

Monitoring Runoff and Sediment at the Platteville Pioneer Farm

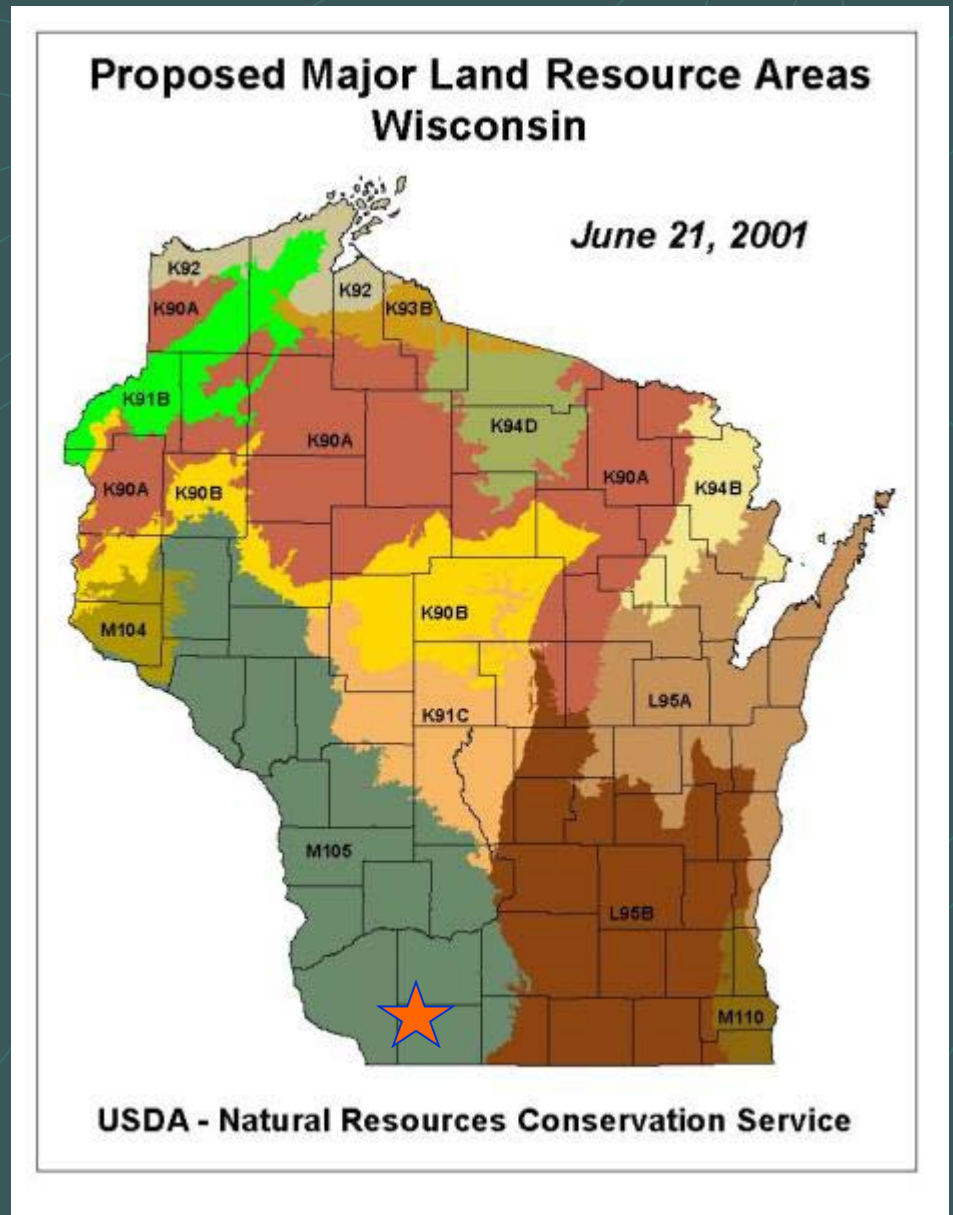


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Pioneer Farm Location

5 miles south of
Platteville, WI.
Located in MLRA
105 – Northern
Mississippi Loess
Hills



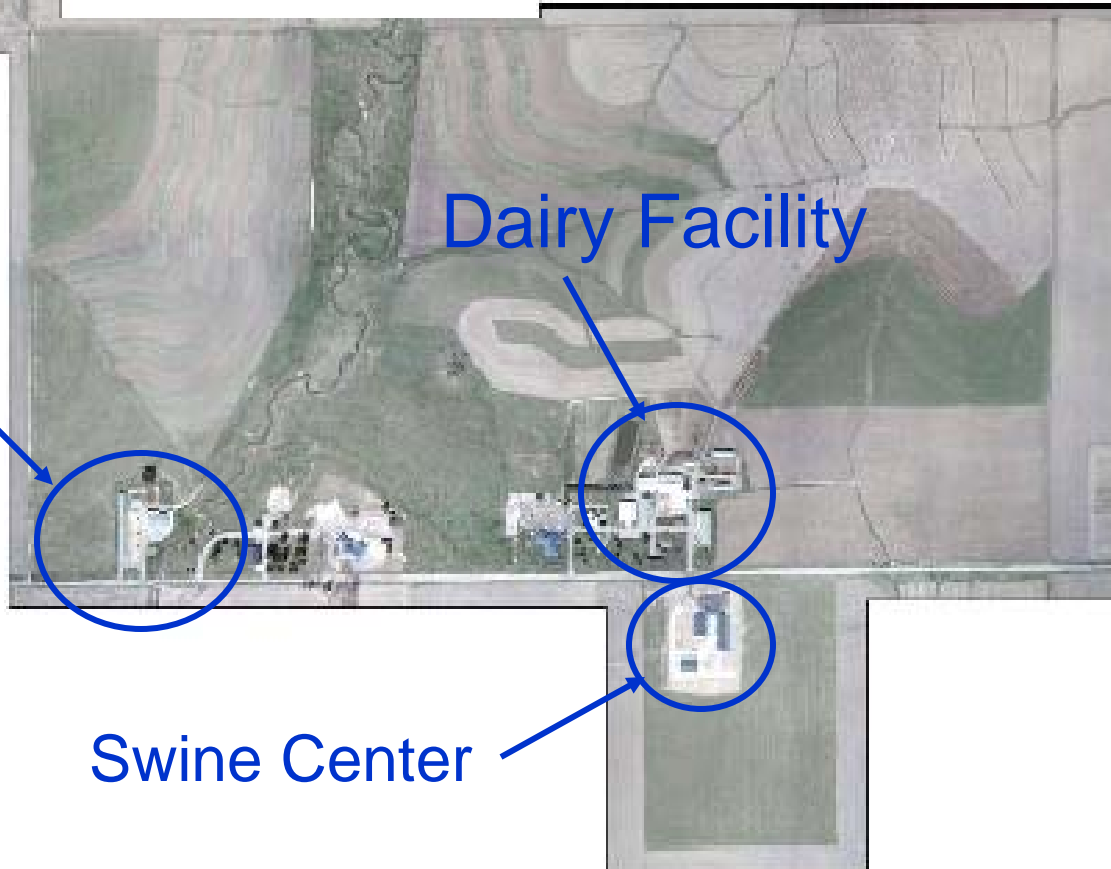
Pioneer Farm Operations

- 330 acres tillable cropland
- contour strips, terraces

Beef Unit /
Bull Test
Station

Dairy Facility

Swine Center



Pioneer Farm 2004 Crops

Legend



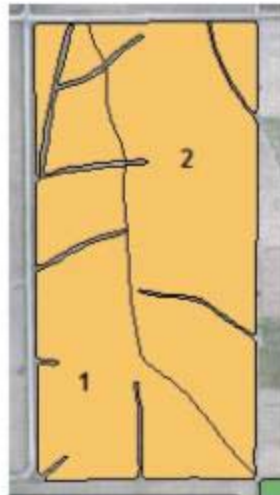
Corn



Hay



Oats/ alfalfa-brome seeding



Corn: 135 ac

Hay: 122 ac

Oats: 73 ac

A vertical strip on the left side of the slide shows a topographic map of a river valley. The map features contour lines, a river channel, and various land use patterns. The colors are muted, with greens for vegetation and browns for land.

Nutrient Sources

● Manure Sources

● Swine

- Compost

● Beef

- Pack manure, compost, lot runoff effluent

● Dairy

- Single stage lagoon, pack manure, compost

● Use only N fertilizers






Current Manure Management

- Provide full or partial N need for corn
- Estimate manure nutrients
- Sample all manure at time of application
- Follow setback guidelines
- Apply to lowest P soils when possible
- Yearly soil testing
- Composting 100% of swine manure, some dairy and beef manure

Nutrient Application Restriction Areas

Legend

-  Surface Water Quality Management Area
-  Application restrictions due to well proximity
-  Waterways and grassed terraces





Results of whole-farm mass balance

● 2002:

● N: 93 lb/acre

● P: 21 lb/acre

● K: 43 lb/acre

● 2003

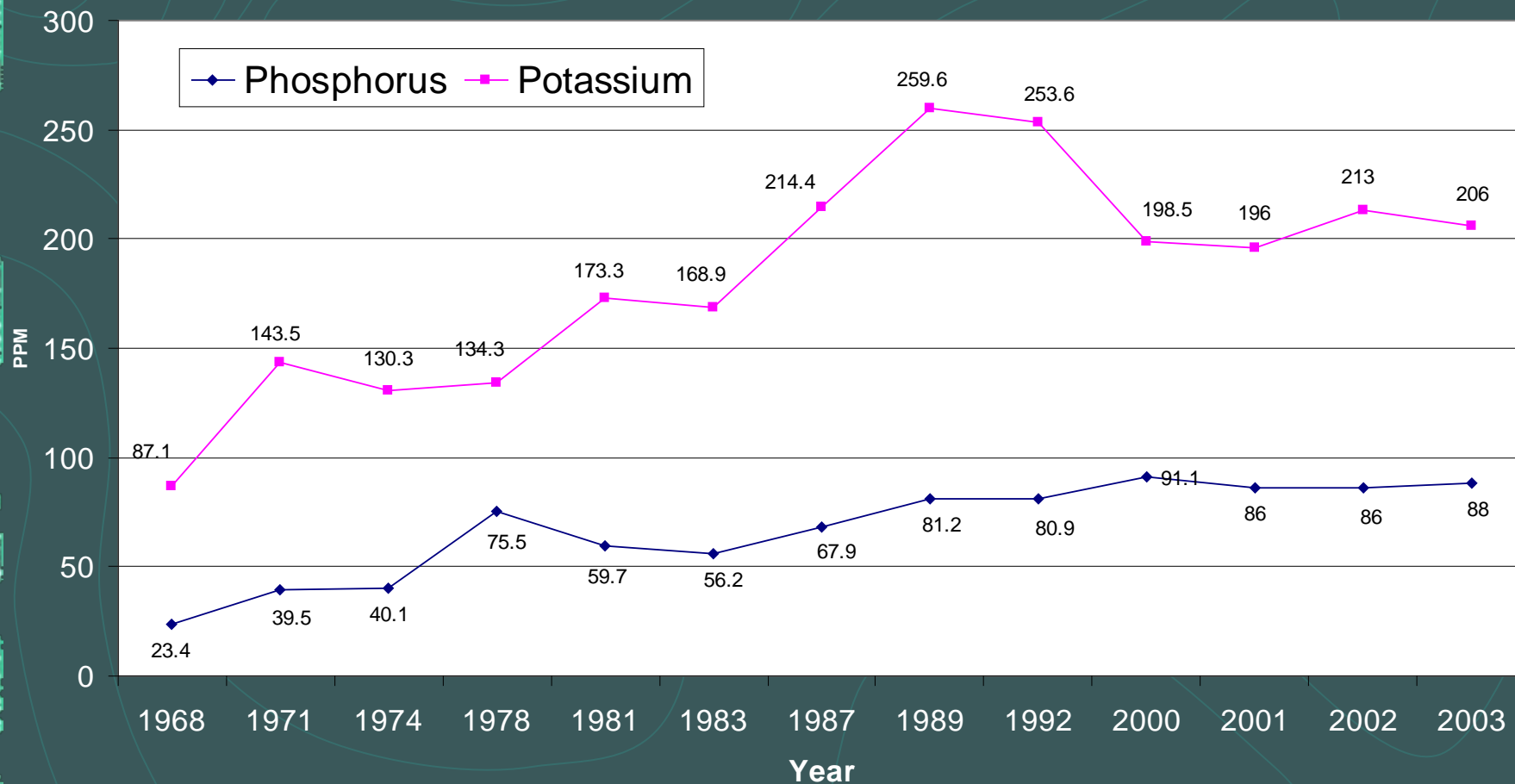
● N: 96 lb/acre

● P: 8 lb/acre

● K: 24 lb/acre

Planned expansion of swine and dairy herds will increase future mass balances under current manure management strategies.

Pioneer Farm Soil Tests 1968-2003



A vertical strip on the left side of the slide shows a topographic map of a river valley, with a river winding through a valley floor and hills on either side. The map is in grayscale with some color highlights.

Pioneer Farm Research Mission

- Mission: Contribute to the vibrancy of Wisconsin's agricultural and environmental health.
- Research addresses issues identified by stakeholders that include:
 - Producers
 - Regulatory agencies
 - University researchers and educators
 - Non-governmental organizations

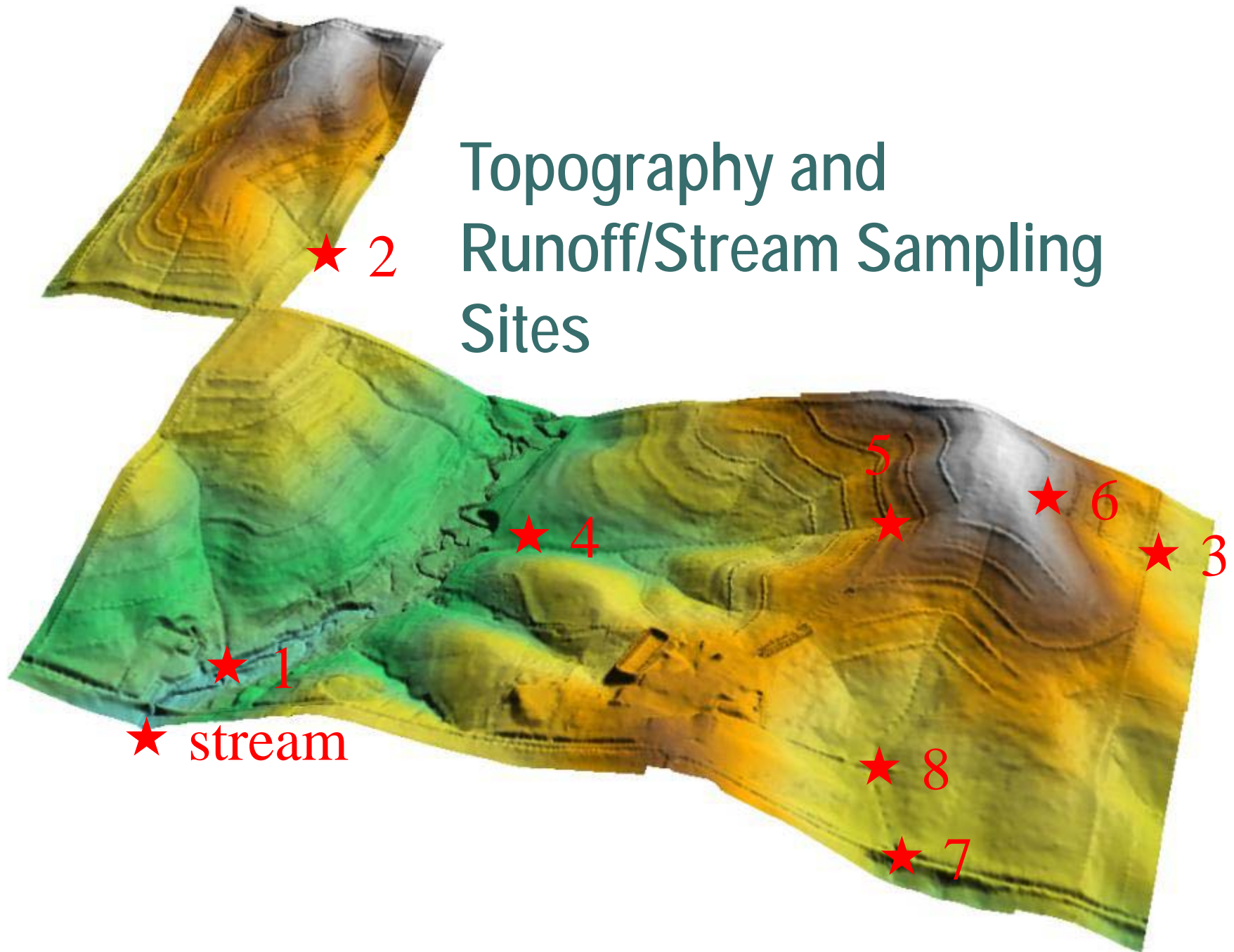
A vertical strip on the left side of the slide shows a topographic map of a river valley, with contour lines and a river channel highlighted in yellow.

Pioneer Farm Research Priorities

1. Baseline measurements:
environmental & farm management
2. Water quality:
soil conservation practices, erosion & sediment delivery
3. Nutrient management:
focus on N & P
4. Manure Management
composting, liquid/solid separation
5. Air quality
odor monitoring

**** Support of science-based public policies ****

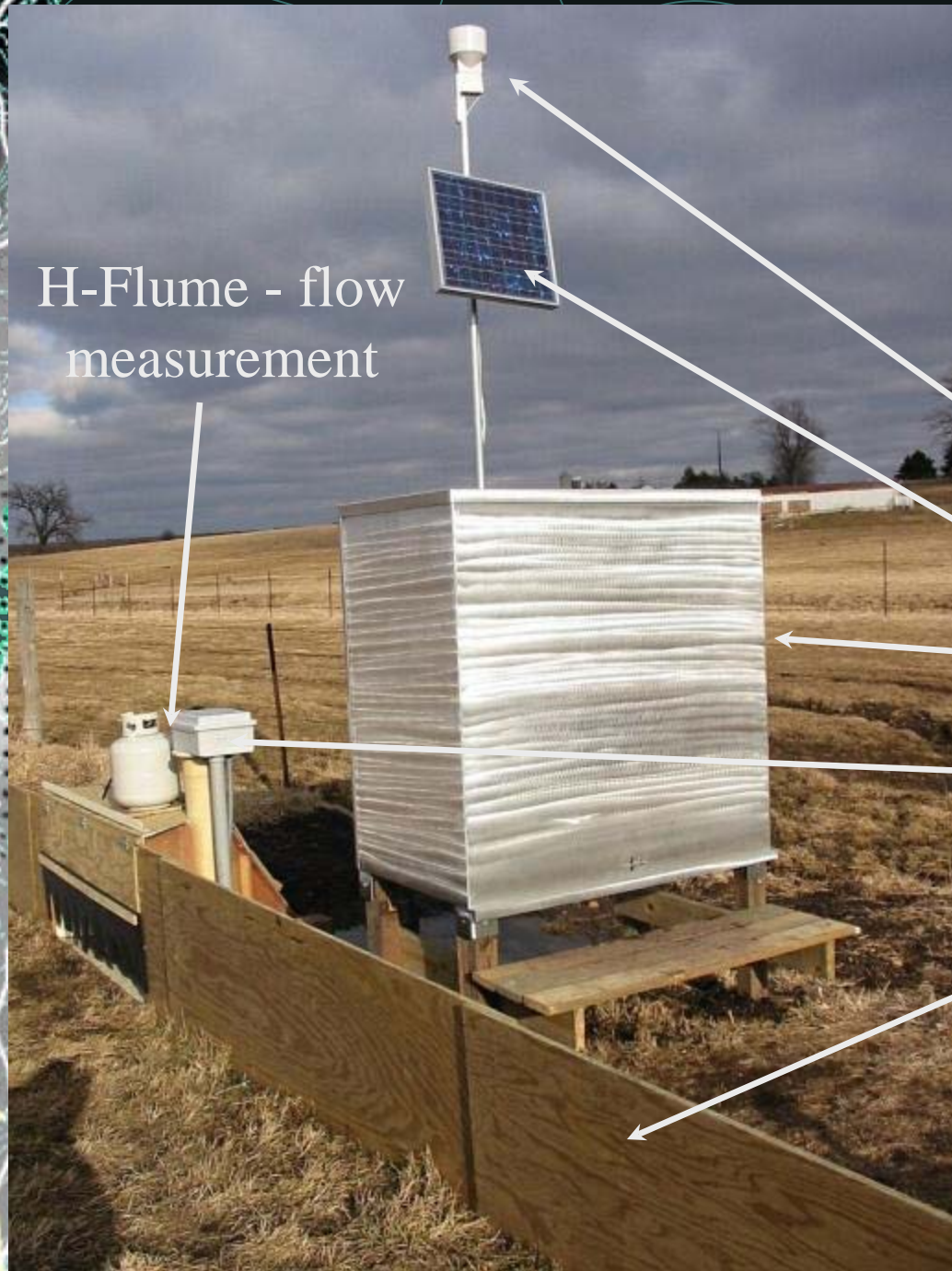
Topography and Runoff/Stream Sampling Sites



Typical Pioneer Farm Monitoring Station

H-Flume - flow measurement

- Raingage
- Solar Panel
- Gaging station
- Shaft-encoder stage sensor
- Plywood wingwall



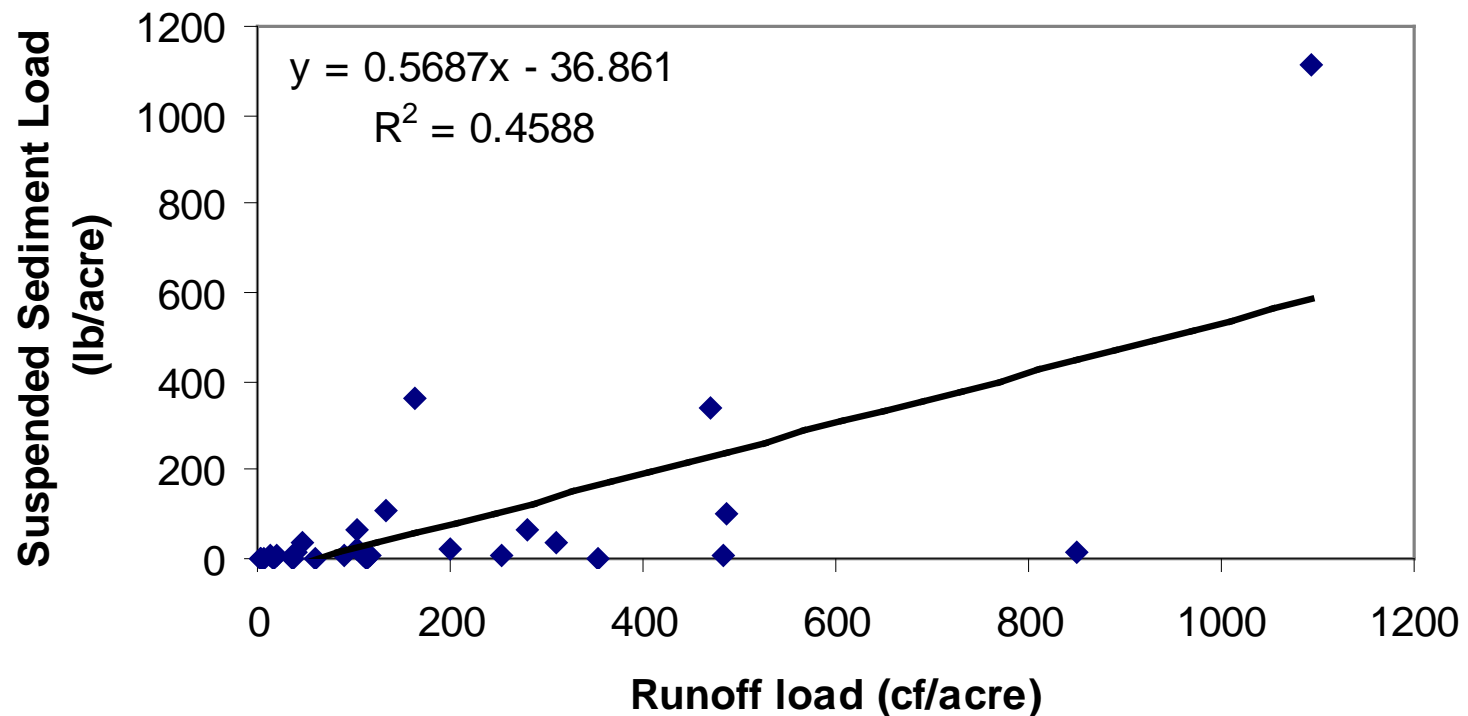


A vertical strip on the left side of the slide shows a topographic map of a river valley. It features contour lines, a river channel, and some infrastructure like roads or railways.

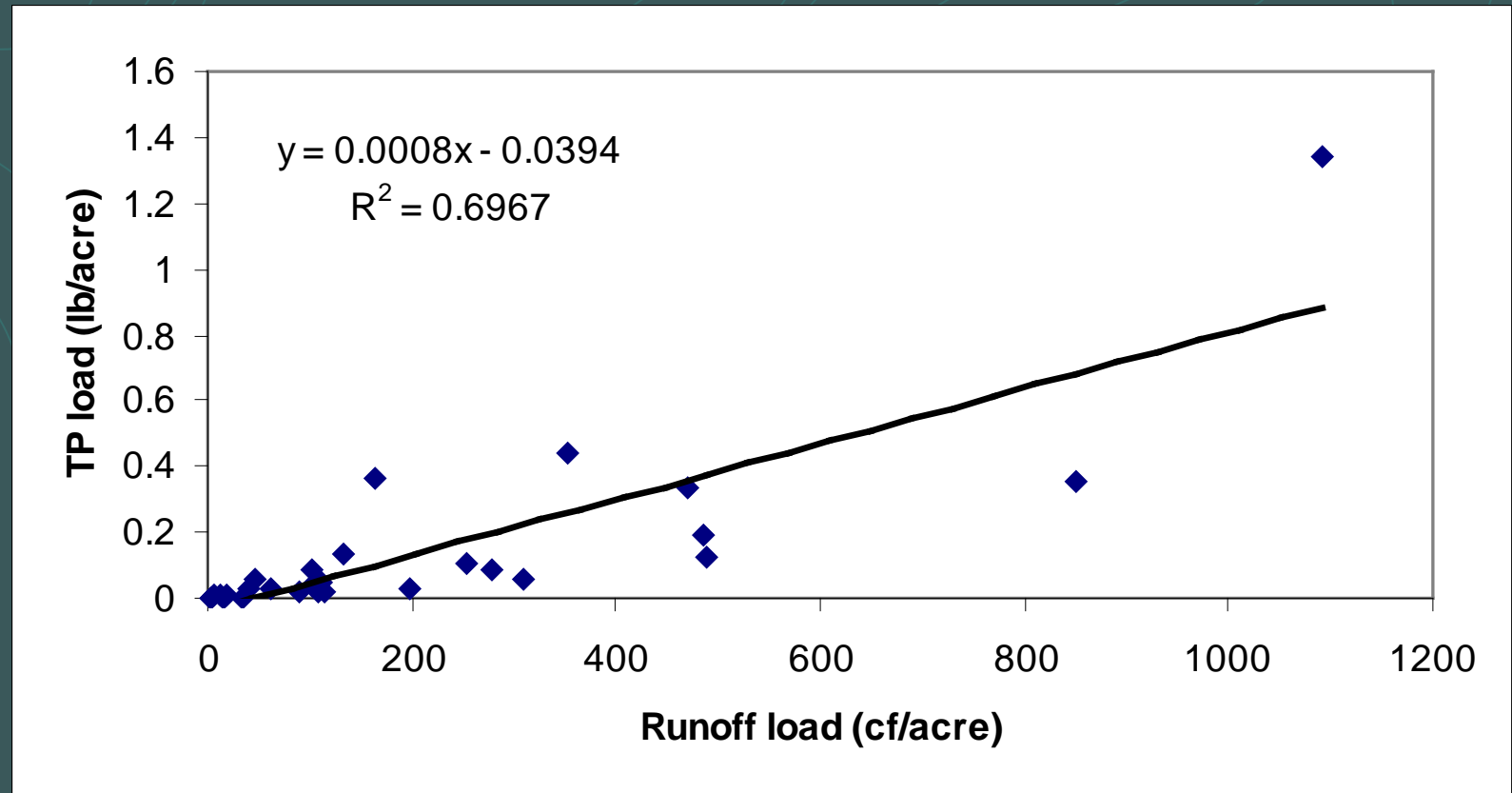
Baseline Runoff Data

- Evaluate factors affecting runoff quality (sediment and P)
 - Relationships among runoff volume, sediment and P concentration
 - Effects of cropping systems
 - Snowmelt vs rainfall runoff

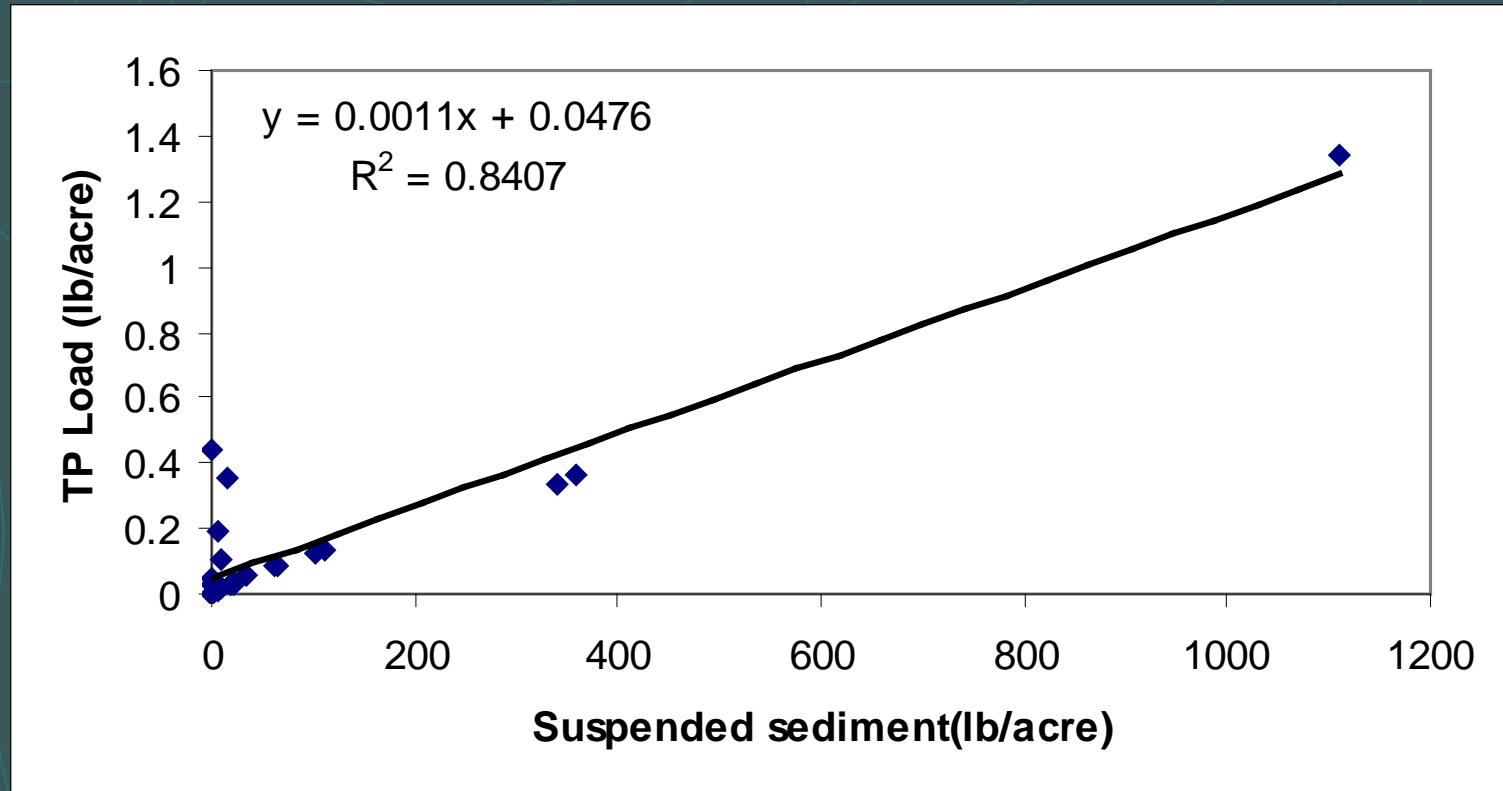
Runoff Volume vs. Suspended Sediment Loads – Site 3



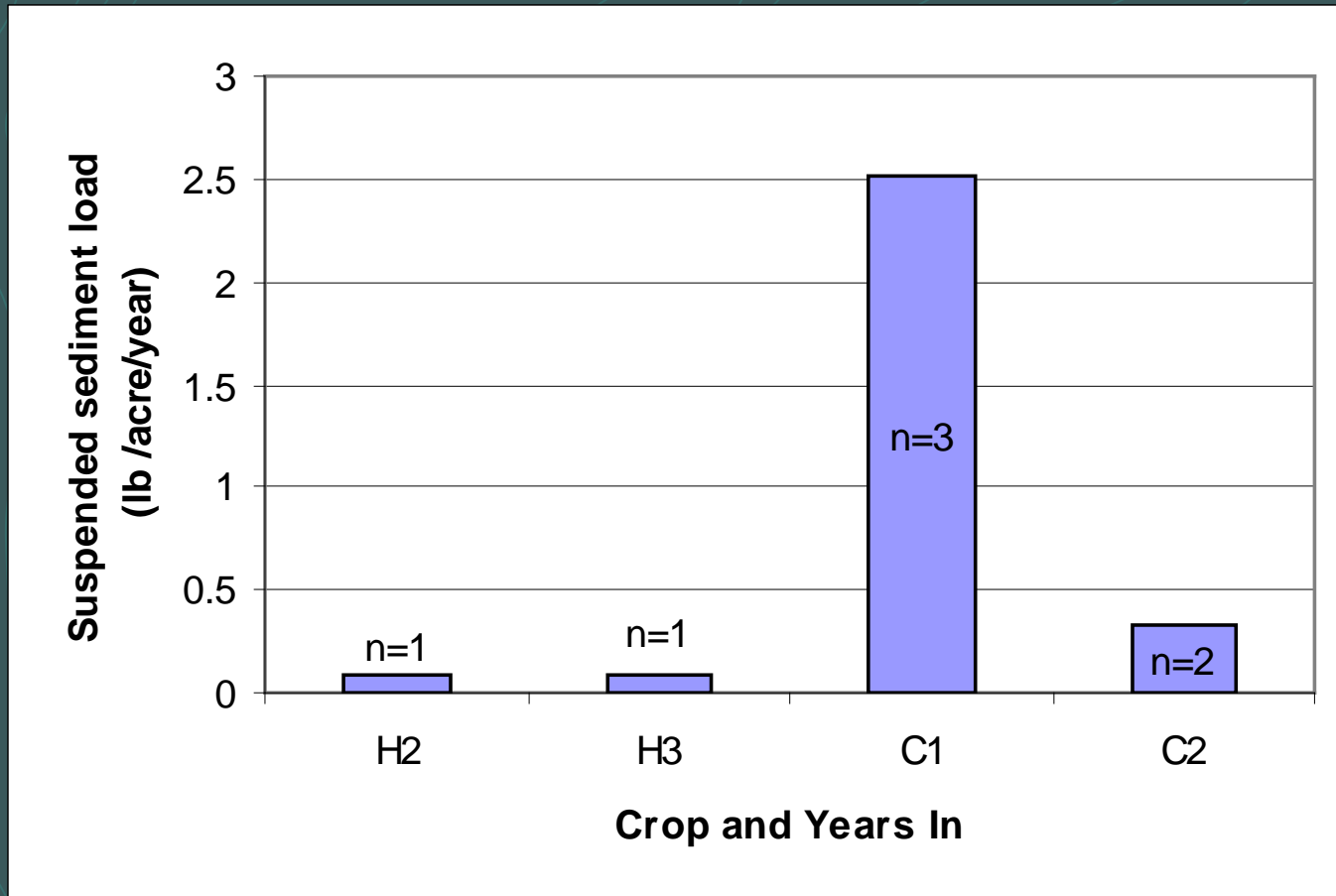
Runoff volume vs Total P Load – Site 3



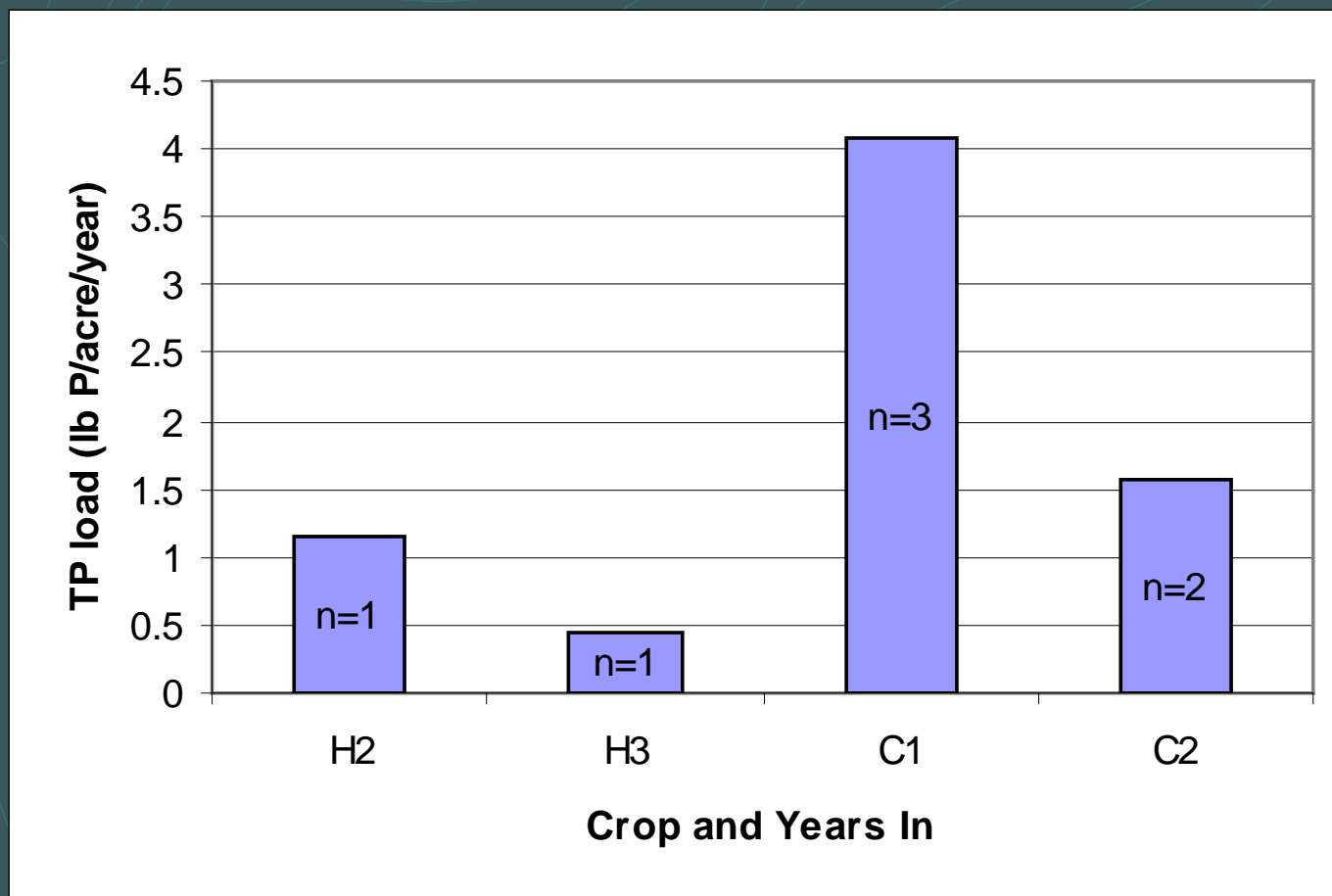
Sediment Load vs. Total P Load – Single Use Watersheds



Effect of Cropping System on Annual Suspended Sediment Load

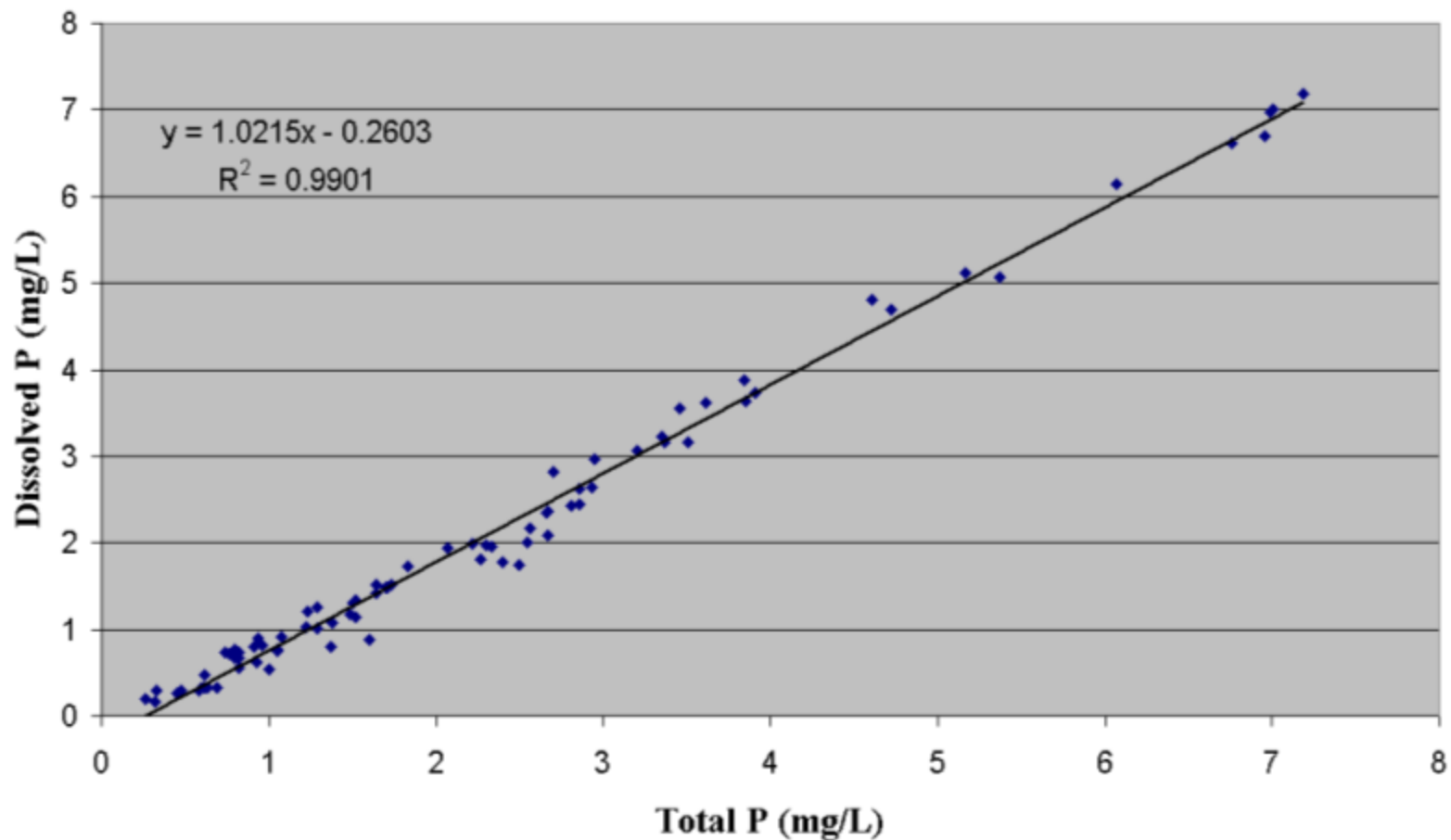


Effect of Cropping System on Total P Load



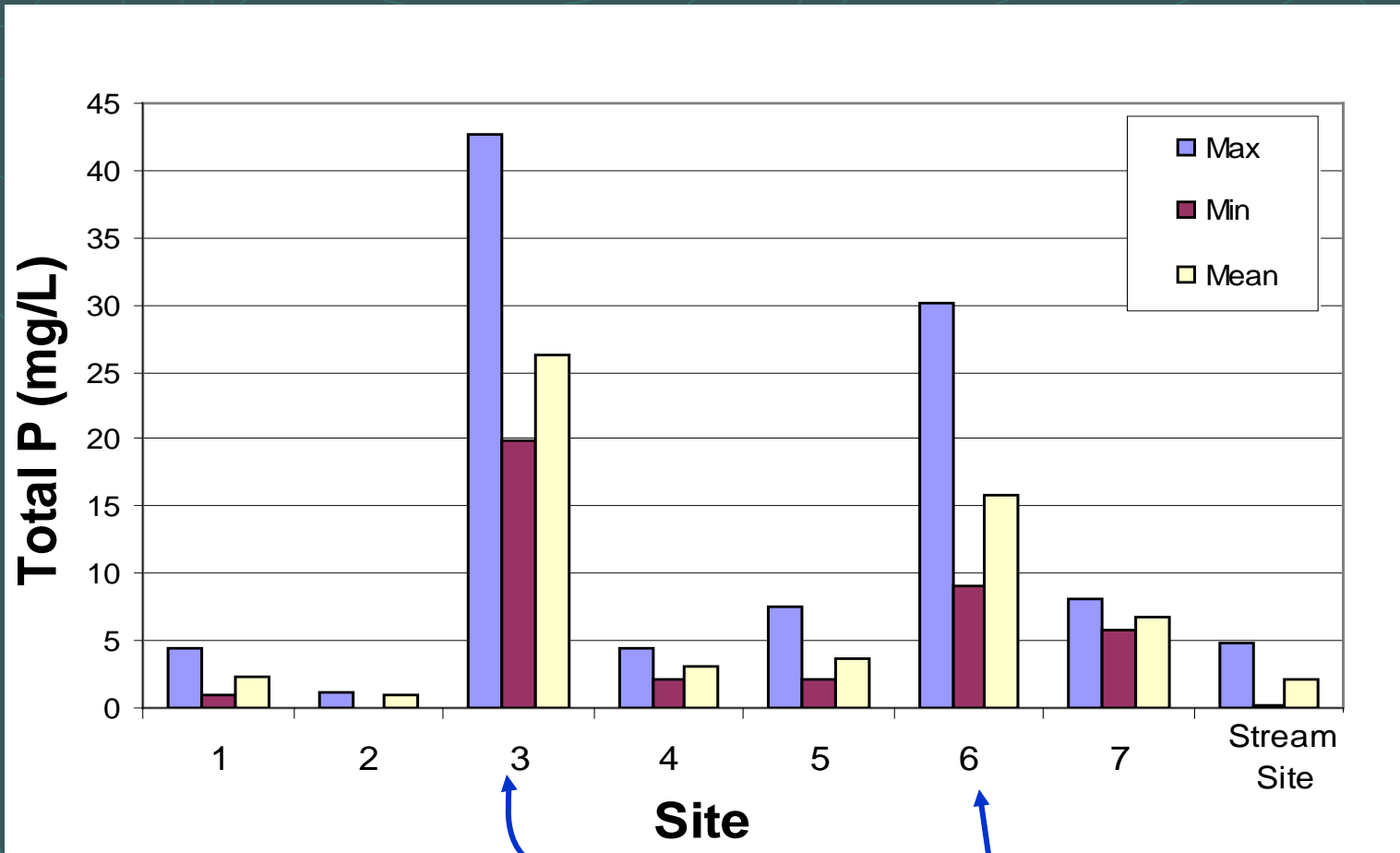
Snowmelt Total and Dissolved P

Relationship of Total P to Dissolved P
in all 2004 Snowmelt Samples



Impact of Winter Manure Applications

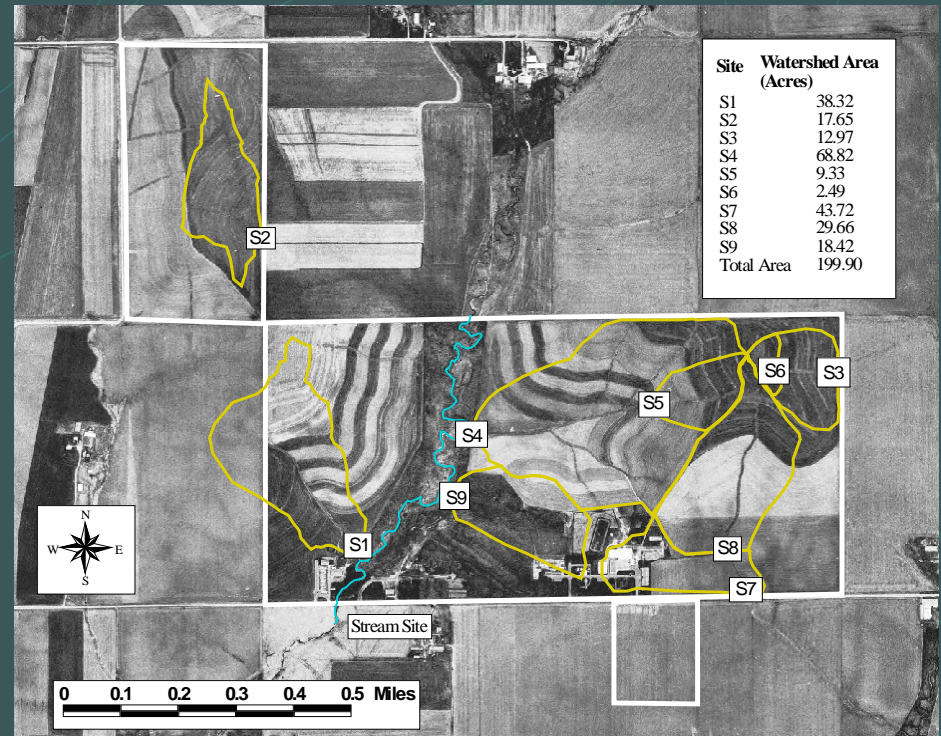
2004 Winter Runoff –3 events



Received winter manure

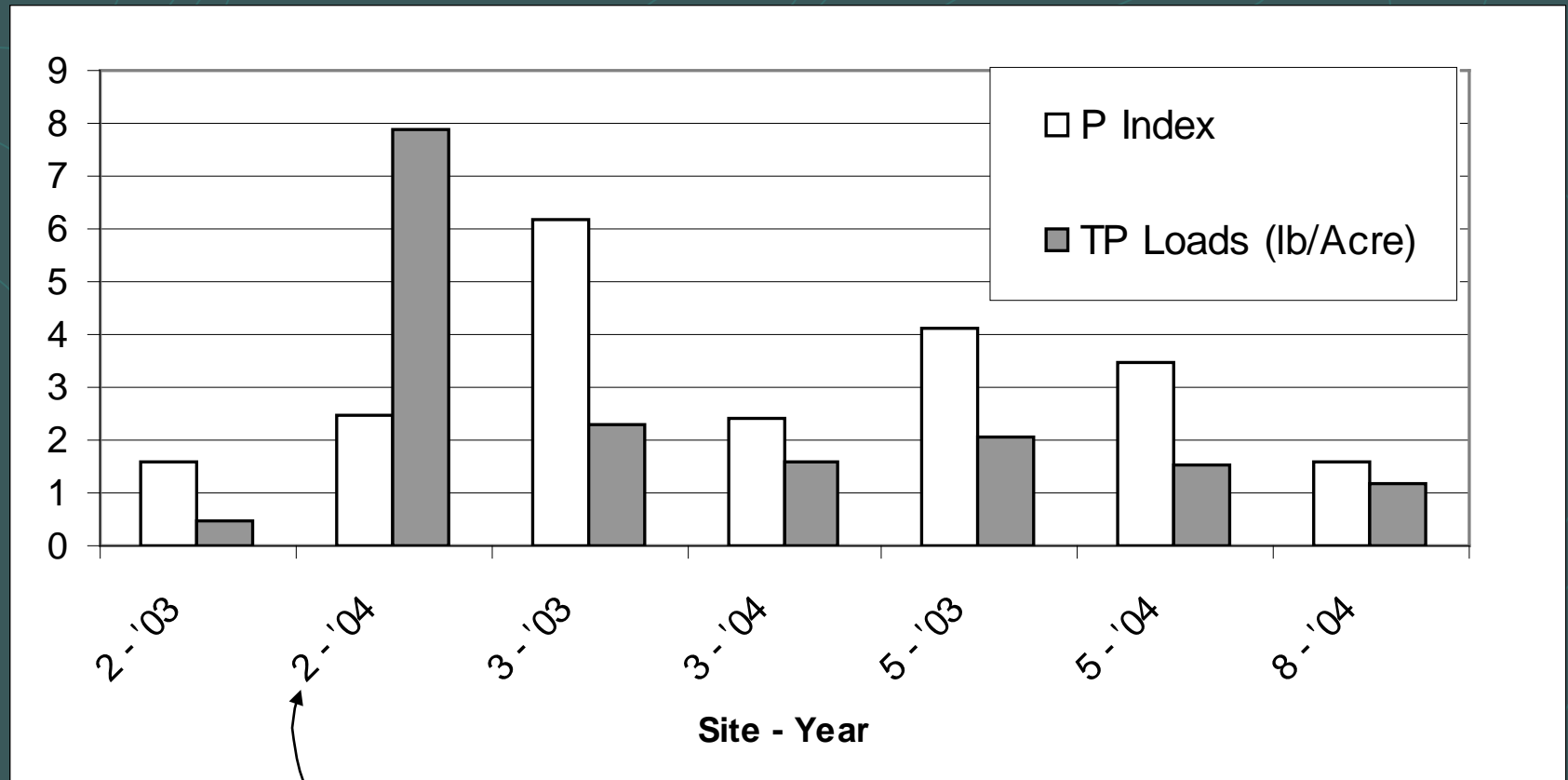
Calibrating the P Index: Why use Pioneer Farm?

- PI has been determined for all fields
- Single-crop subwatersheds provide ideal conditions for measuring edge-of-field losses
- Have flexibility in management to test assumptions of the PI



Results of PI and Annual Loads

**** Provisional Data ****

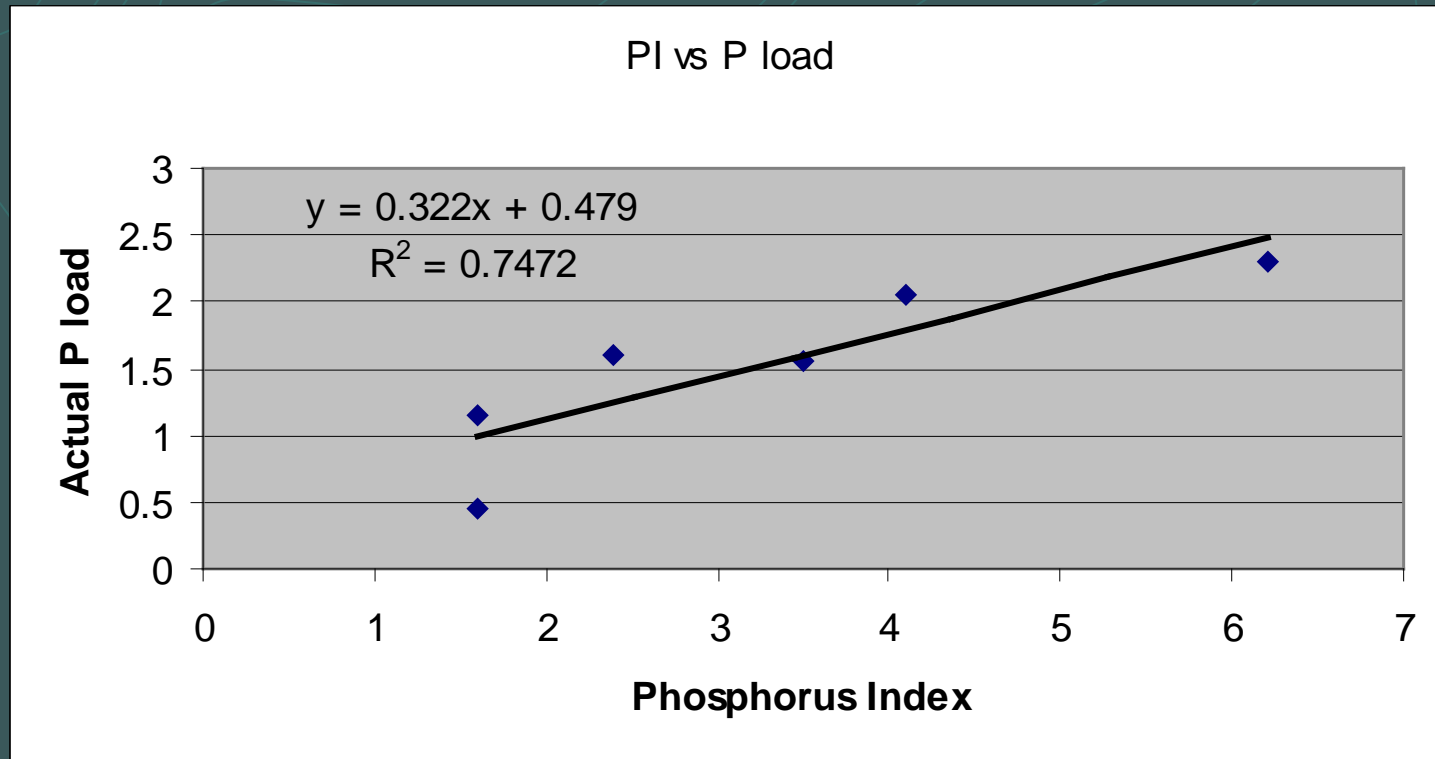


channelized flow & gully erosion

Site 2 – June 2004



Is the PI a better predictor of runoff losses than Soil Test P?



*** Provisional data and Site 2 – 2004 removed

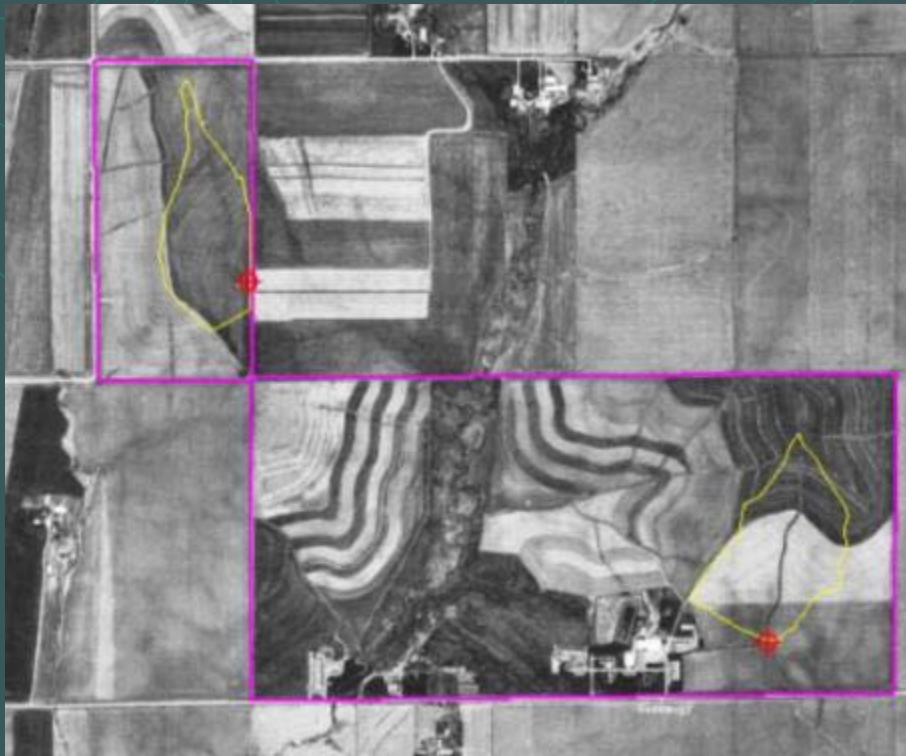
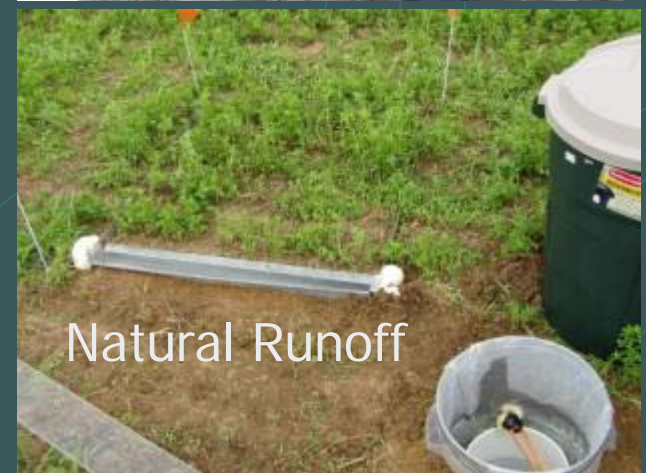
A vertical strip on the left side of the slide shows a topographic map of a watershed. It features contour lines, a network of streams, and a yellow line that likely represents a road or a specific boundary within the watershed.

Phosphorus Index - Related Research

- Testing the relationship between soil test P and runoff concentrations at plot and subwatershed scales
- Evaluating the assumption that runoff P is consistent throughout the year
- Determining if a sediment P enrichment factor would better predict sediment P concentrations
- Determining the impact of acute P losses

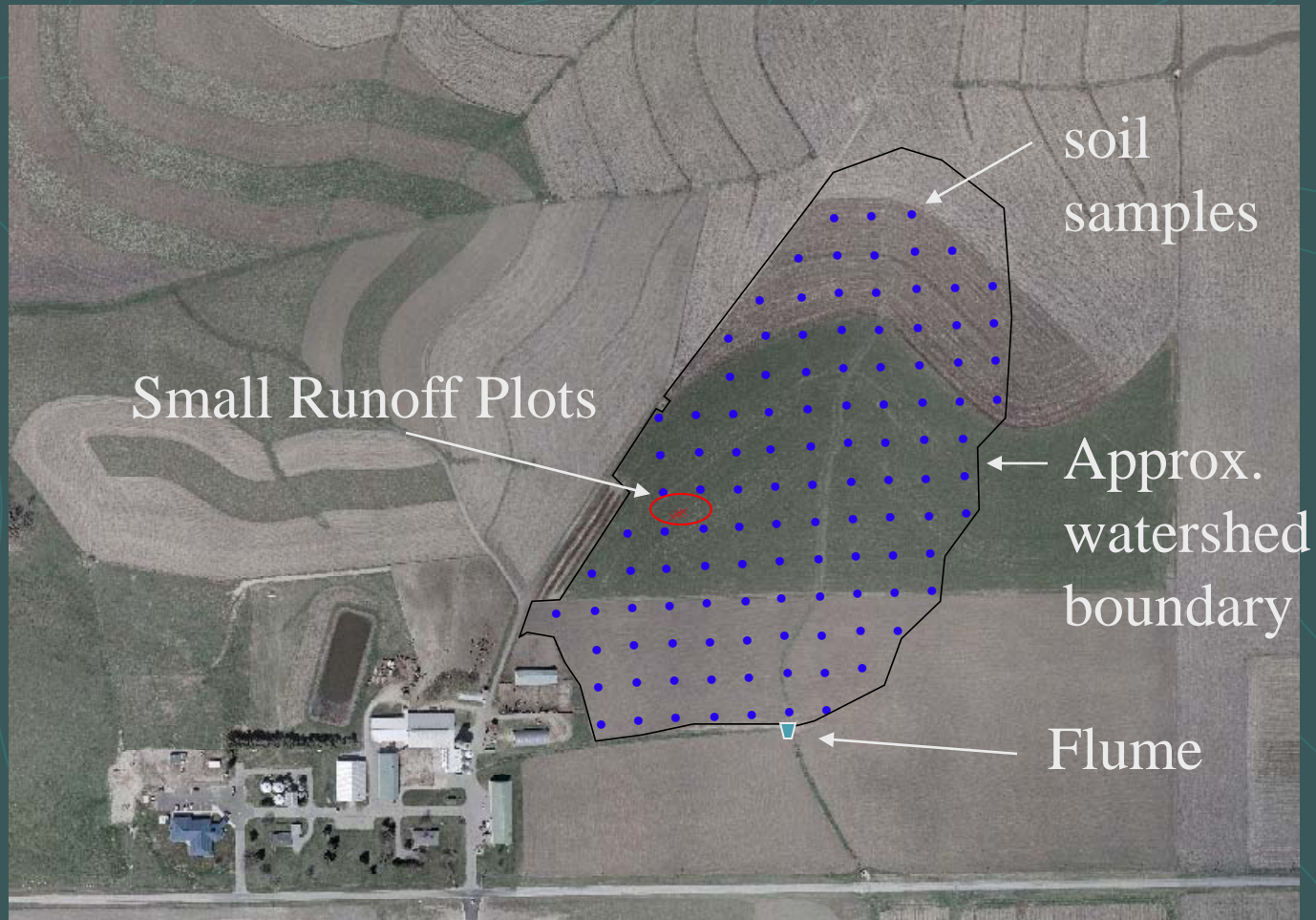
Ongoing Research: Testing the relationship between STP and runoff P losses

Small Plot Scale



Watershed Scale

Alfalfa watershed

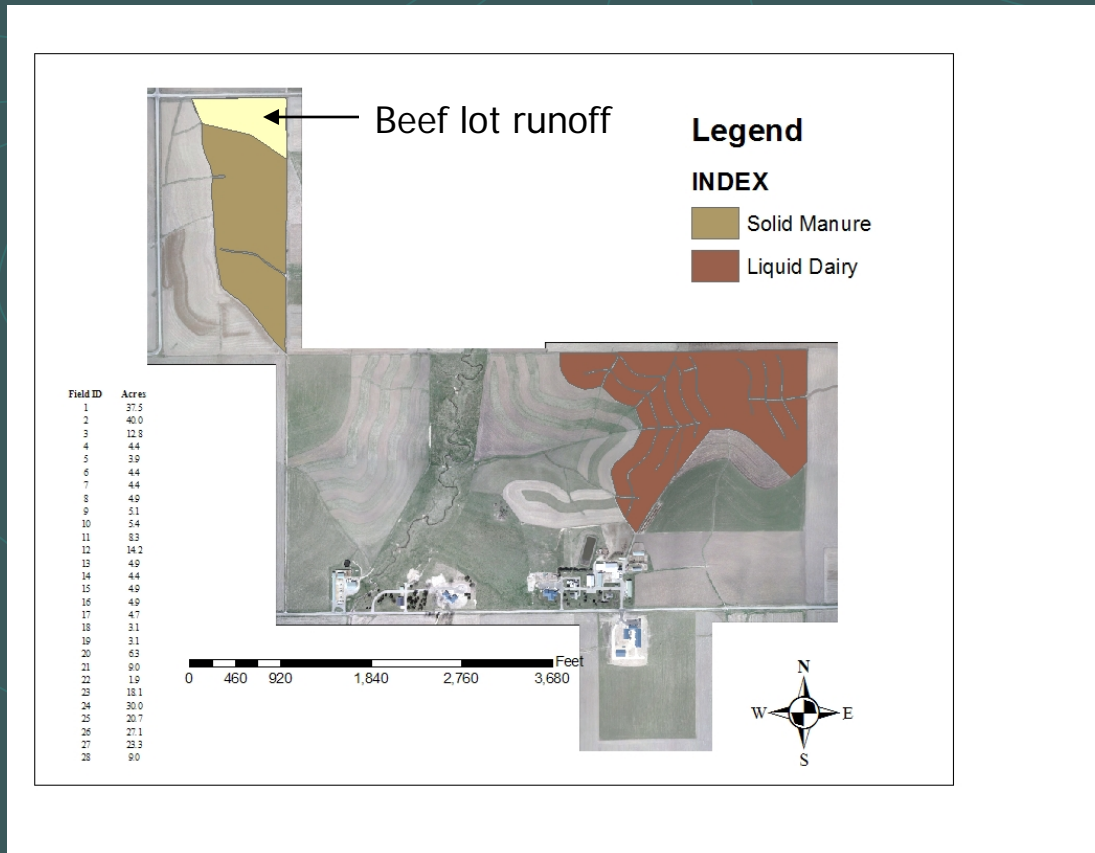


Winter runoff – Sites 2 and 8 (not manured)

Season (2004 crop year)	Site 2 (1 st year corn)	Site 8 (1 st year hay)
	----- Average dissolved P concentration (mg/L) -----	
Fall (harvest- Nov. 15)	0.50 (n=4)	N/A
Winter (snowmelt and winter precipitation)	0.43 (n=20)	2.35 (n=23)
Spring (April 1 – June 1)	0.46 (n=13)	0.57 (n=6)
Summer (June 1 - harvest)	0.42 (n=8)	1.57 (n=2)

Evaluating Acute Losses

- Fall / Winter 2004-2005: Planned applications of solid and liquid dairy manure



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Summary

- Large amounts of data have been collected
- Baseline data is beginning to answer questions about runoff sediment and P dynamics
- Data quality control and dissemination is a priority
- Goal is to provide sound basis for nutrient management – related public policy, leading to more widespread adoption of BMPs

Questions?

