnight Foundation, Seven Mile Creek Watershed Project, Clean Water Partnership Program, Conservation Reserve Enhancement Program, Conservation Reserve Program.

Conservation Drainage

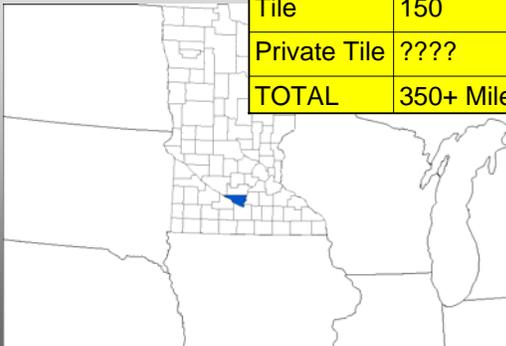
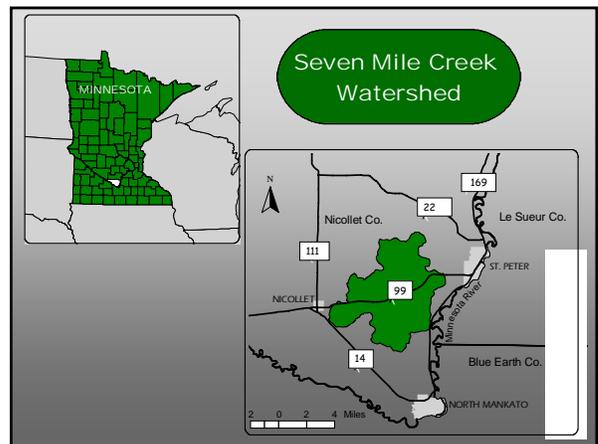
- 1) Controlled Drainage Structures
- 2) Shallow Drainage vs. Deep Drainage
- 3) Bio-Reactors
- 4) Alt. Ditch Design
- 5) Linking Drainage with Restored Wetlands



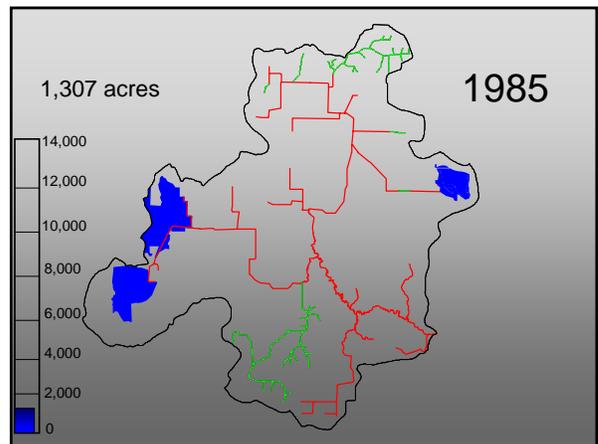
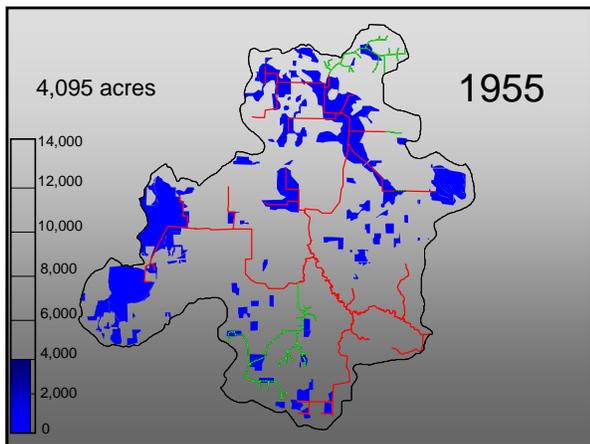
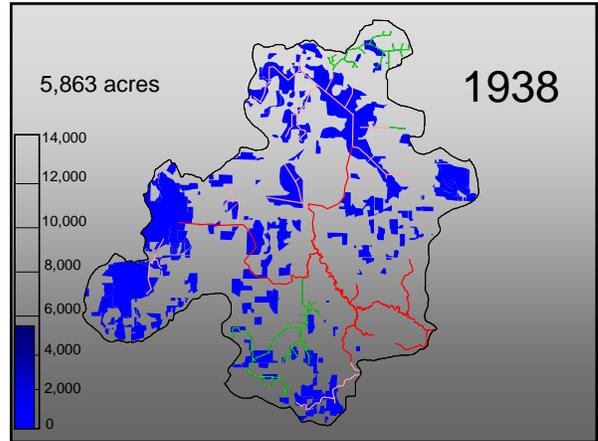
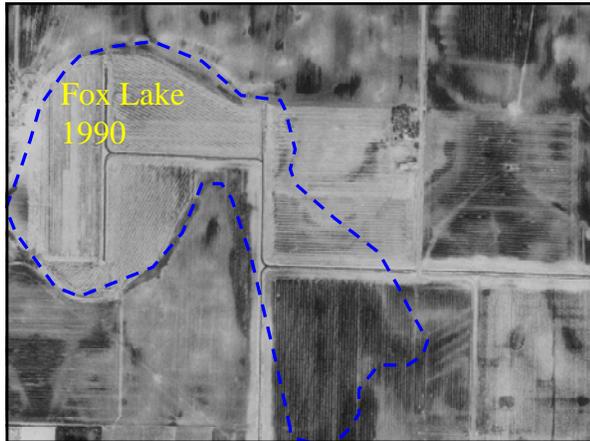
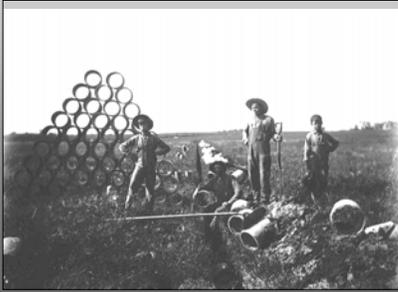
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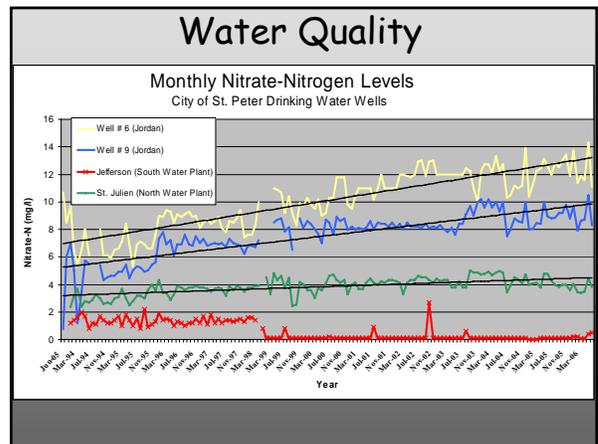
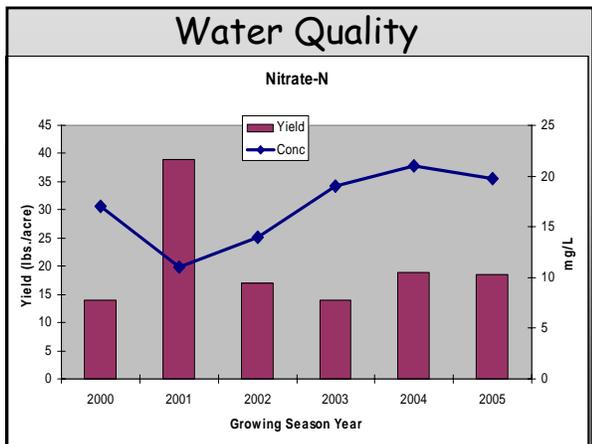
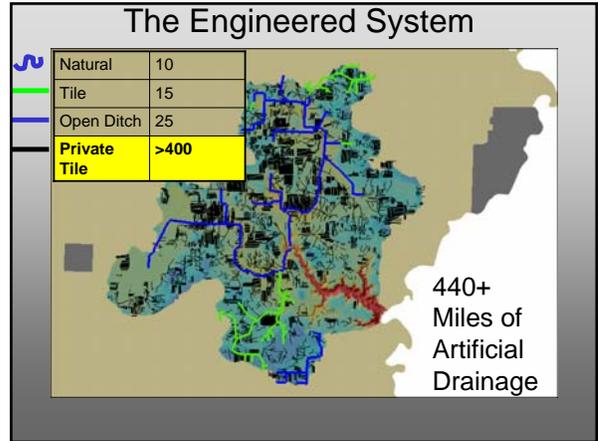
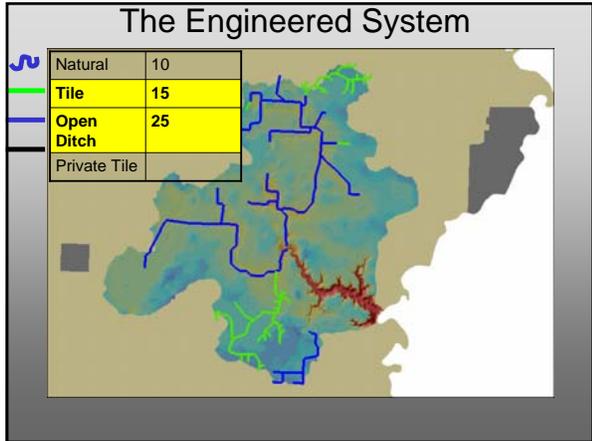
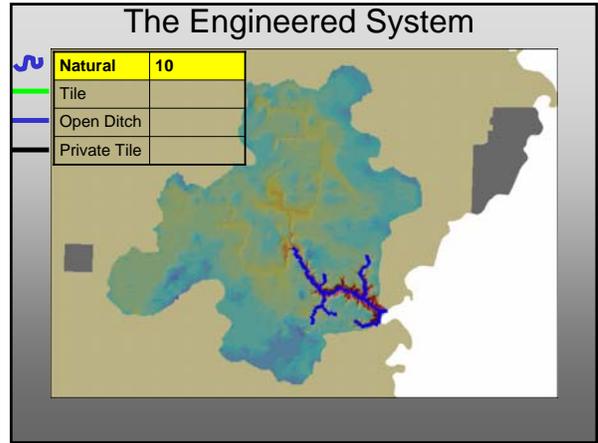
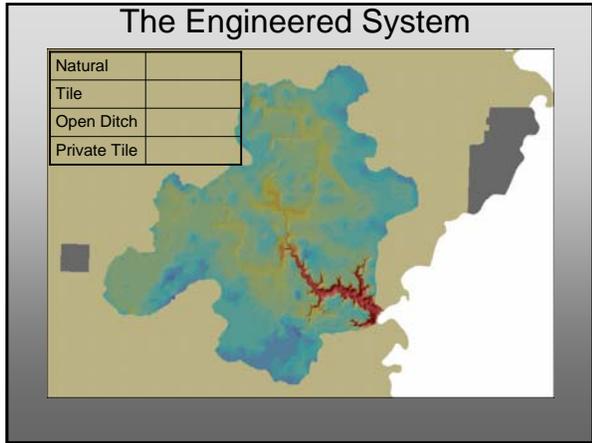


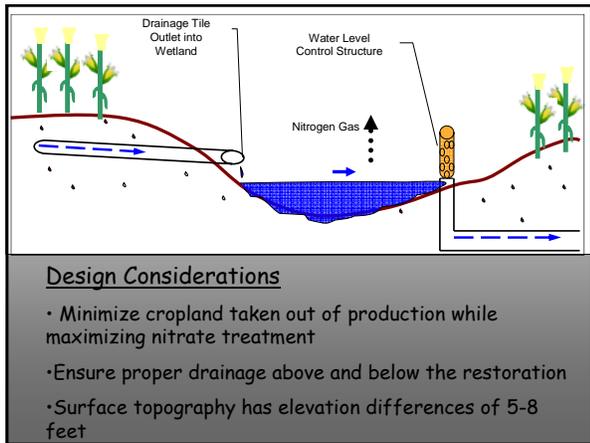
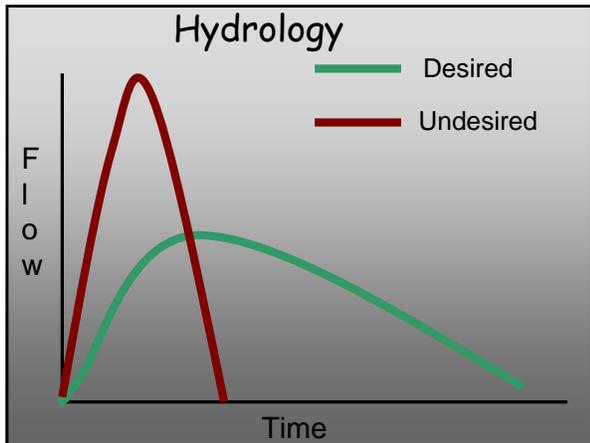

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|--------------|-------------------|
| Open Ditch | 250 |
| Tile | 150 |
| Private Tile | ???? |
| TOTAL | 350+ Miles |

An Historical Perspective of Drainage Management



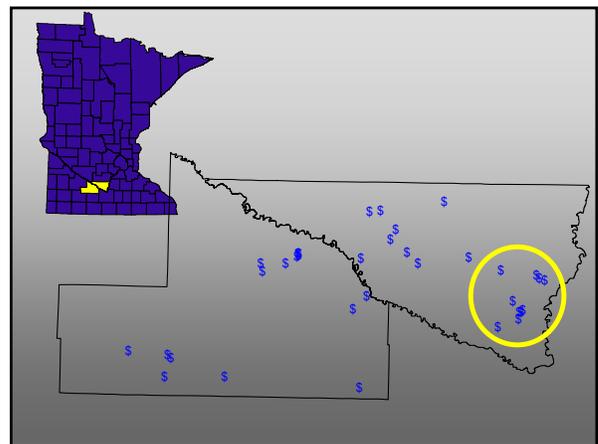


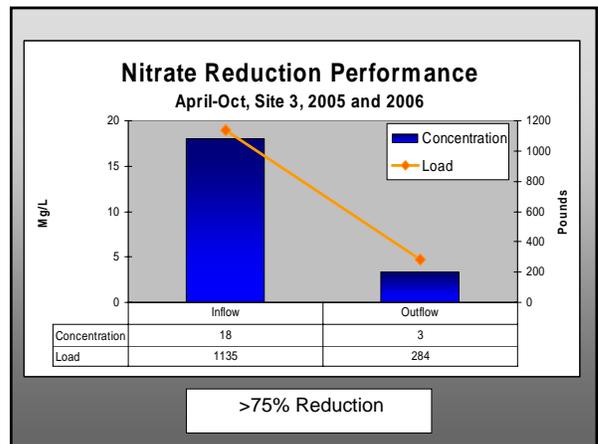
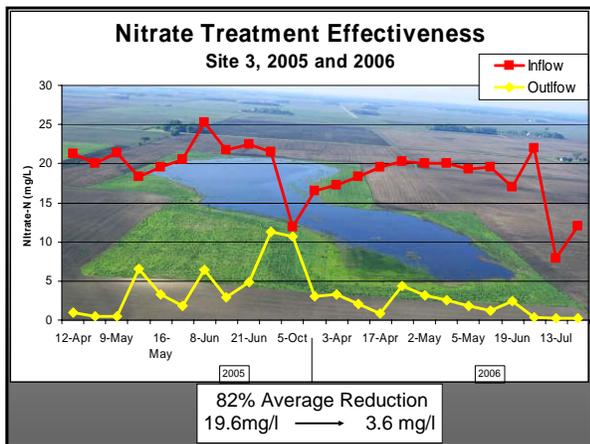
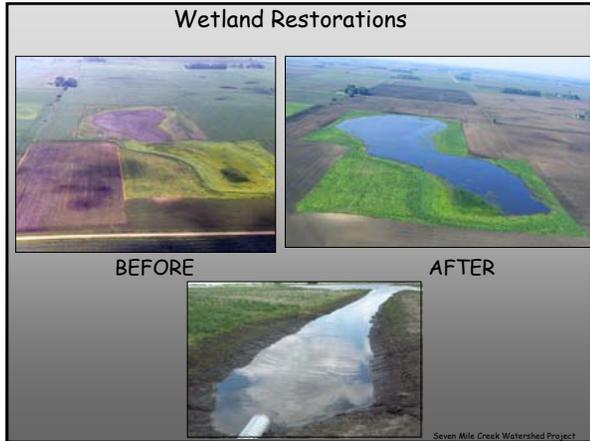
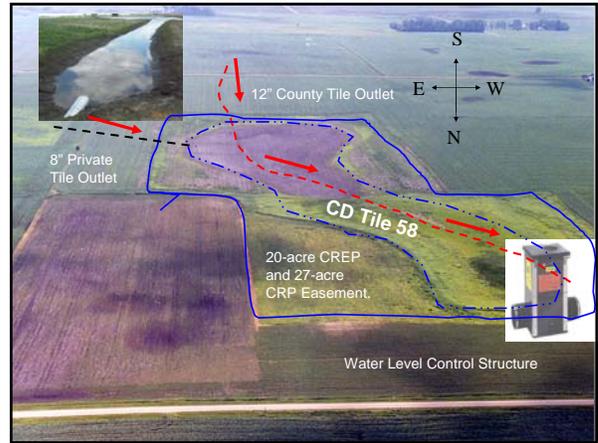


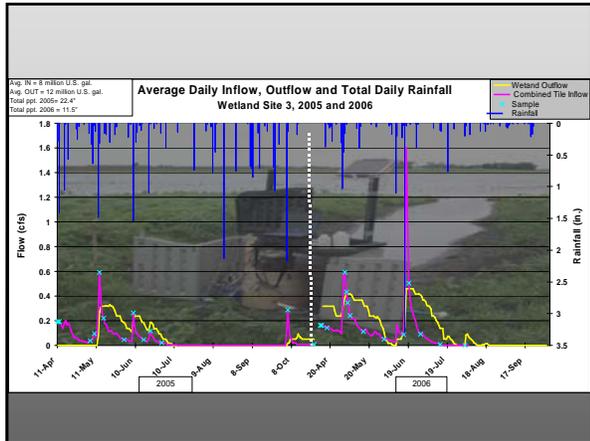
Summary of Wetland Restorations

Brown and Nicollet County

- 34 Wetland Restorations.
- Over 500 acres of wetlands and buffers established in a three-year time period.
- It was technically feasible to outlet tiles into restored wetlands about 20% of the time.

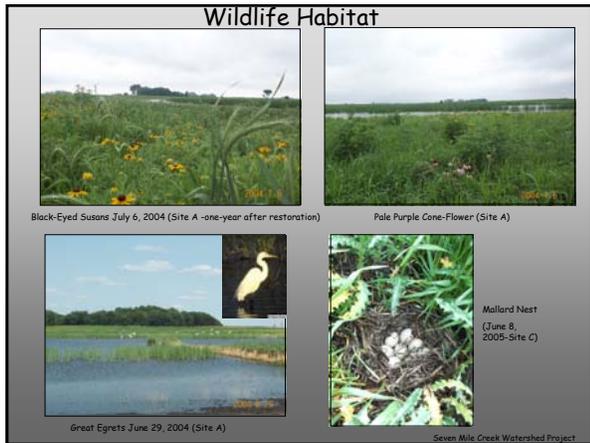






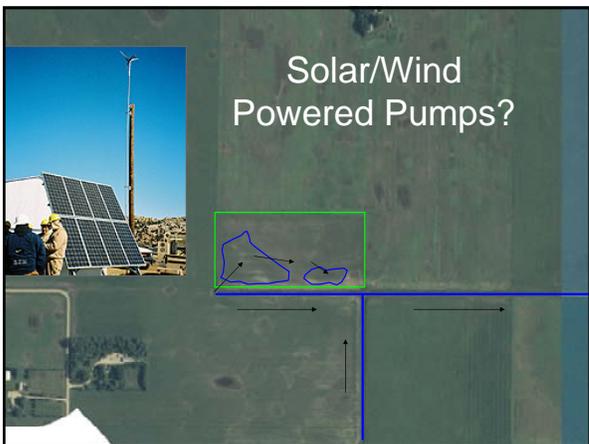
Performance Monitoring

- More sustained and regulated flow
- Wetland flow continues about one month longer than the tile flow
- Peak tile flow rates are reduced by 25%-75%
- Tile flows from east tile are affected by other wetland
- Landowner testimonies



Lessons Learned

- 1) Technical Limitations
- 2) Opportunities to bridge gaps
 - a) Technical Service Representatives and Conservation Liaisons
 - b) Assistance with installation and follow-up
- 3) Need an integrated approach
- 4) Need further analysis



Acknowledgements

Special thanks to the many project partners and especially to:

- McKnight Foundation
- Clean Water Partnership Program
- BWSR



Kevin Kuehner

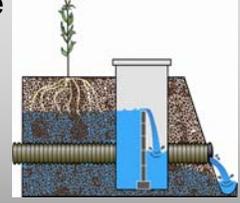
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<http://mrbdc.mnsu.edu/org/bnc/>

Conservation Drainage

Demo Farm

1) Conventional depth (80ft spacing, 4ft depth)



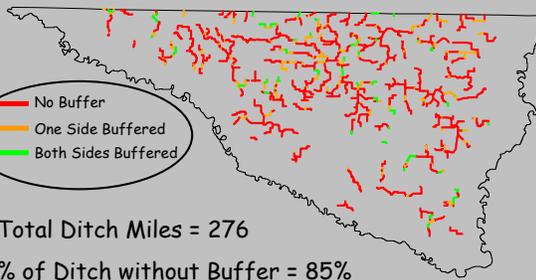
2) Shallow depth (60ft spacing, 3ft depth)



3) Controlled drainage (50ft spacing, with 2ft water outlet structure)

4) Same as #3 but with a woodchip bioreactor

Nicollet County Drainage Ditch Buffer Status



Total Ditch Miles = 276

% of Ditch without Buffer = 85%

% of Ditch with Buffer = 15%



Drainage Records Modernization

- Digital conversion of County Ditch Maps
- Historical Air photo Rectification
- Geo-referenced Drainage Inspection
- Integration into ArcGIS, ArcReader and ArcIMS Applications

