# Tile Drainage Basics and UW Discovery Farms Tile Research

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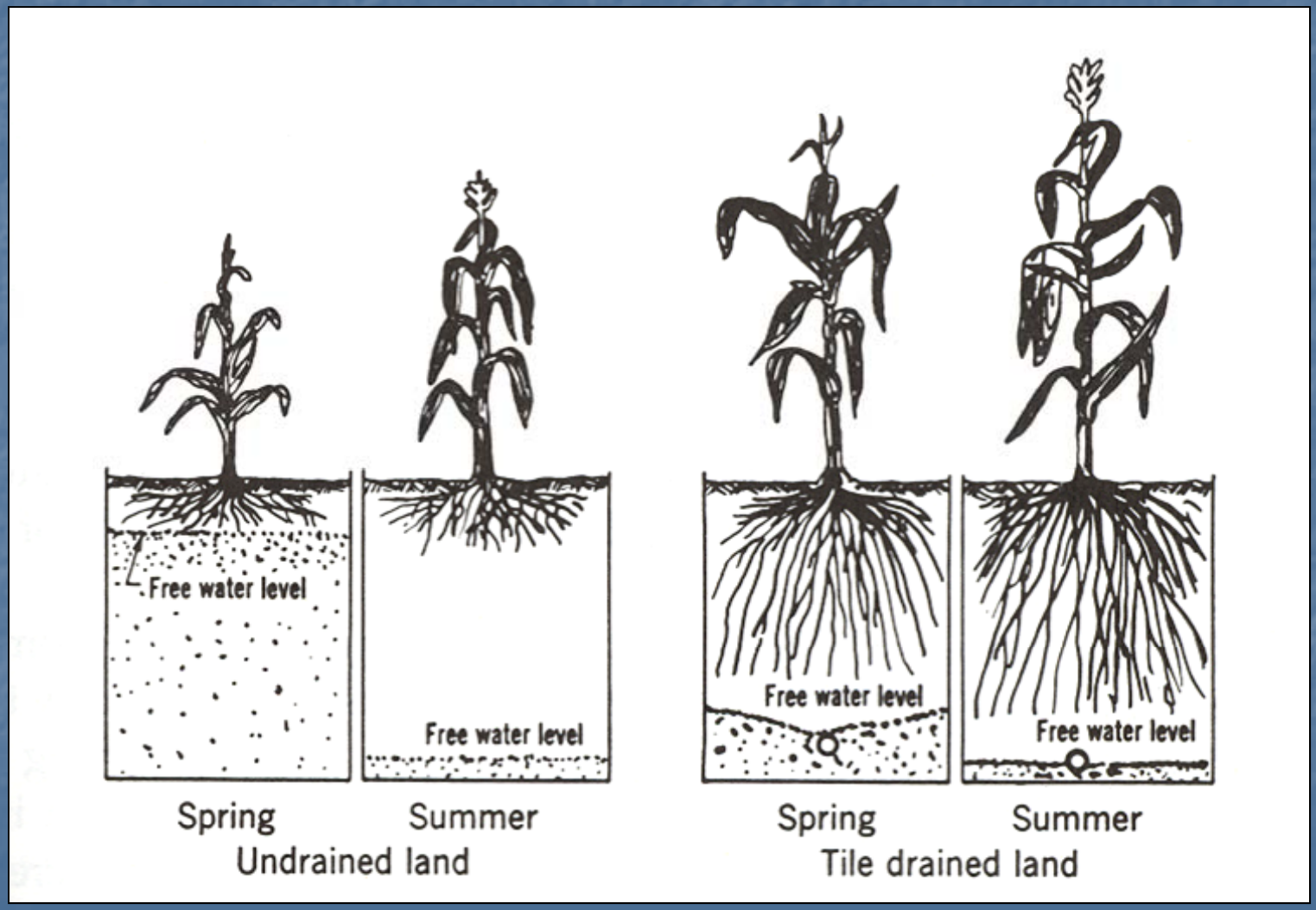
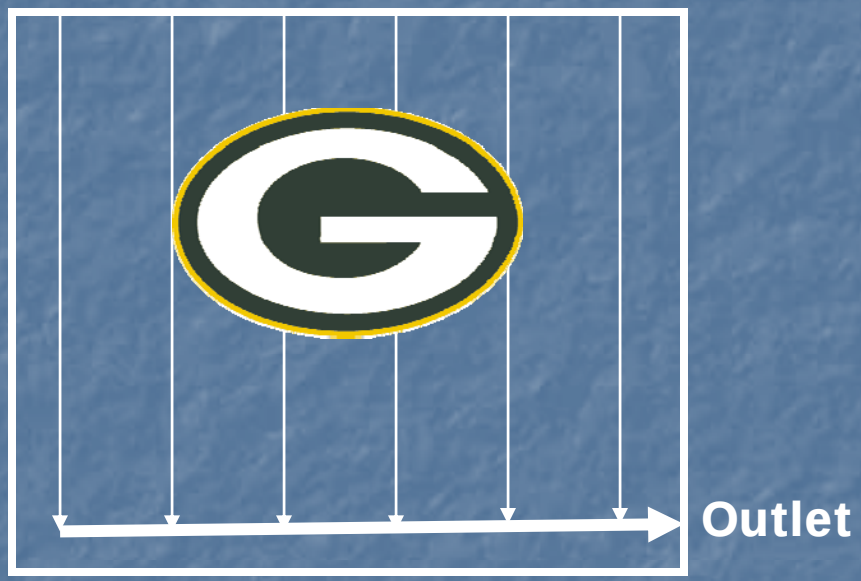
# Why tile?




Credit: John Panuska

# Gridiron

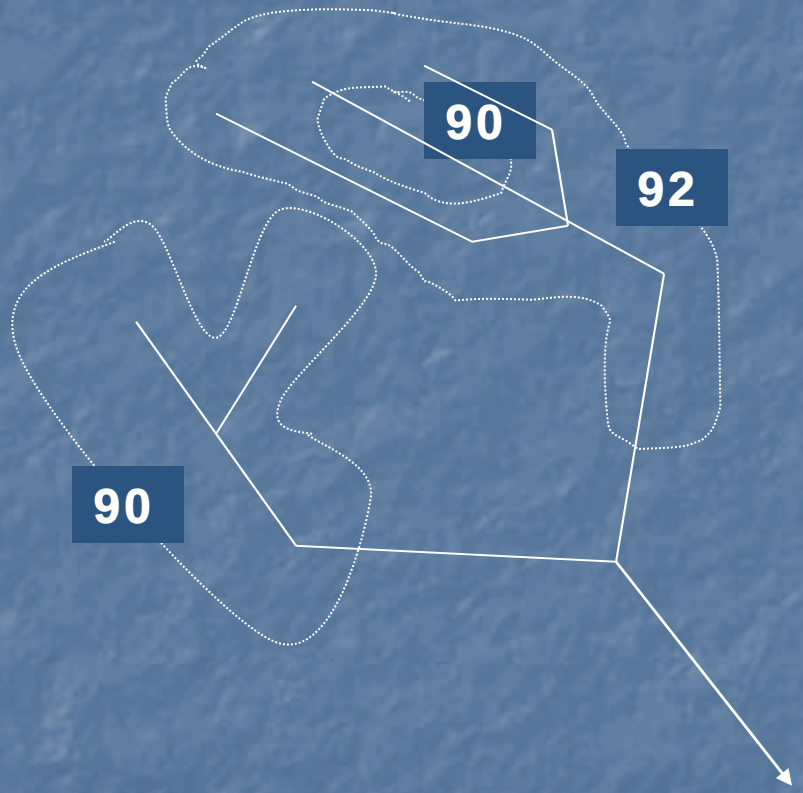
- Drainage of level areas, uniform slopes and soils w/ wide-spread wet areas.
- One main or sub-main serves as many laterals as possible




Credit: John Panuska

# Natural or Random

- Follow natural depressions.
- Used frequently in “pot hole” landscapes to drain isolated depressions.

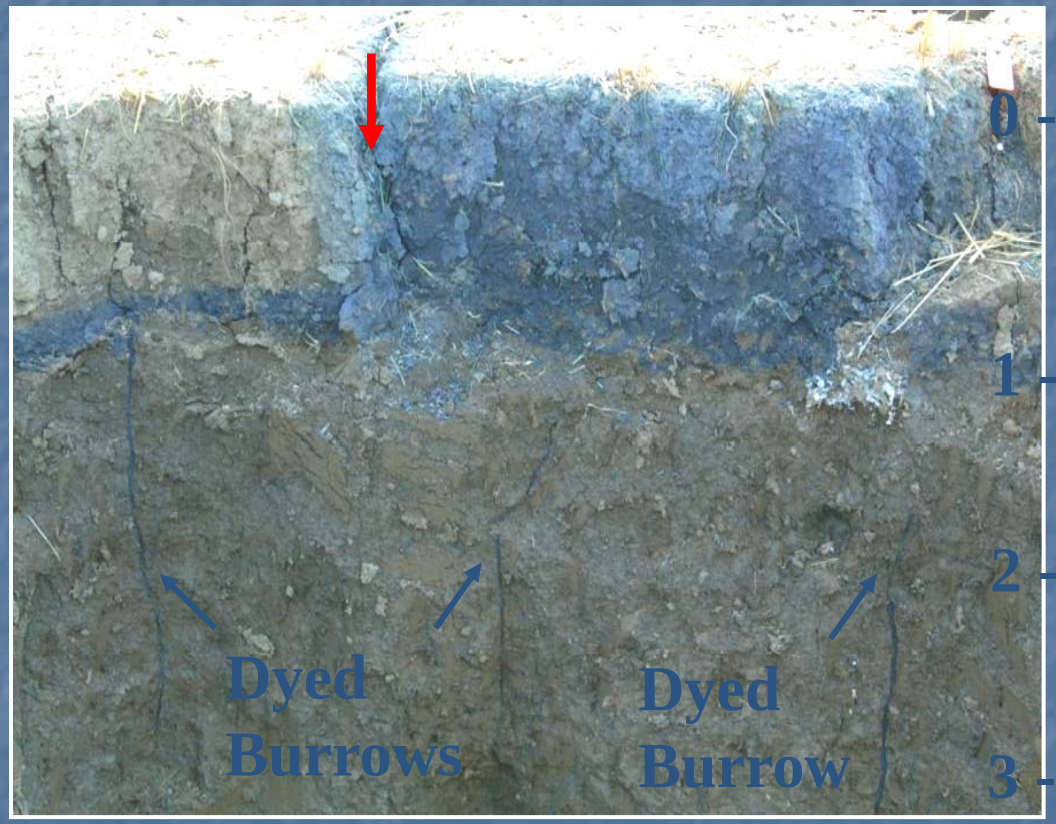



Credit: John Panuska

# Environmental Risks of Tiles
## - Macropores -

Preferential flow

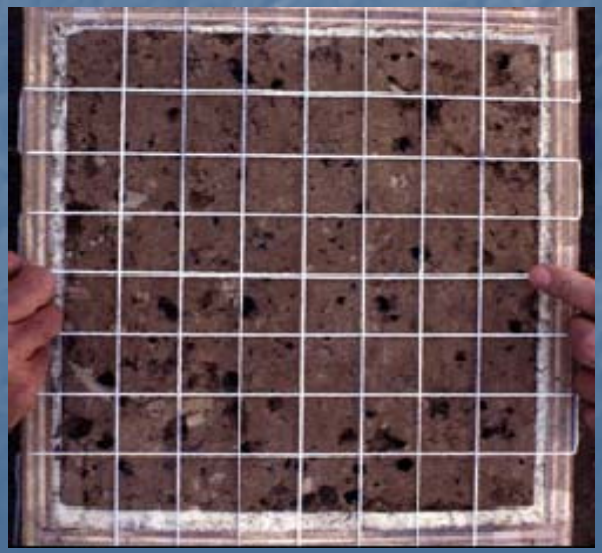
- Earthworm burrows
- Root channels
- Shrinkage cracks
- Structural porosity




Credit: John Panuska

# Earthworm Burrows

- 727,000 per acre (long term no till)
- High prevalence over tiles
- Higher velocity of water and solute movement
- Less contact time



(Shipitalo and Gibbs, 2000)

# Soil drying and crack formation

# Discovery Tile Research Farms

## Kewaunee County

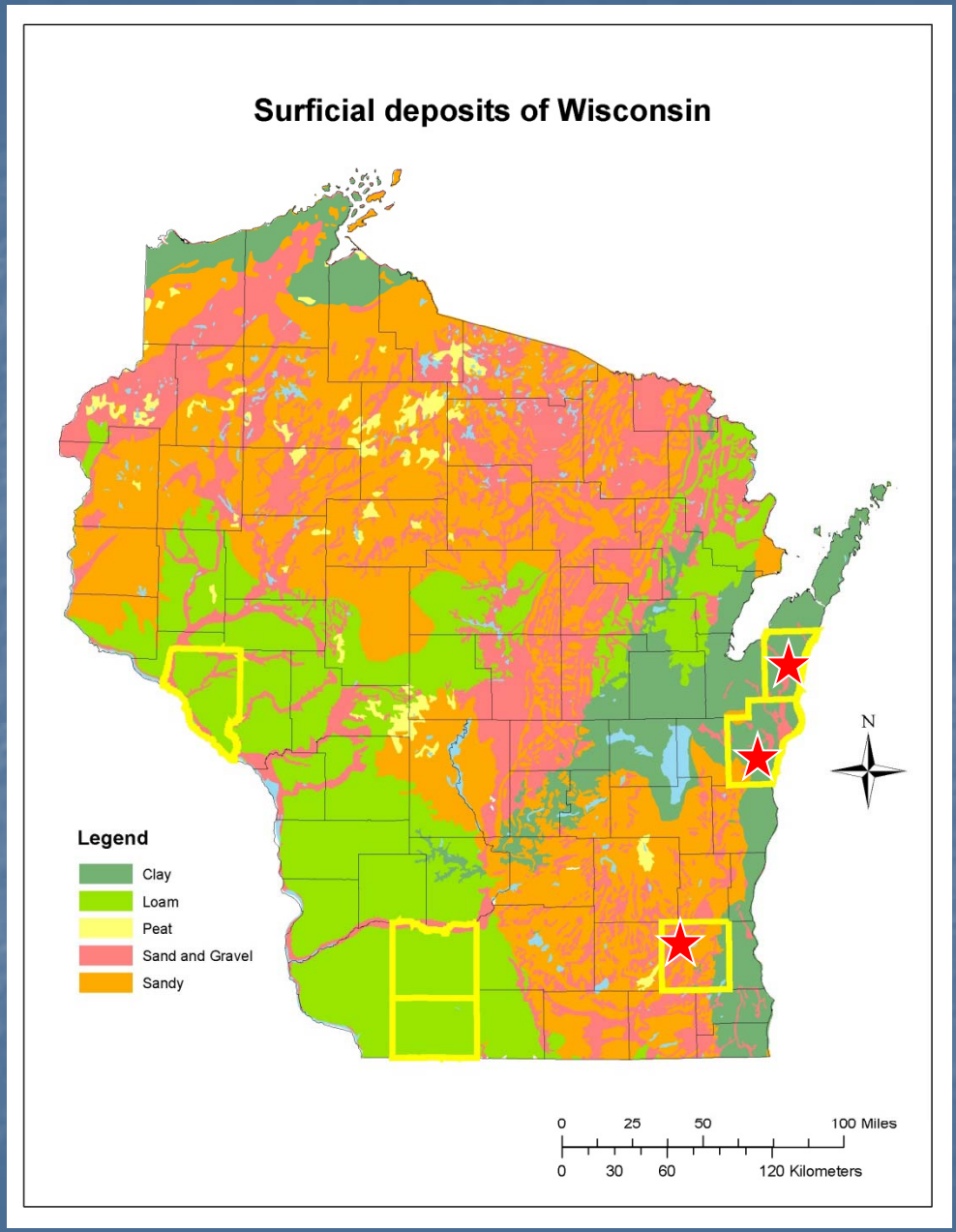
- Two tile line sites (2004 – 2009)

## Manitowoc County

- Two tile line sites (2004 – present day)

## Waukesha County

- Two tile line sites (2004 – 2009)

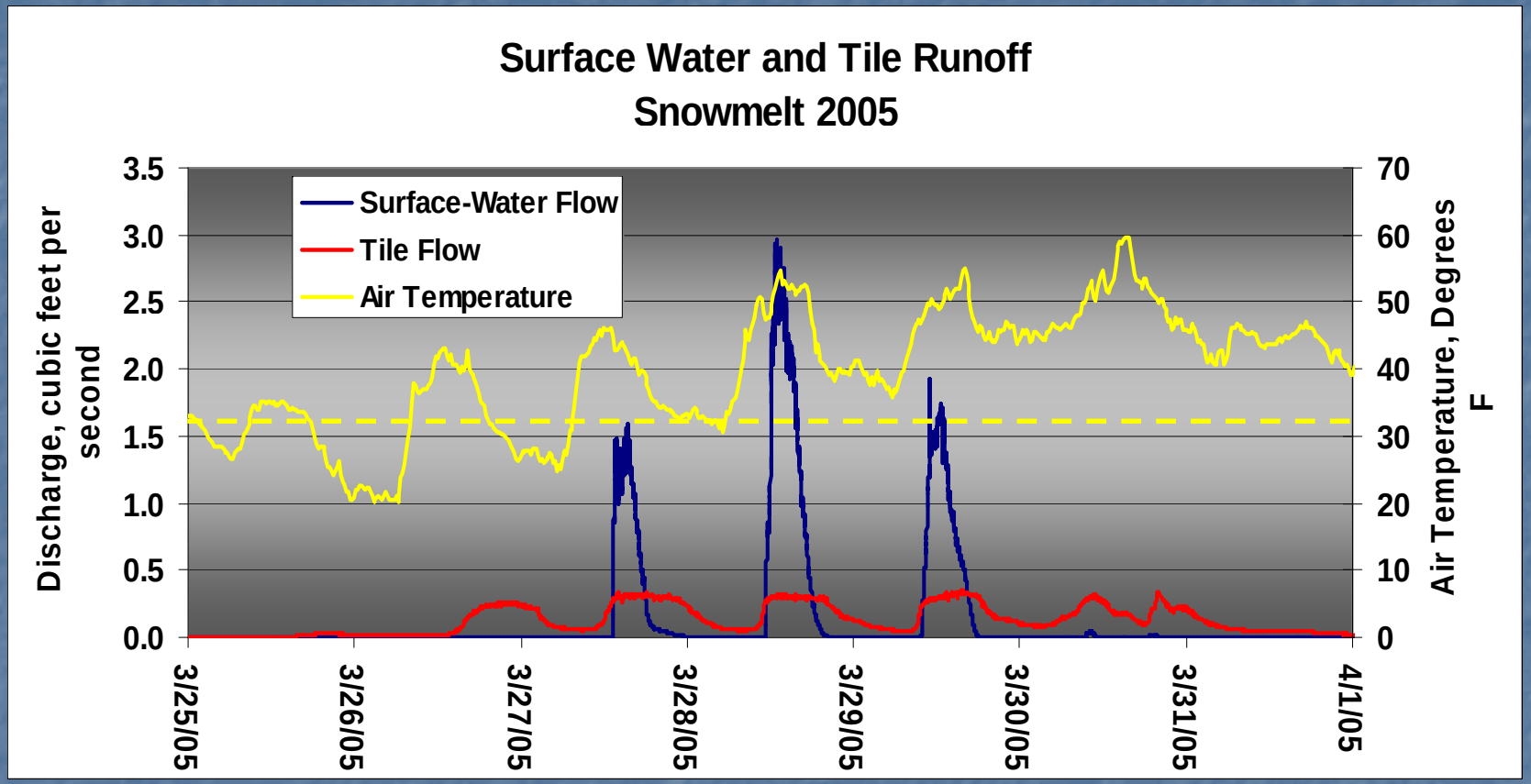


# Tile line water monitoring

# Tile line water monitoring

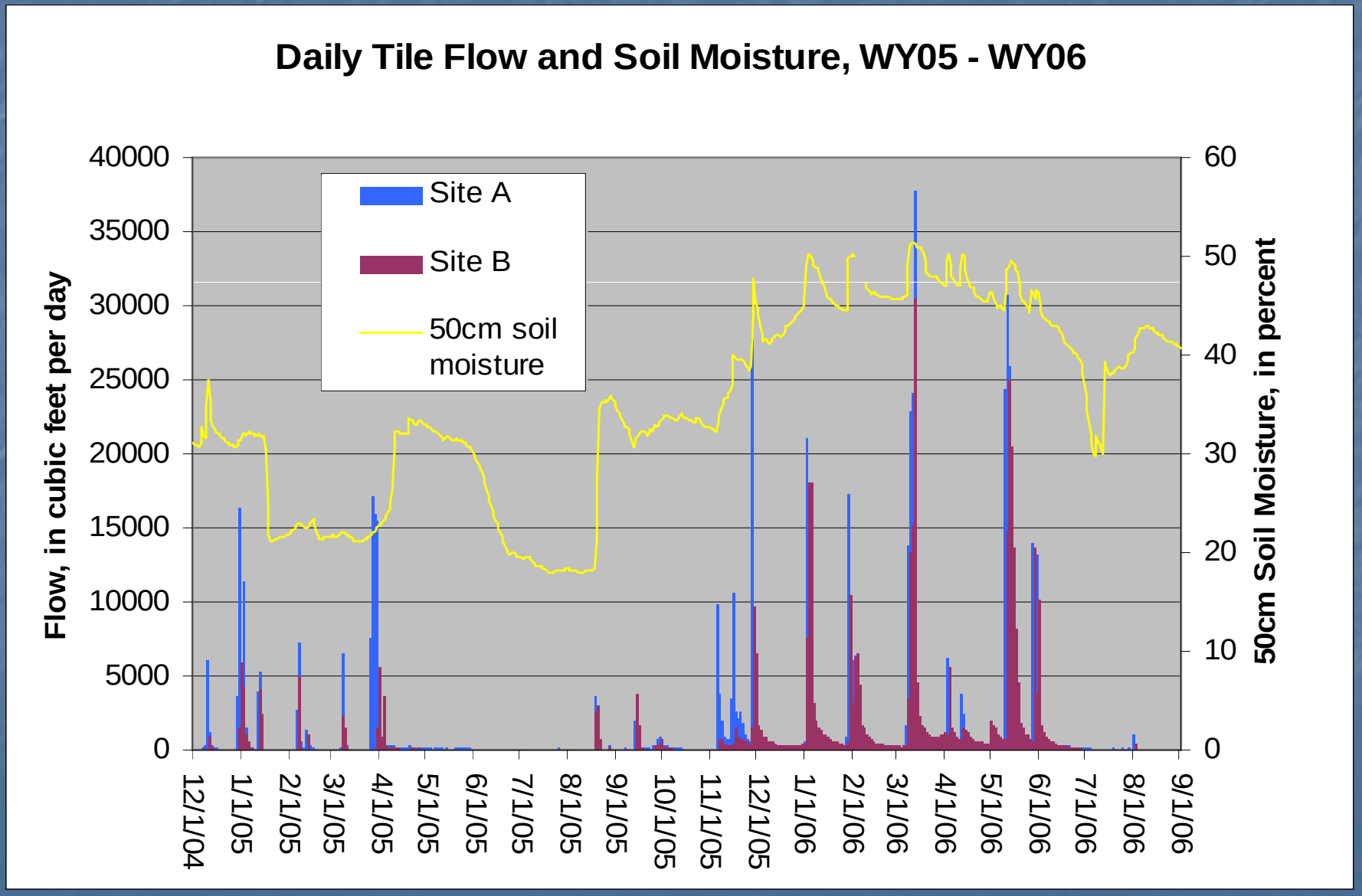
# Tile monitoring equipment

# Surface and Tile Runoff Under Snowmelt Conditions

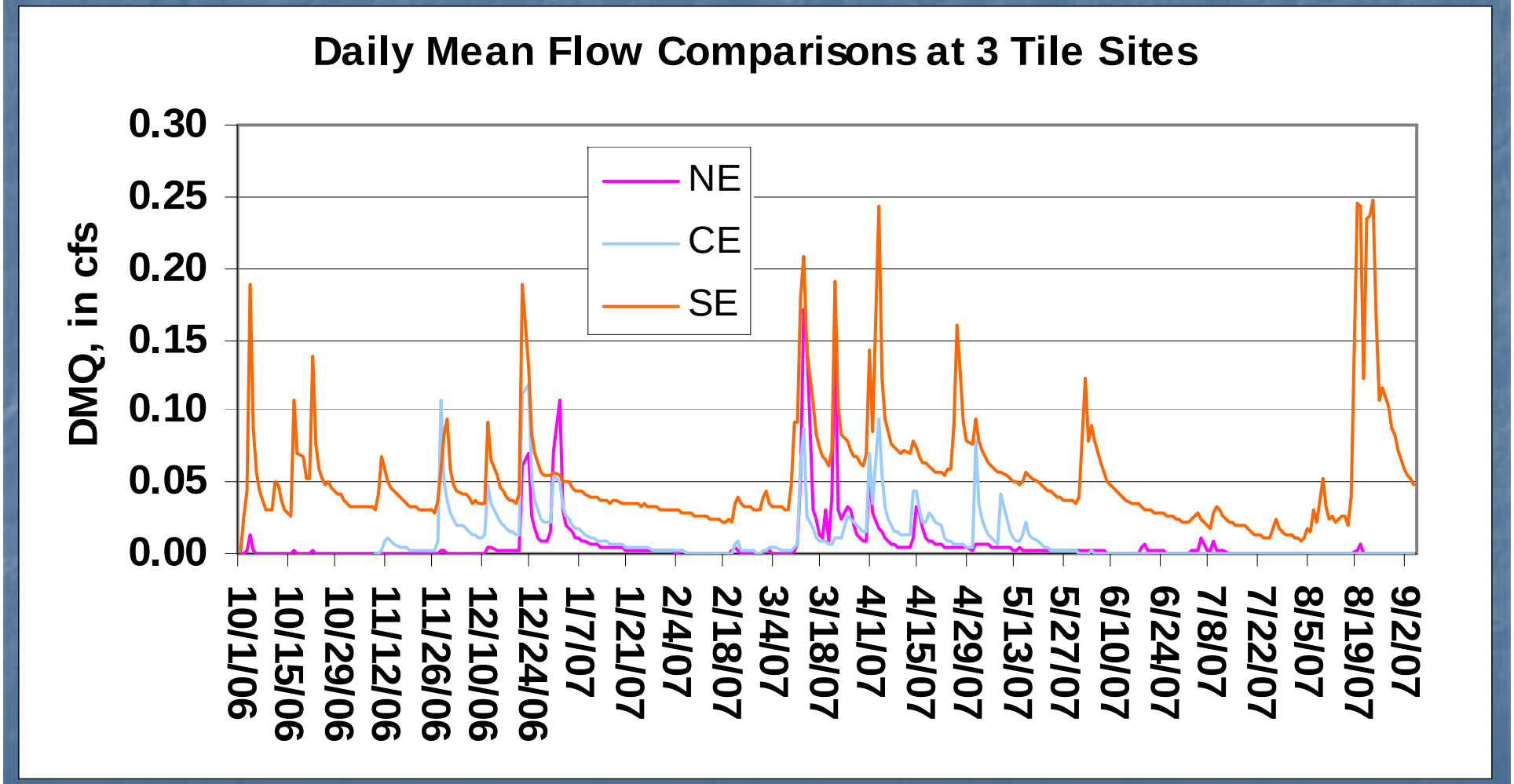



- Tile flow began before surface flow
- Relative volumes of water flowing in surface and tile were similar for this snowmelt period

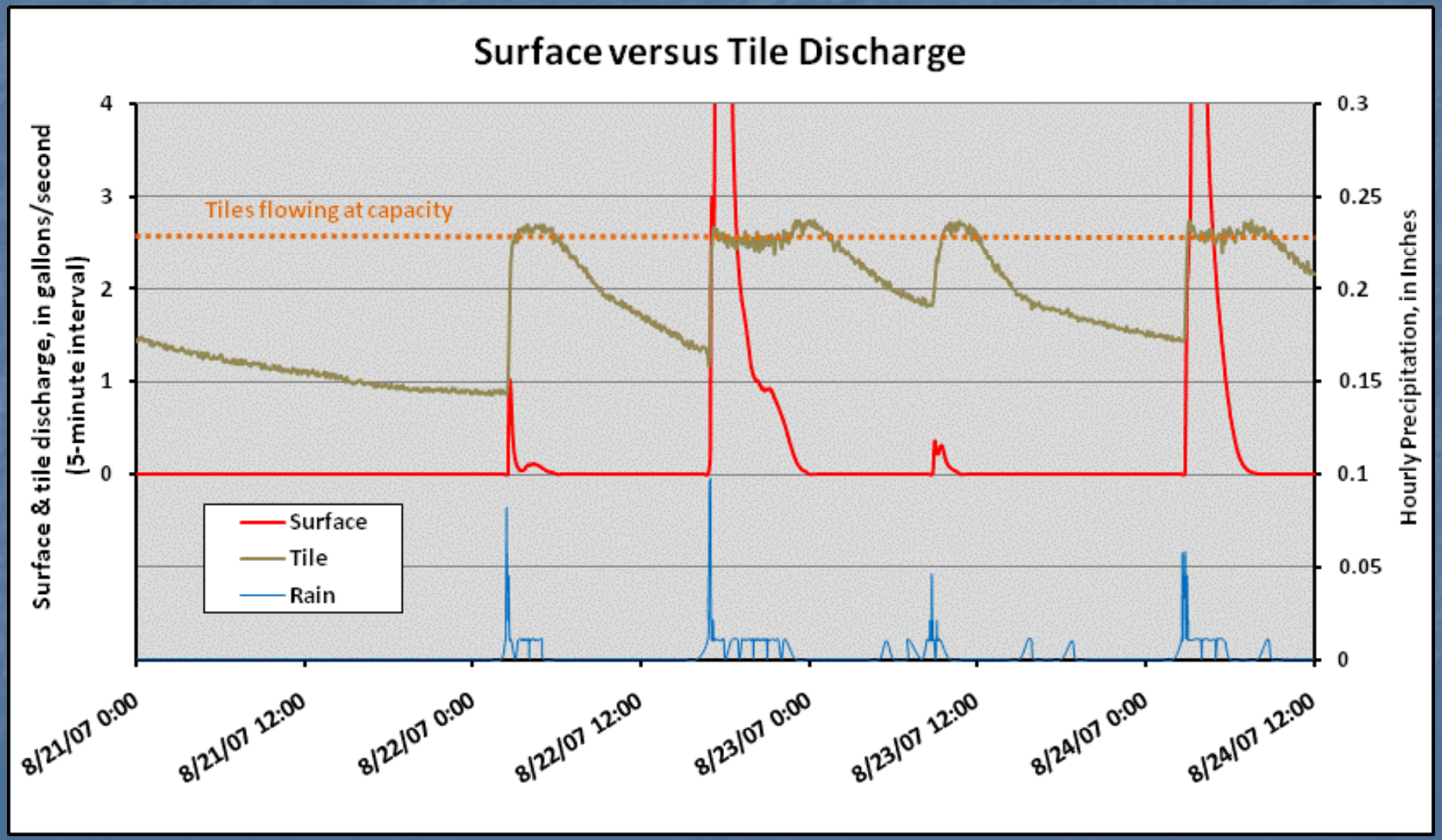
# Tile flow periods



# Tile flow patterns



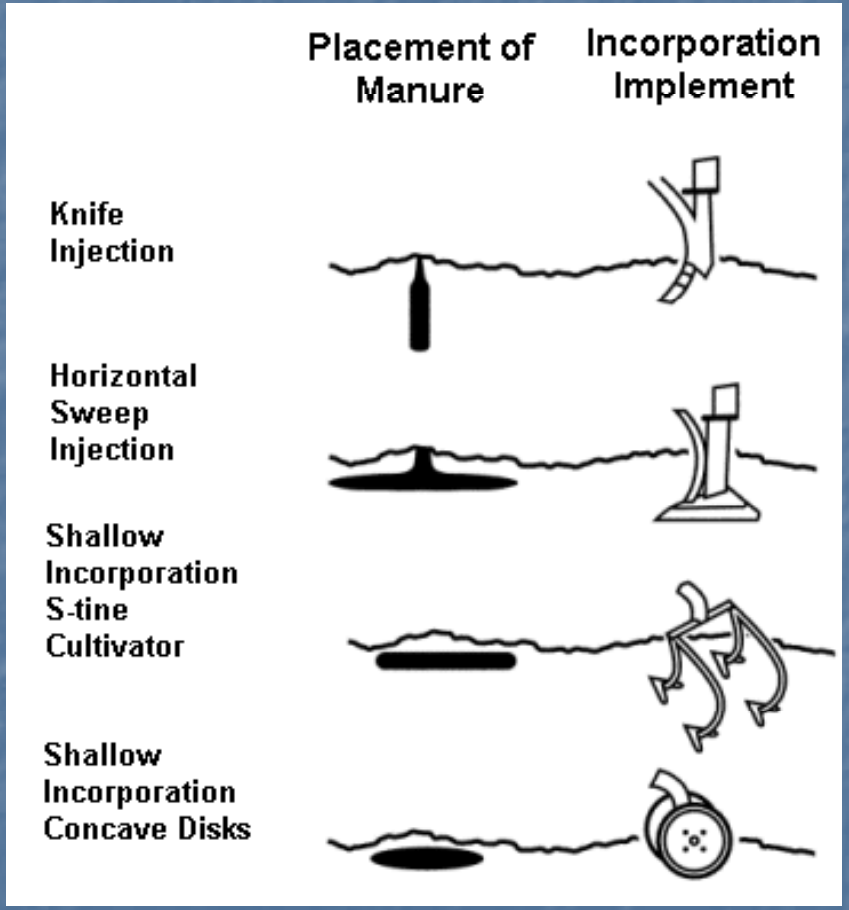
# Efficiency of tile water removal



# Factors Influencing Manure Contamination of Tile Lines

- Consistency of manure:
  - 0-2% solids: high risk
  - 2-5% solids: moderate risk
  - > 5% solids: low risk
- Application rate
- Tillage / manure incorporation
- Soil moisture content / frozen soils
- Tiles flowing

# Manure Application Over Tile Line




Source: *University of Nebraska, Institute of Agriculture and Natural Resources*

# What are Discovery Farms next steps?

- Improve our understanding of tile drainage
- Development of risk assessments during potential surface-water & tile runoff periods
- Determination of when best management decision (BMP) should be utilized/maintained
- Knowledge of when to expect to see surface-water/tile losses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