

Three Discovery Farms... Three Unique Water-Quality Stories

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ND Water-Quality Monitoring Conference
March 5, 2014





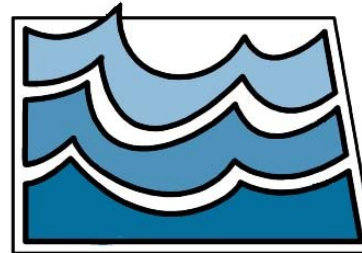
Partners

NDSU

NDSU Extension Service
N.D. Agricultural Experiment Station
North Dakota State University



NORTH DAKOTA
DEPARTMENT of HEALTH
Water Quality



**North Dakota
State Water
Commission**

...with support from ND's
agricultural community

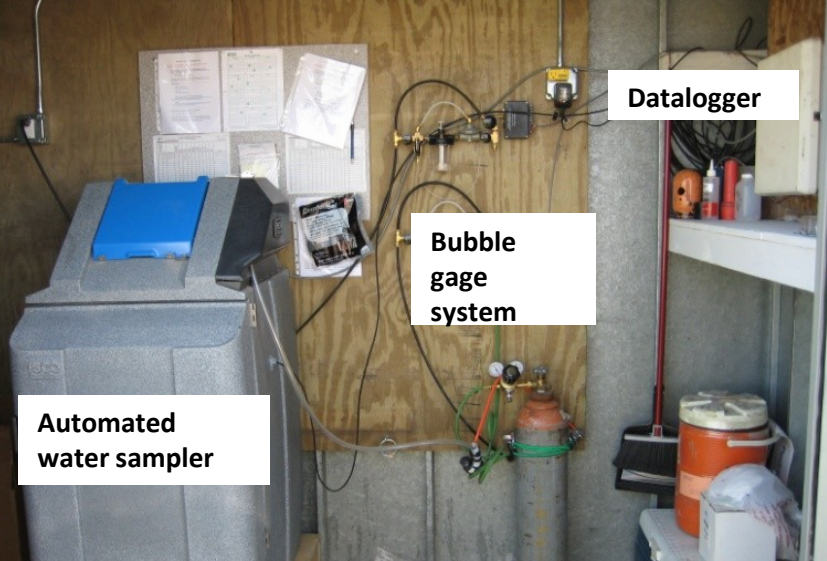
Background

- Discovery Farms were started in Wisconsin, modeled after a program in the Netherlands
- Established to collect and analyze water-quality information from agricultural lands and livestock feeding areas
- Documents the effectiveness of producer-driven solutions to water quality impacts

North Dakota Discovery Farms

- Data collection started in June 2008
- 3 farms –
 - 2 cattle & crop; 1 crop with drain tile
- Event-based (snowmelt & precip) project
- 3 data collection sites per farm
- Water quality / hydrologic / meteorological / soil moisture & temp
- Sampling season: March through October





Automated water sampler

Datalogger

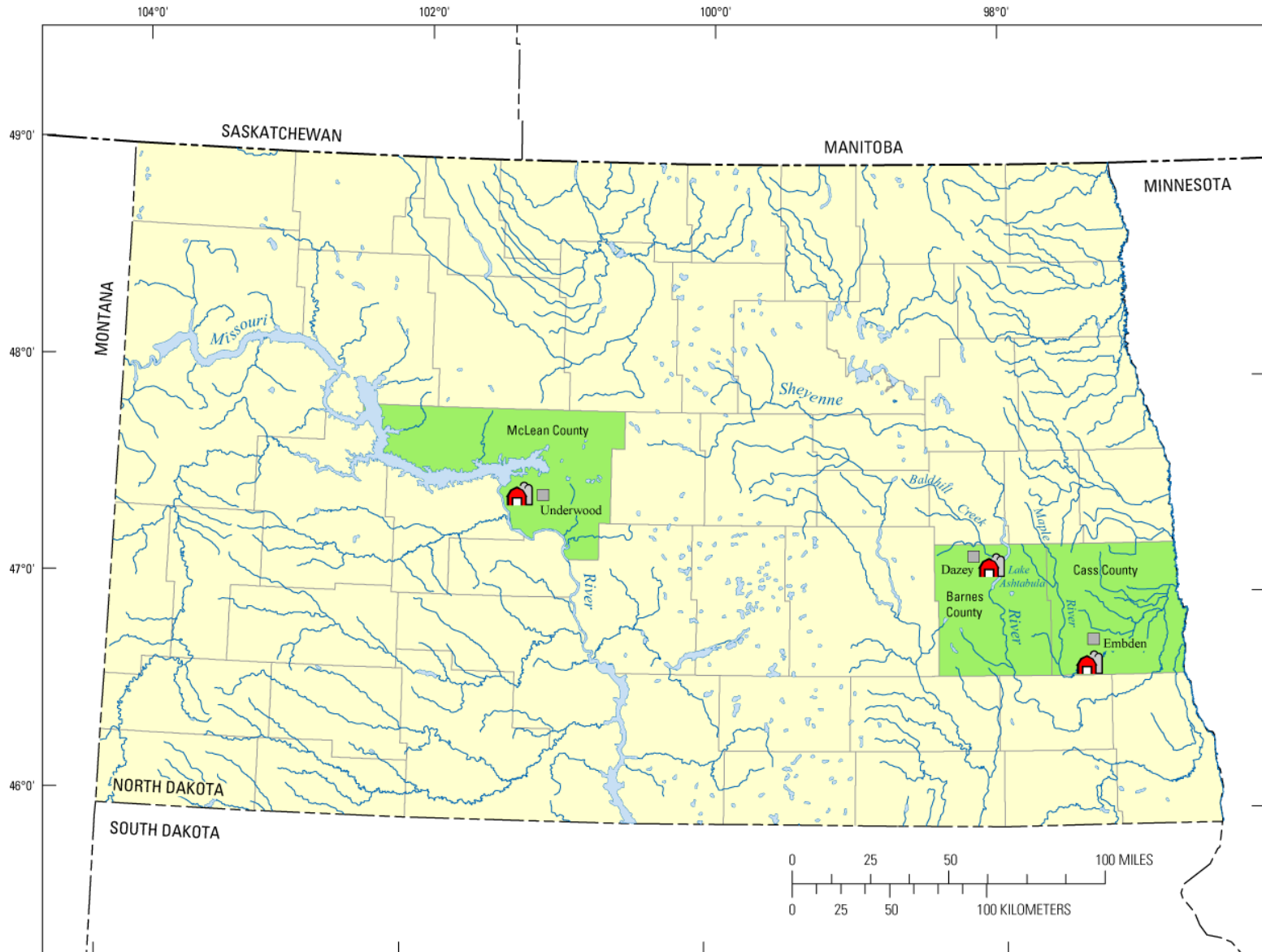
Bubble gage system



10/30/2008 08:24



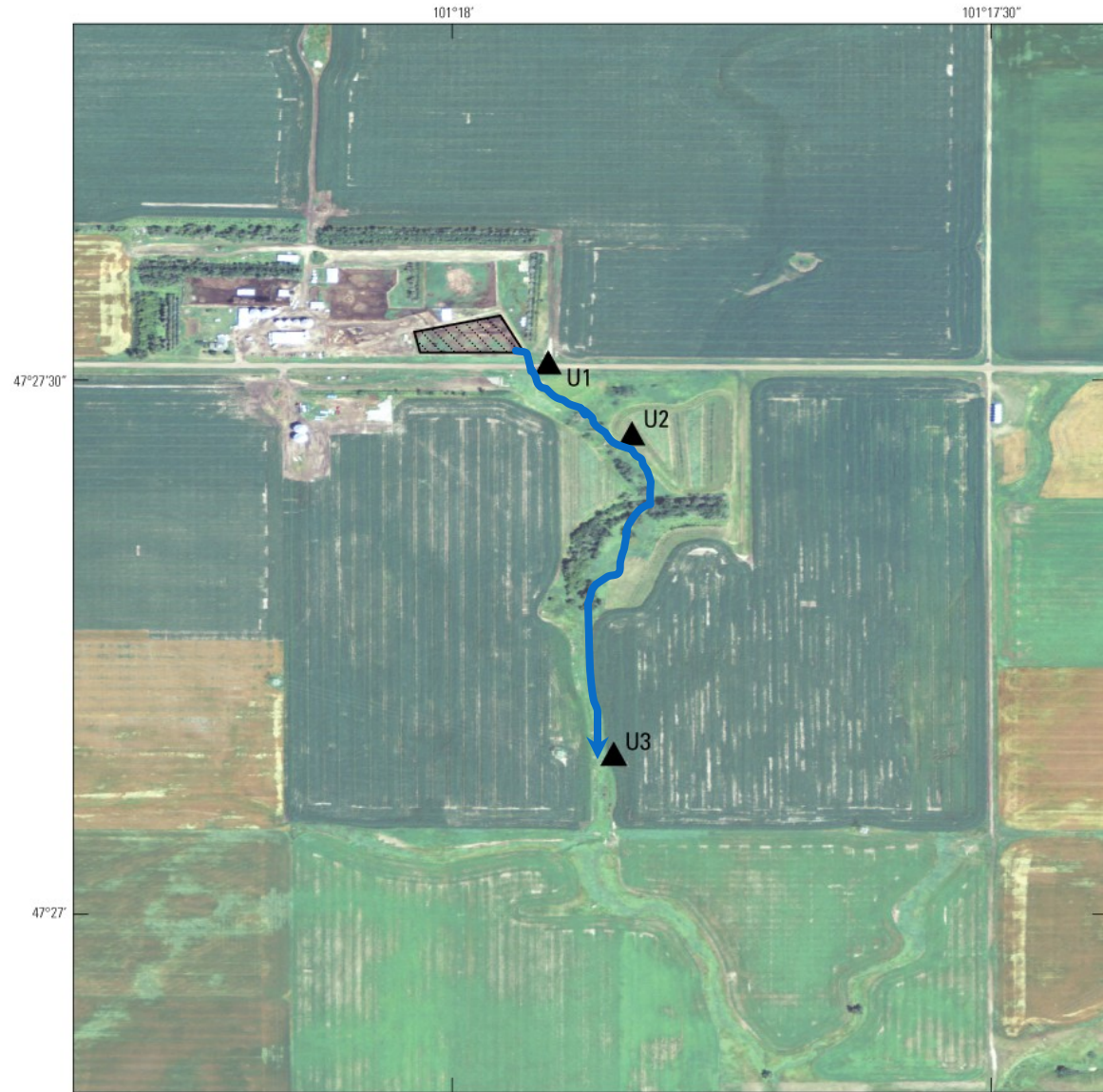
The Three Farms....



Base from U.S. Geological Survey digital data, 1983
Universal Transverse Mercator projection
Zone 14

Underwood



- Drainage area about 2.5 mi²
- Drains to Missouri River (about 5 mi west)



Base from 2012 National Agricultural Imagery Program
(U.S. Department of Agriculture, 2012)



EXPLANATION

-  Feedlot
-  U3 Station and identifier

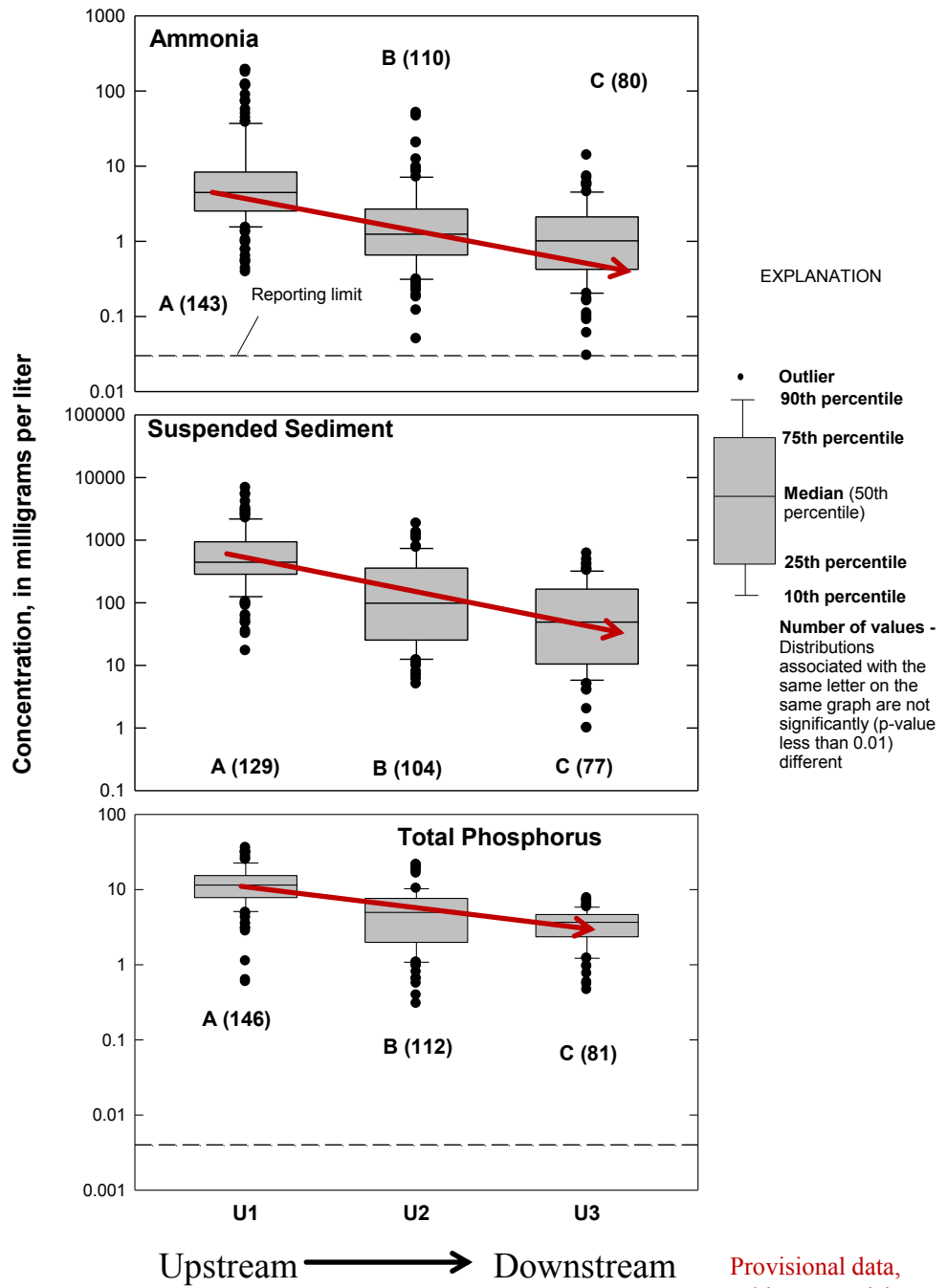


Underwood

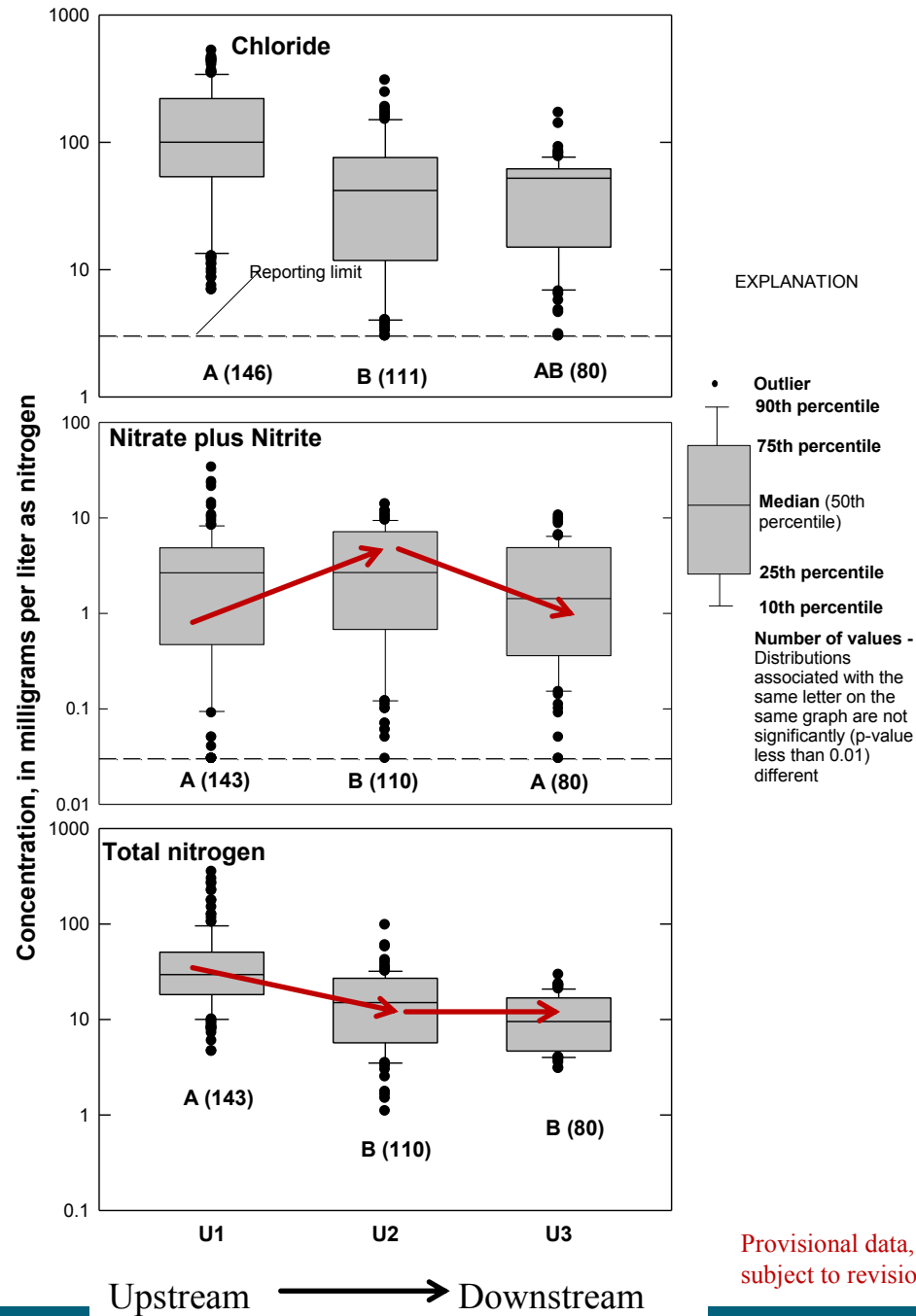


Grab samples--water color gets lighter from upstream to downstream.

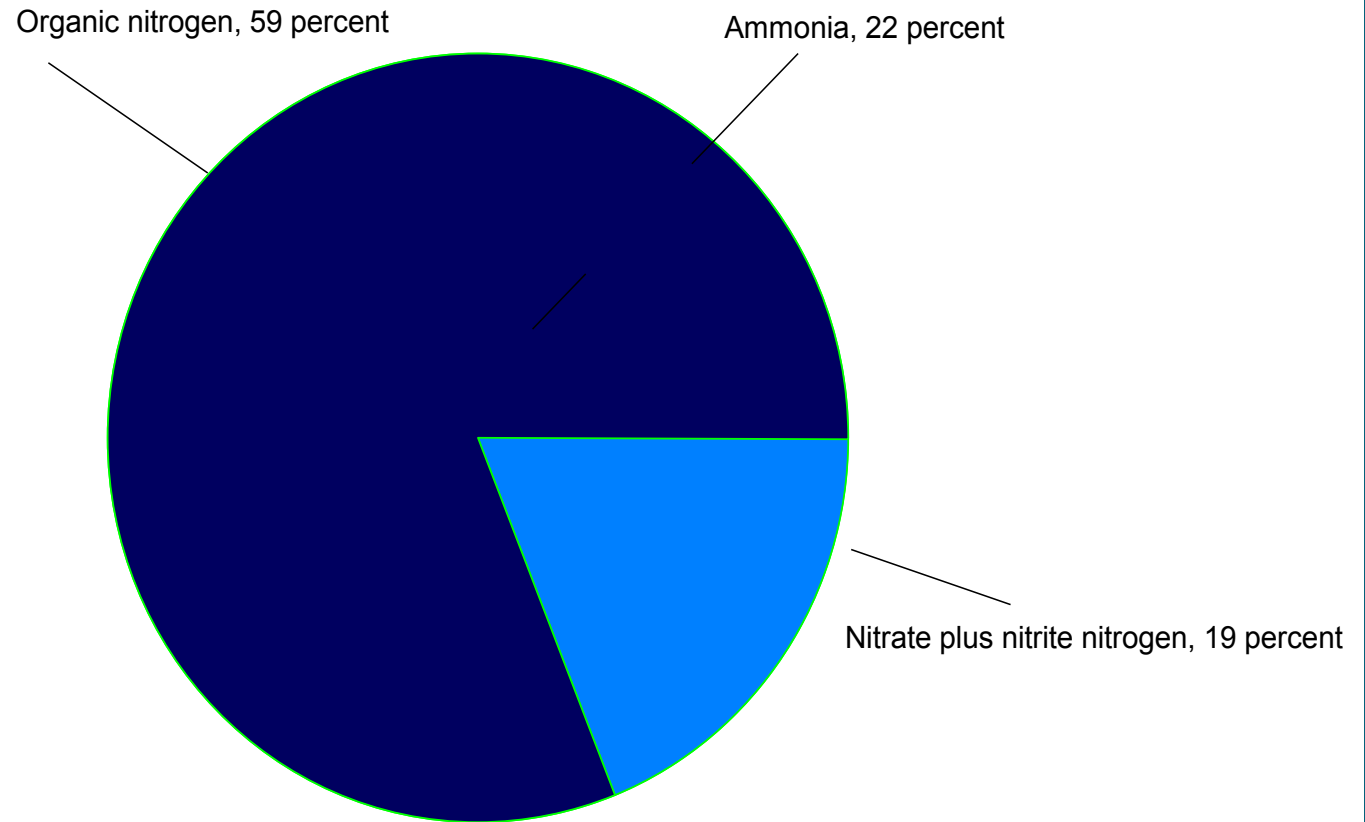
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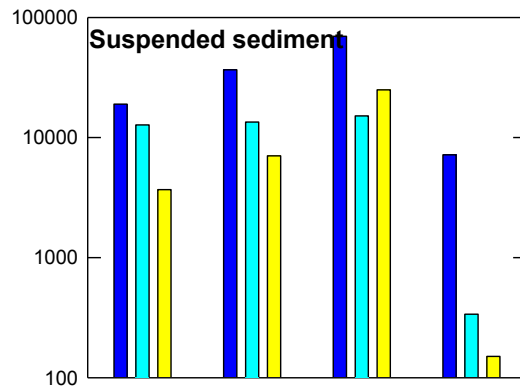
Underwood



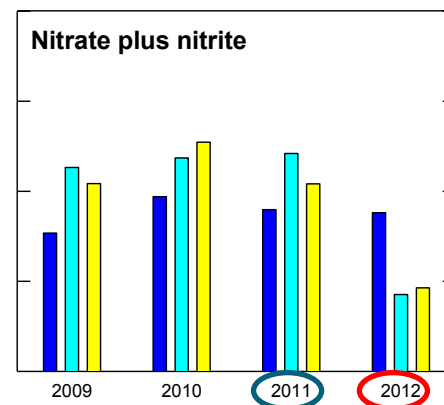
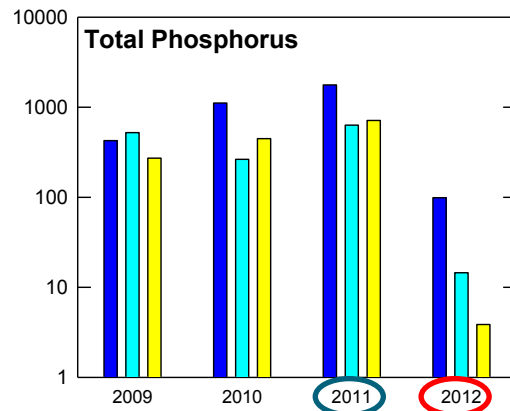
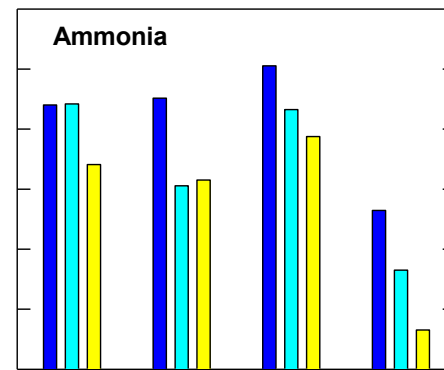
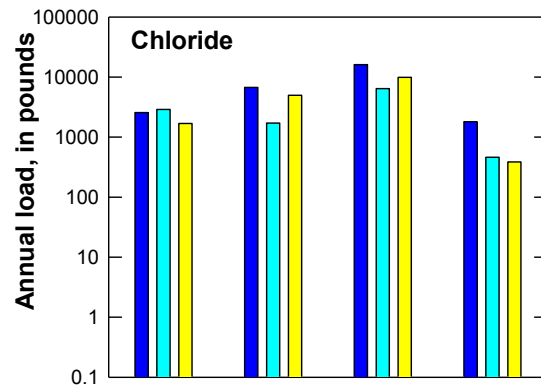
Underwood



Provisional data,
subject to revision



■ U1 Upstream
■ U2 ↓
■ U3 Downstream



○ Largest annual flow volume
○ Smallest annual flow volume

Provisional data,
subject to revision

Dazey

- Drainage area about 1.5 mi²
- Drains to Sheyenne River (about 1 mi east)



Base from 2012 National Agricultural Imagery Program
(U.S. Department of Agriculture, 2012)



EXPLANATION

-  Feedlot
-  Station and identifier

Dazey



During “spring thaw” ...Dazey # 3 on April 12, 2009



2.5-foot flume rated for 20 cubic feet of water per second at max. OR 8,976 gallons per minute. Much more water than this going through this small coulee during this time period.

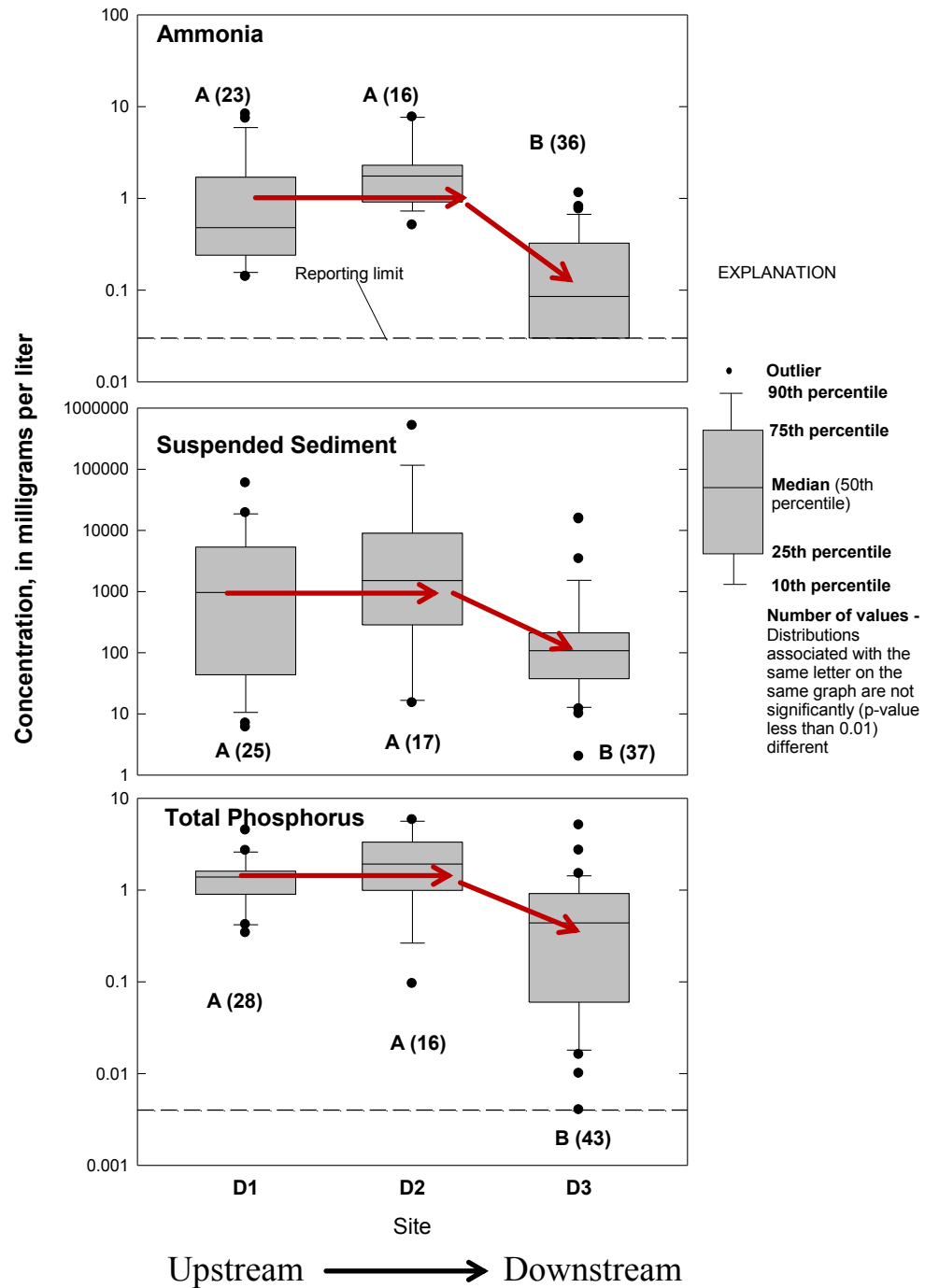
**After “spring thaw”
...Dazey # 3 on April 14, 2009**



“Rebuilding...”

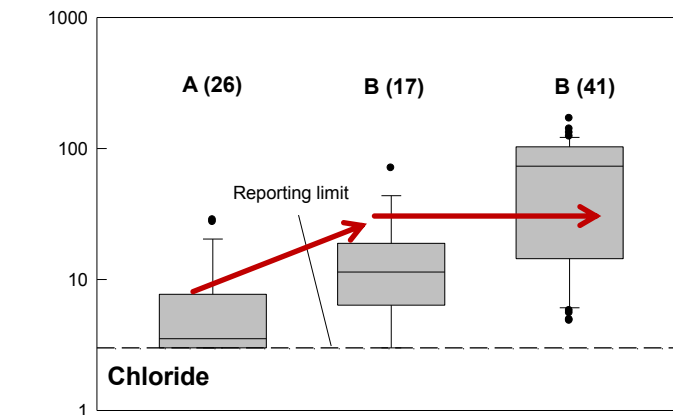


Dazey

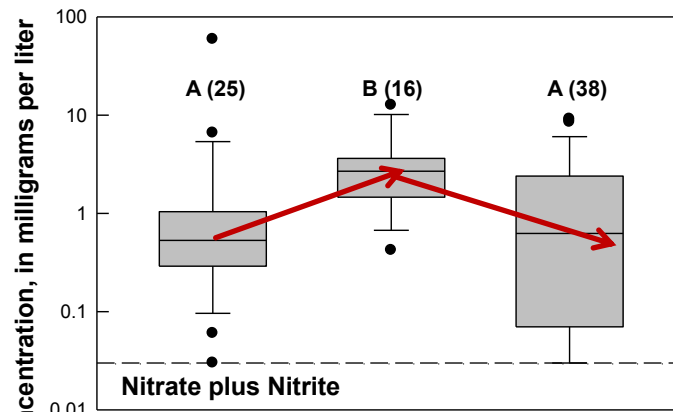


Provisional data,
subject to revision

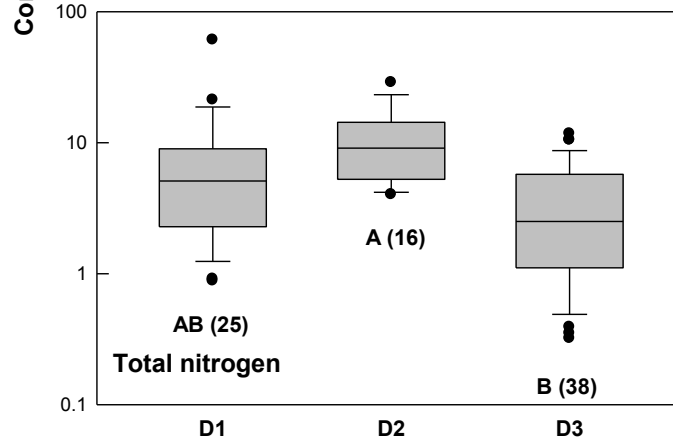
Dazey



EXPLANATION



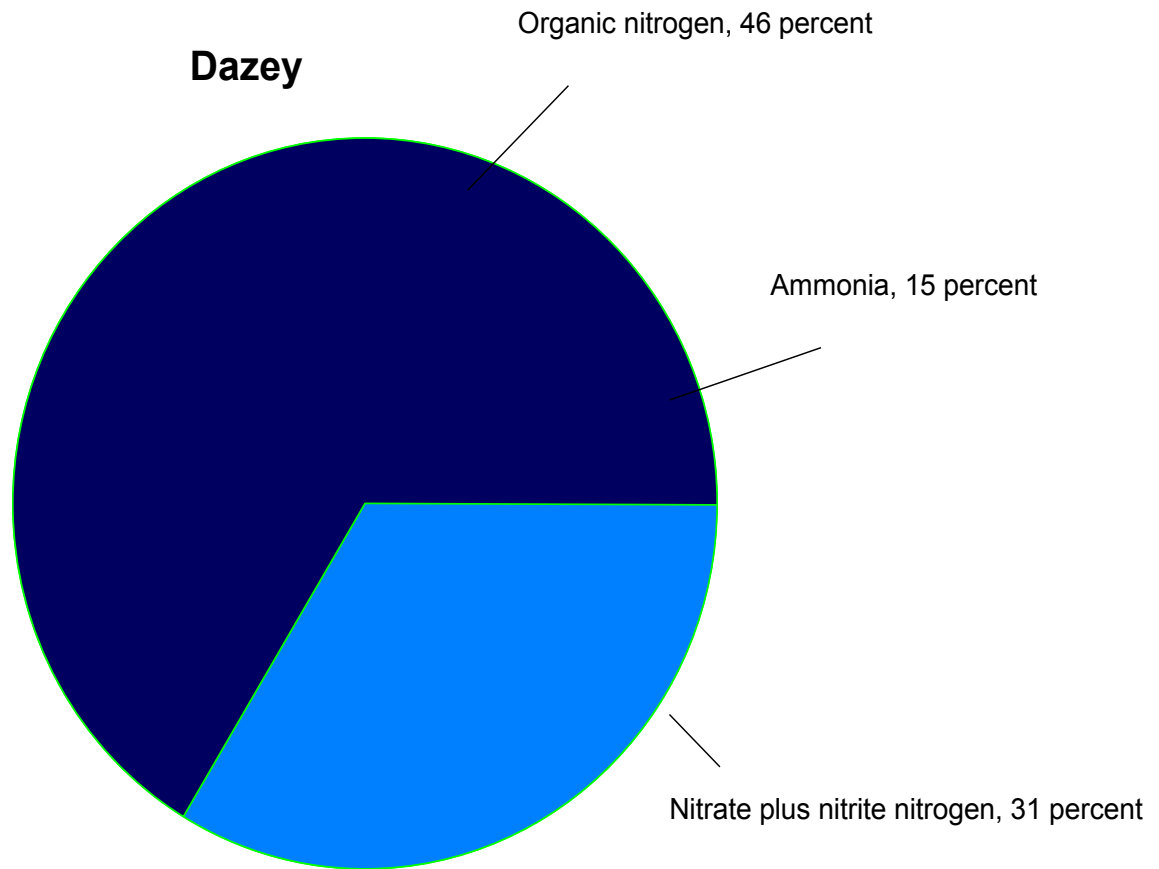
- Outlier
 - 90th percentile
 - 75th percentile
 - Median (50th percentile)
 - 25th percentile
 - 10th percentile
- Number of values -**
Distributions associated with the same letter on the same graph are not significantly (p-value less than 0.01) different



Upstream → Downstream

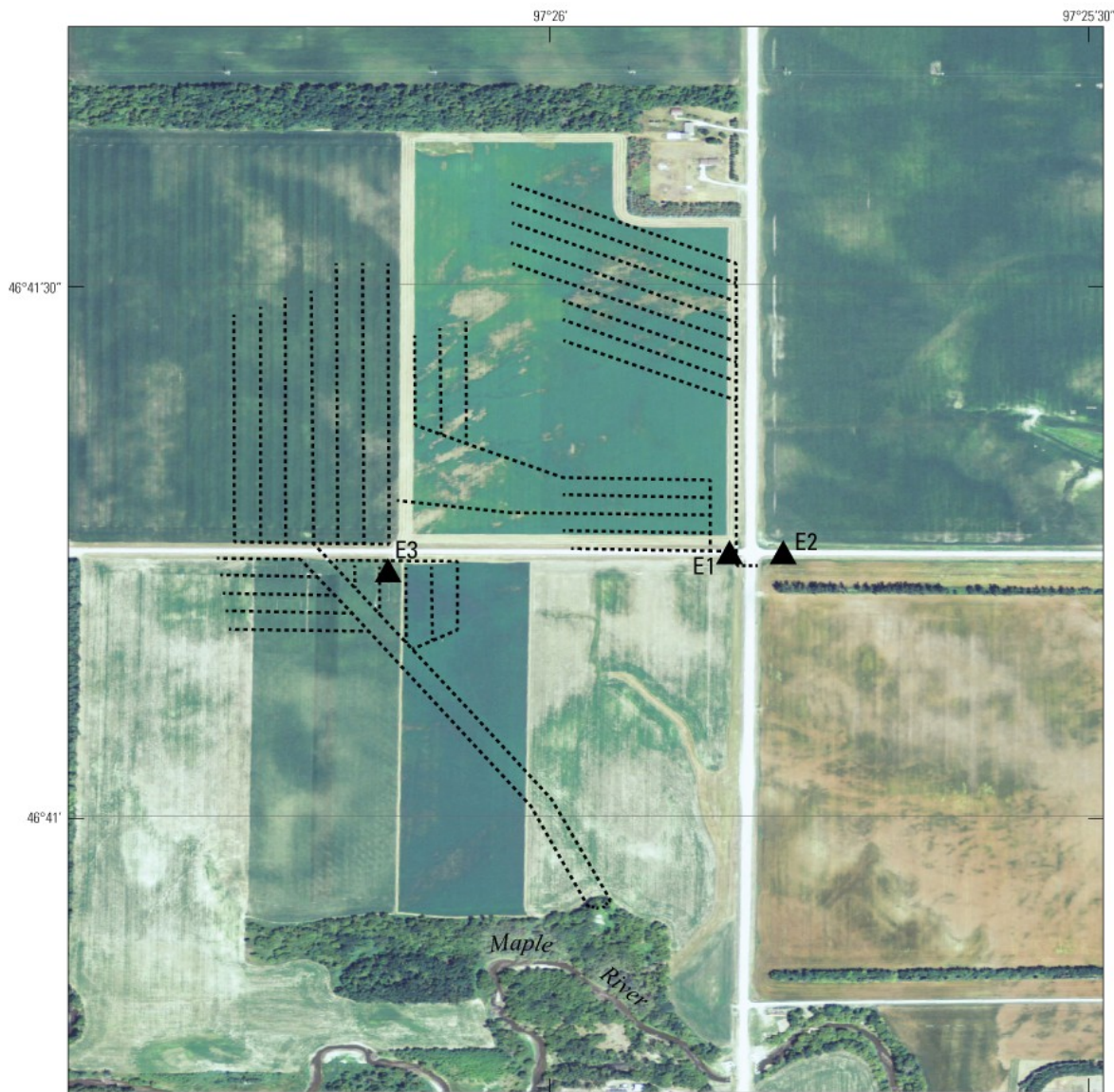


Dazey



Embden

- Drainage area about .125 mi²
- Drains to Maple River (about .3 mi south)



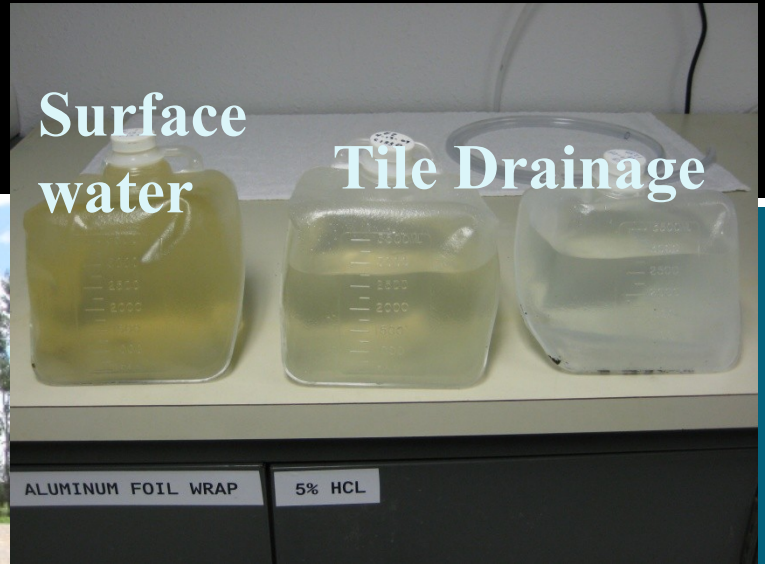
Base from 2012 National Agricultural Imagery Program
(U.S. Department of Agriculture, 2012)

EXPLANATION

- Drain tiles
- ▲ E3 Station and identifier



Embden



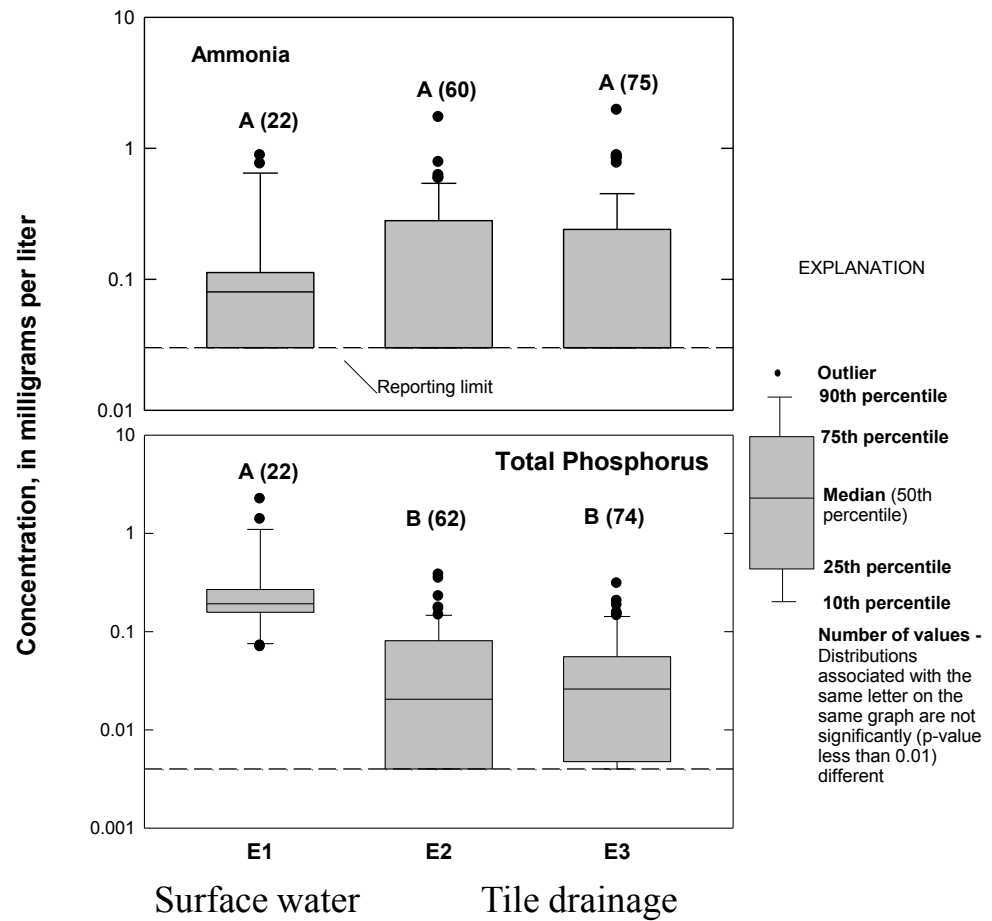
Embden 1 & 2



Embden 3

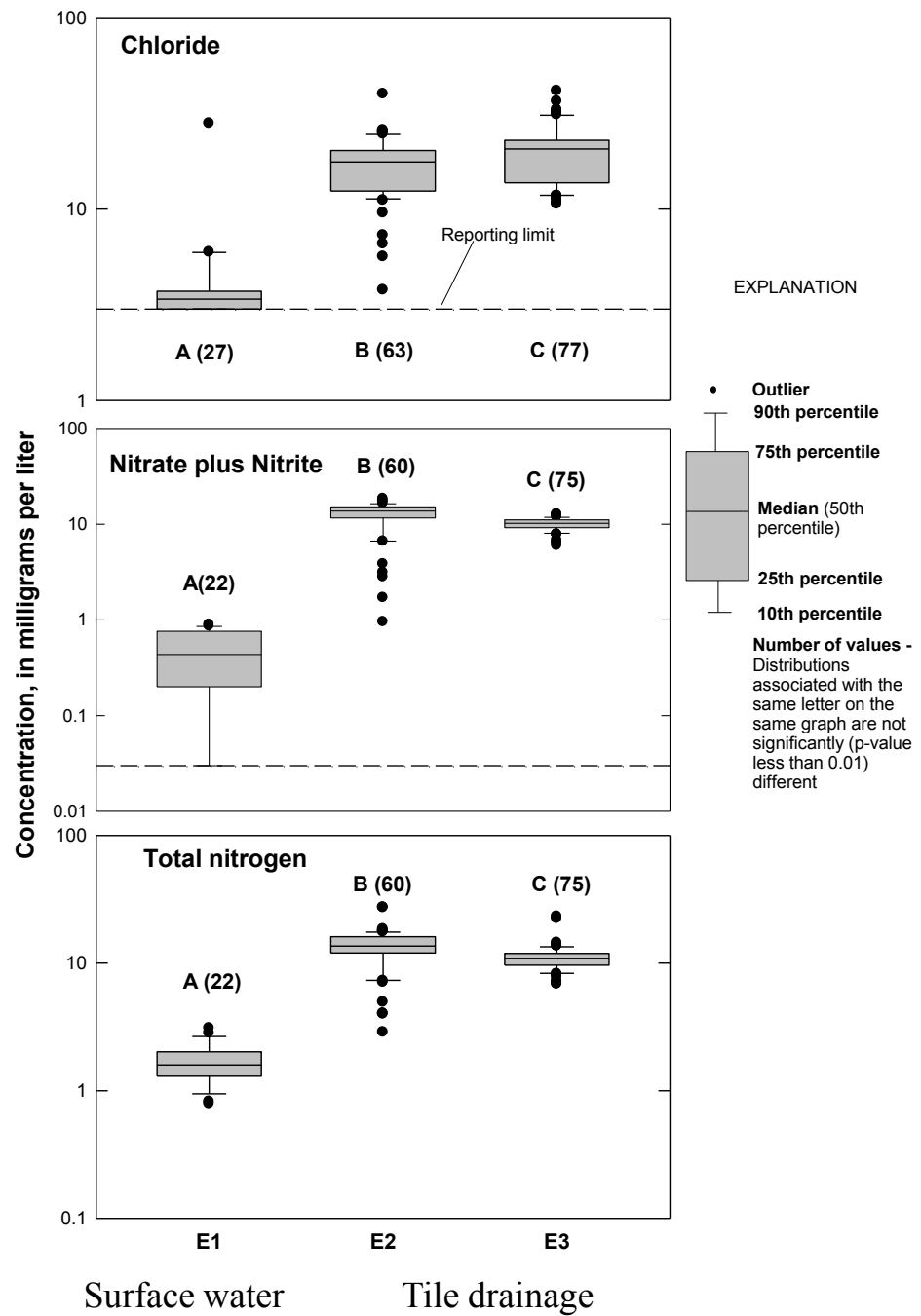


Embden



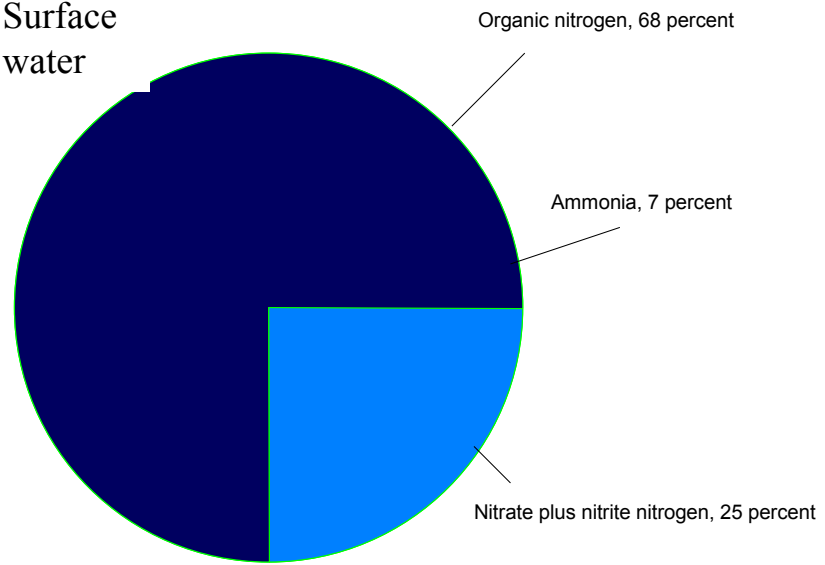
Provisional data,
subject to revision

Embden

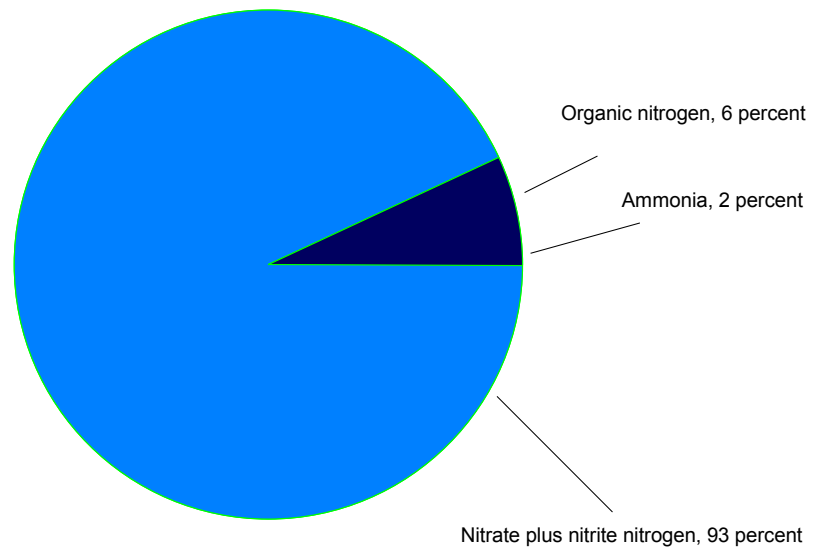


Embden

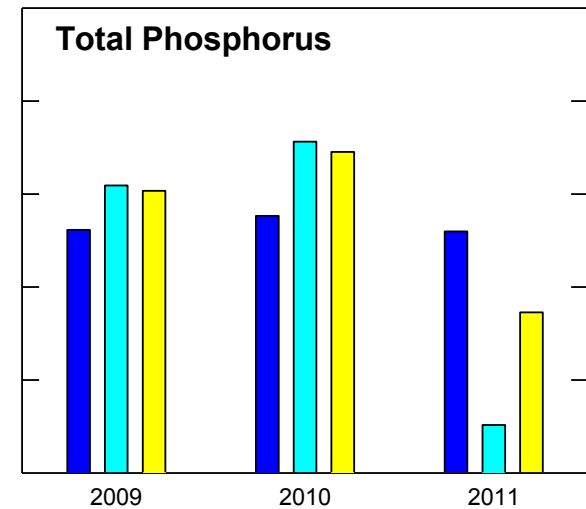
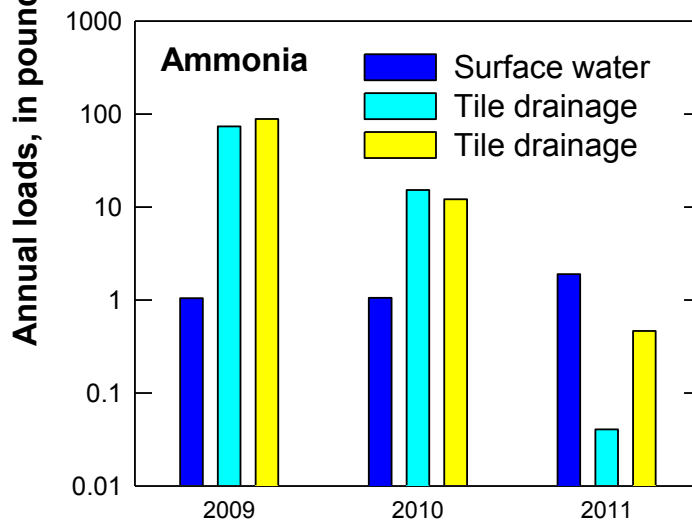
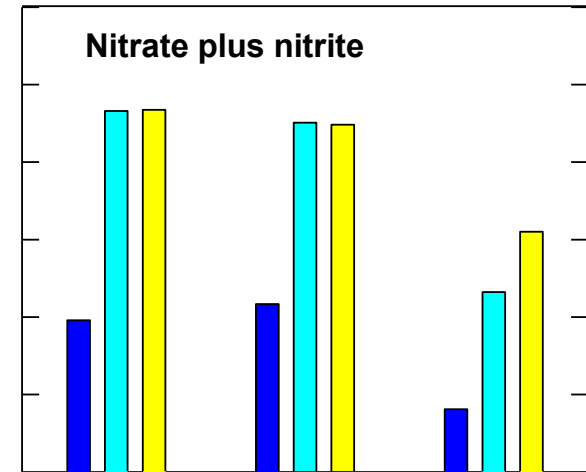
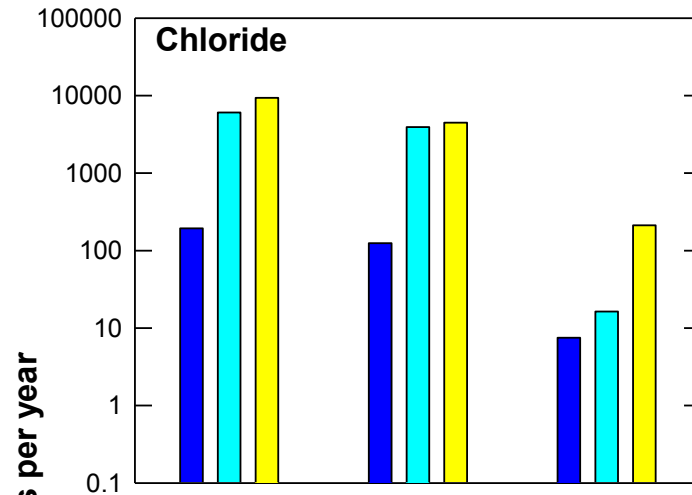
Surface water

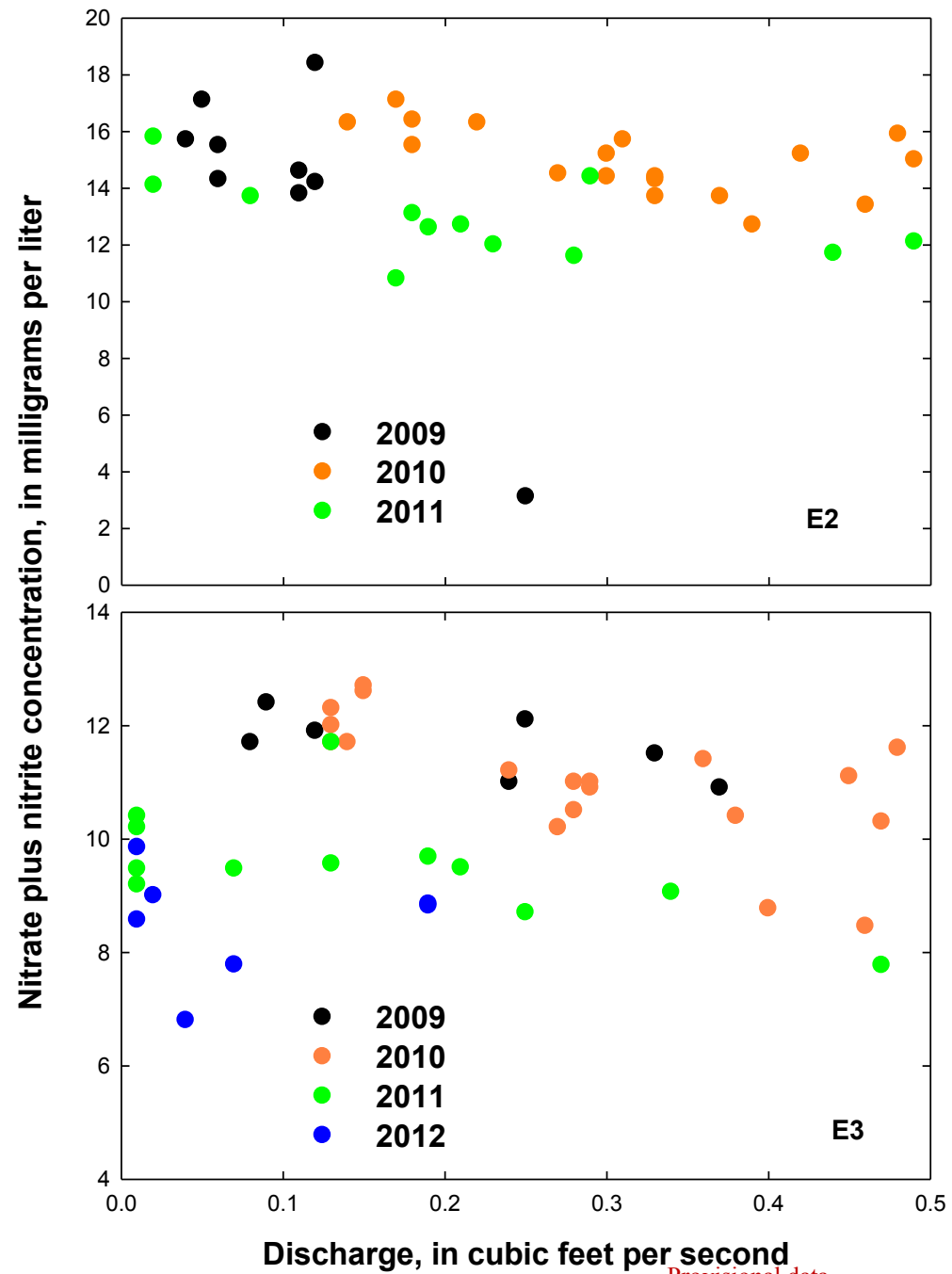


Tile Drainage



Embden





Provisional data,
subject to revision

For more information....

<http://nd.water.usgs.gov/discoveryfarms>

<http://www.ag.ndsu.edu/df>

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