

**SUSTAINABLE MANAGEMENT OF
NUTRIENTS ON C&H FARM IN BIG
CREEK WATERSHED**



DIVISION OF AGRICULTURE

RESEARCH & EXTENSION

University of Arkansas System



How the project came about

- C&H farm owner went to U of A Extension requesting help & advice
- Were invited to develop a research plan
- Our mission is to develop & implement BMPs in compliance with State and Federal laws
- We are not a regulatory body
- Provide sound science for others to develop mgt. guidelines

Project objectives

- ✓ Monitor fate & transport of nutrients & bacteria from land-applied swine slurry
- ✓ Assess impact of farm operations on water quality of springs, streams & ground water on & adjacent to the farm
- ✓ Determine sustainability of manure solid-liquid separation that may enhance nutrient export out of the watershed

Scale of monitoring

Field

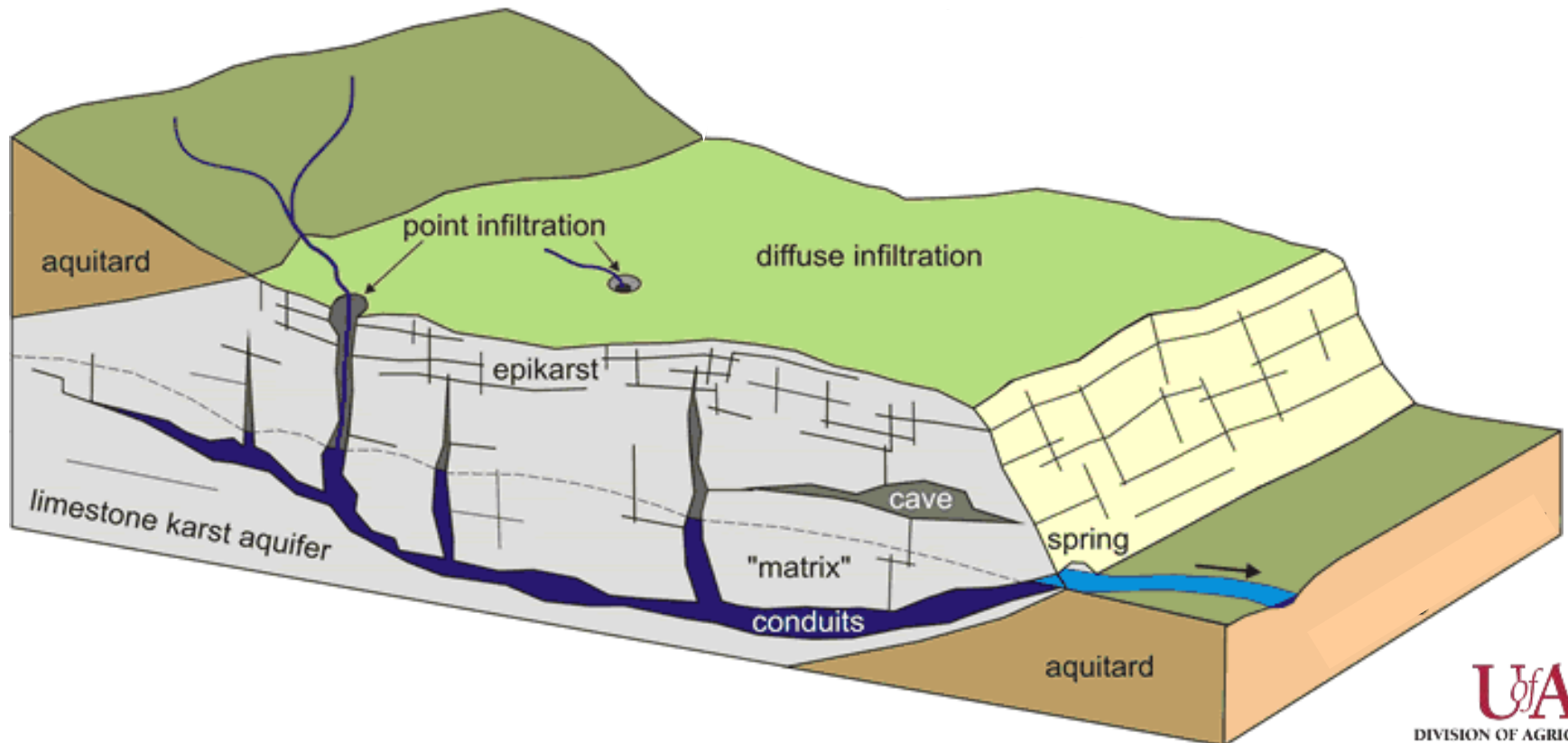
Farm

Watershed

- ✓ Field - source management
- ✓ Stream - impact on quality of river
- ✓ Watershed - sustainable operation

Complex karst systems

- Water flow pathways and residence times highly variable







Field monitoring

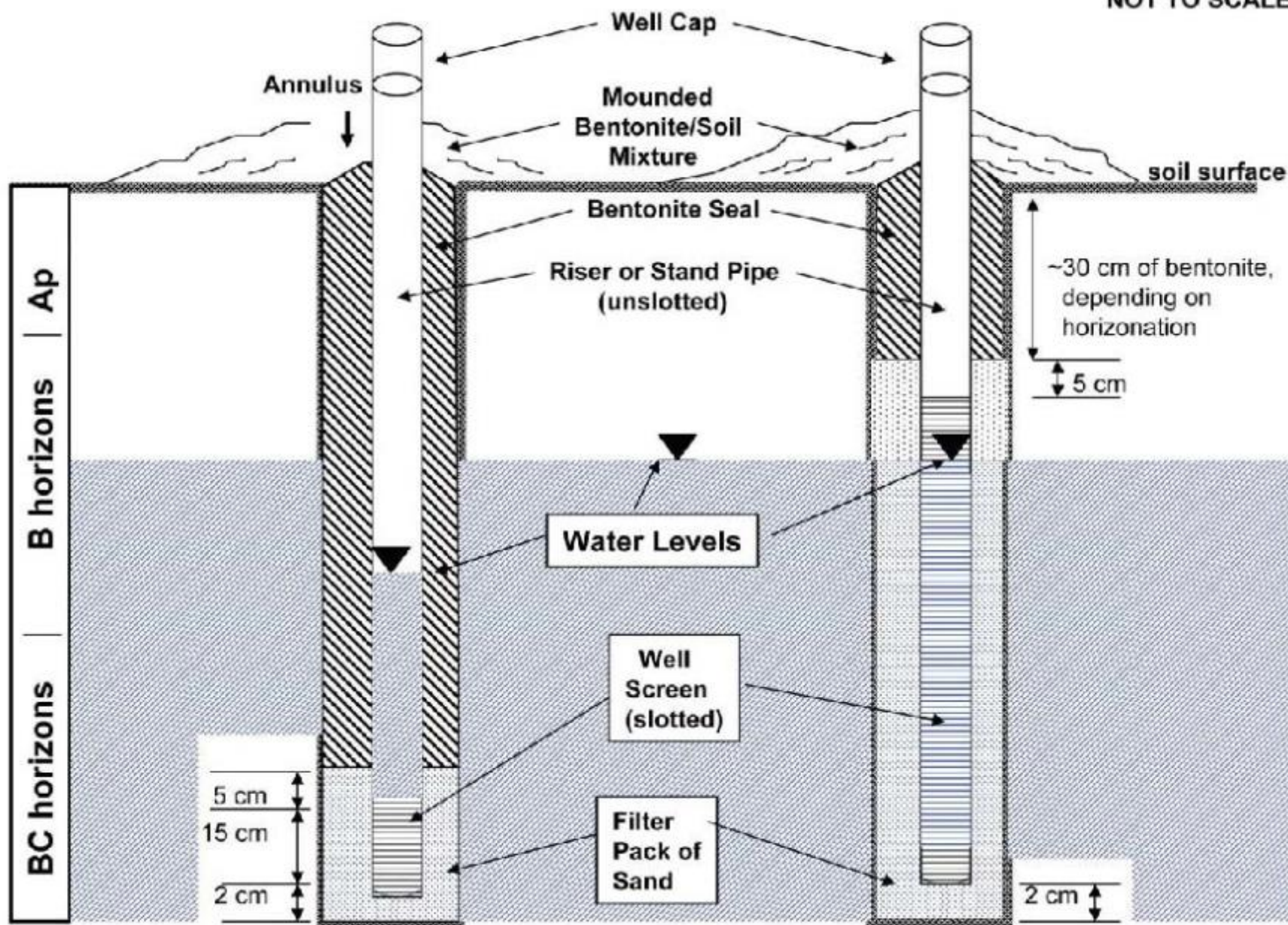
- Detailed topographic survey
- Ground penetrating radar
- Grid soil sampling & piezometers (i.e., for gravel layers, nutrients & water table depth)
- Surface runoff - flumes
- Applied slurry follows approved nutrient management plan

Surface runoff flumes





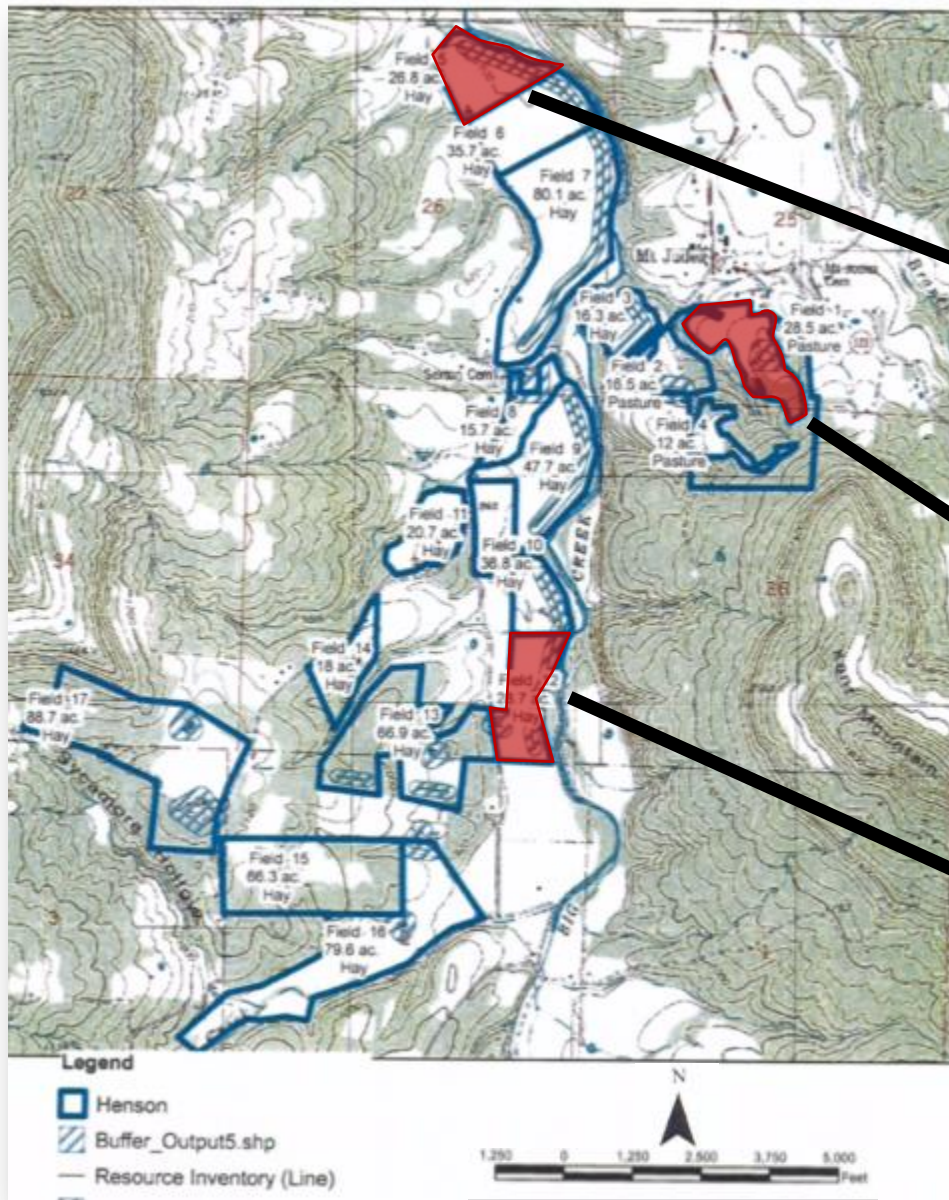
NOT TO SCALE



1A. Piezometer

1B. Water-table Well

Field sites



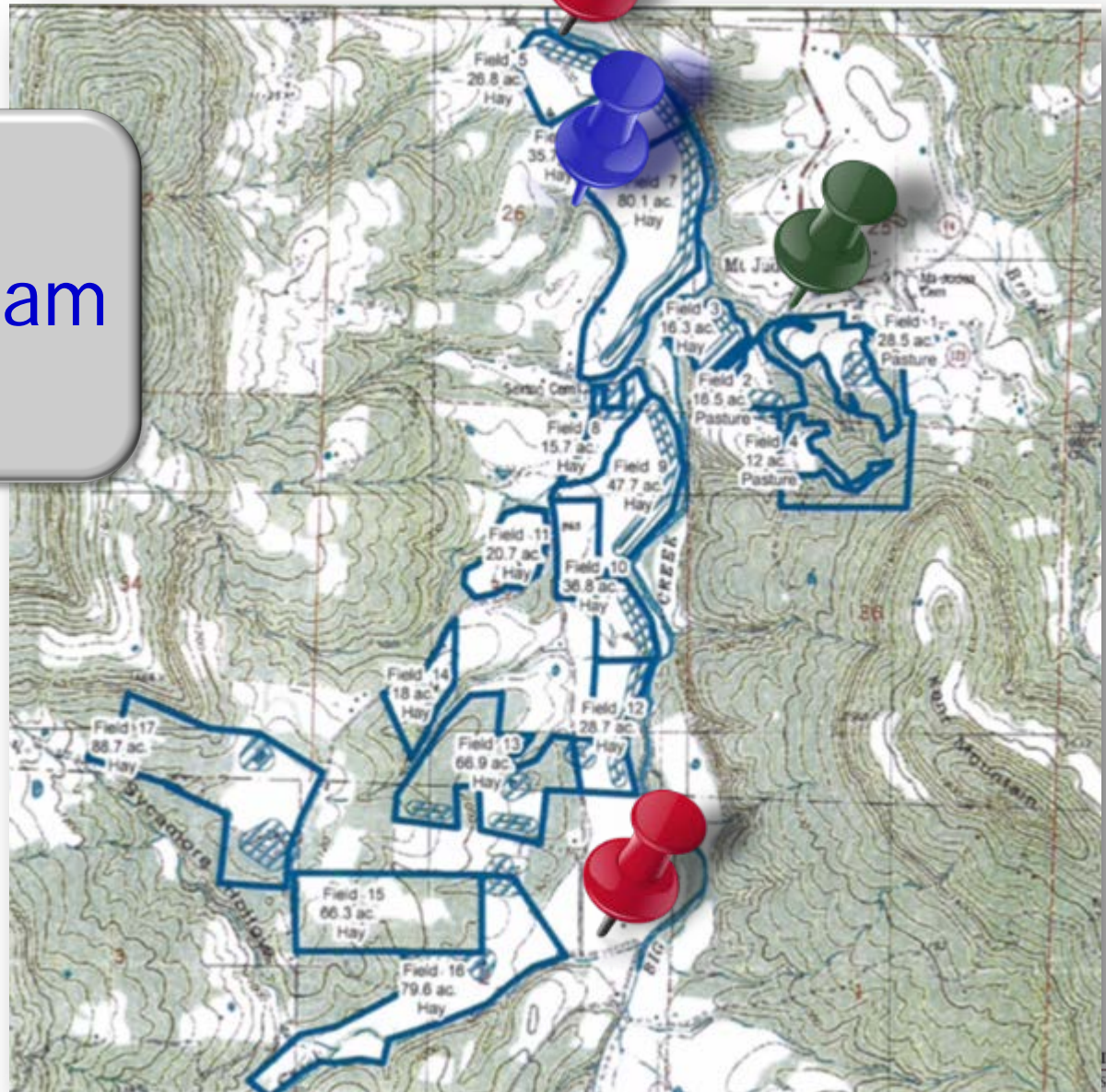
Field #	Area, acres	Soil test P, ppm
5	23.8	65
1	15.6	83
12	23.7	19

Sampling sites

Big Creek

Ephemeral stream

Spring

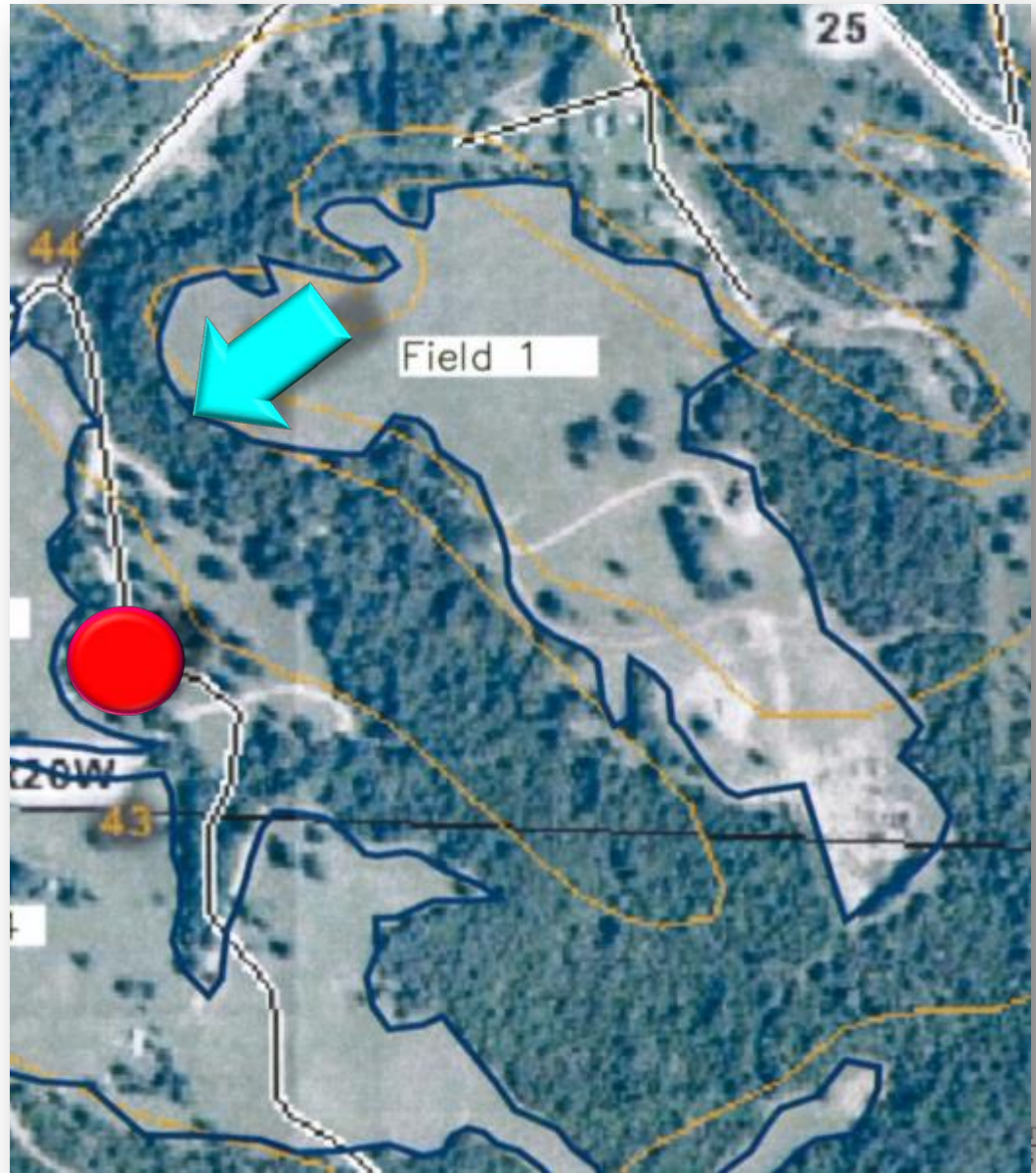




Field 1

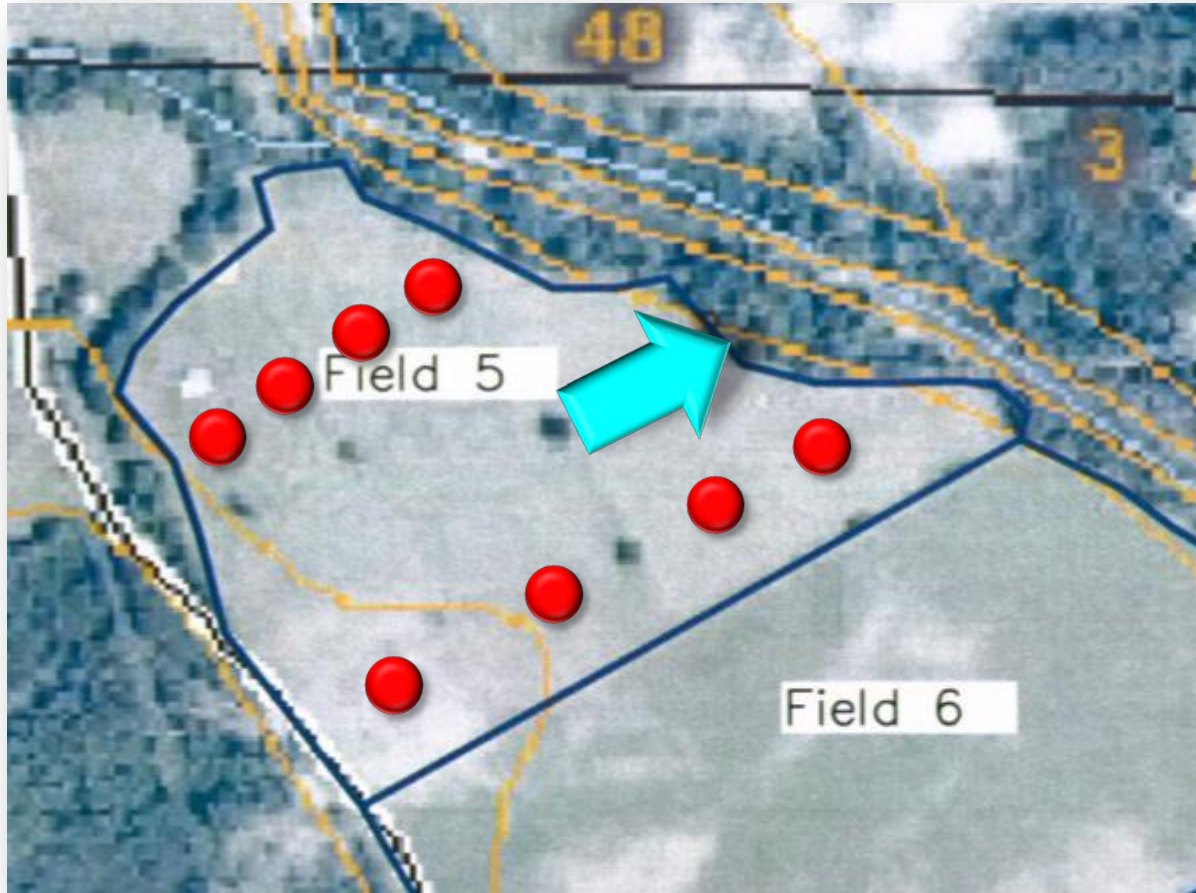
Surface
runoff flume

Spring





Field 5

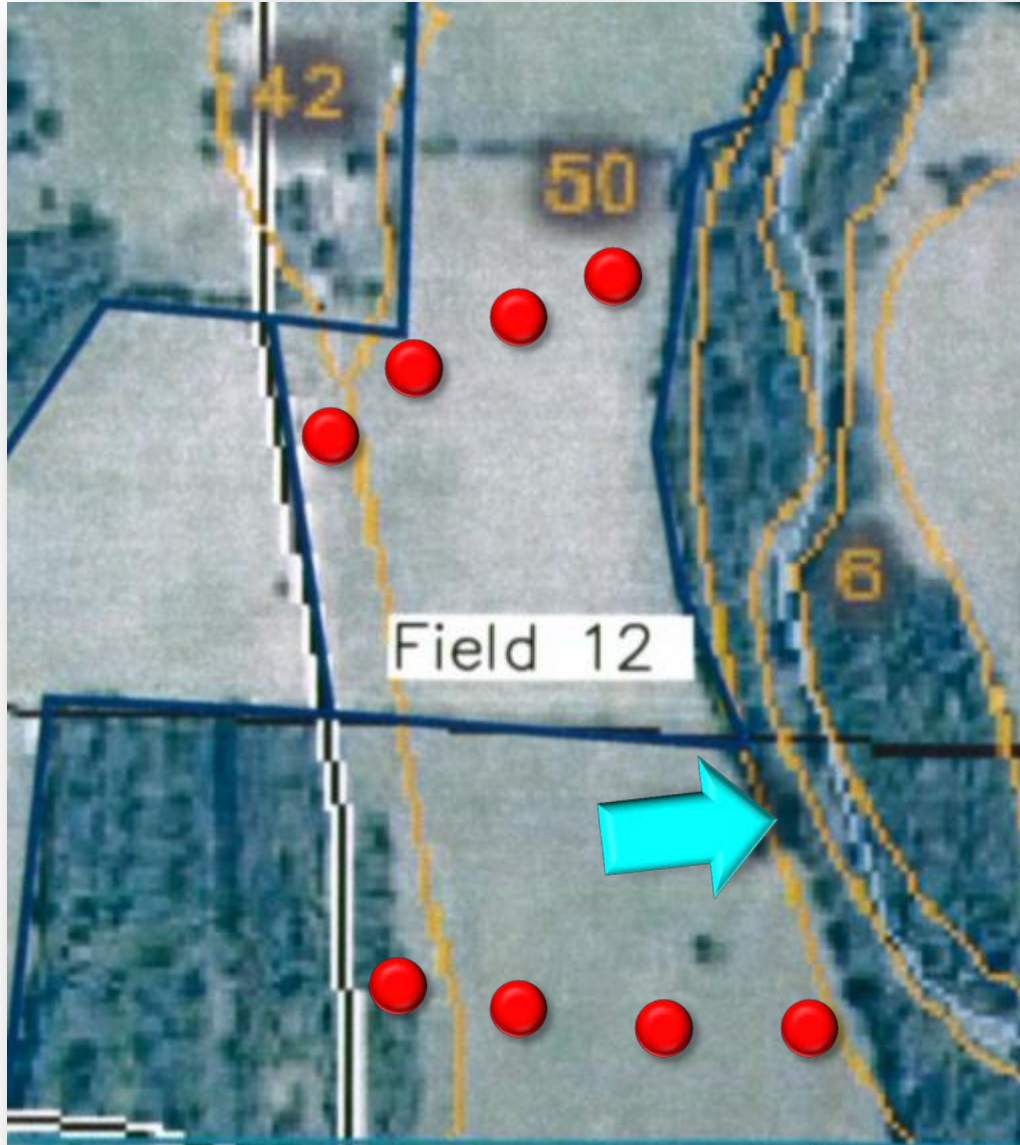


Surface
runoff flume

Piezometers



Field 12



Piezometer

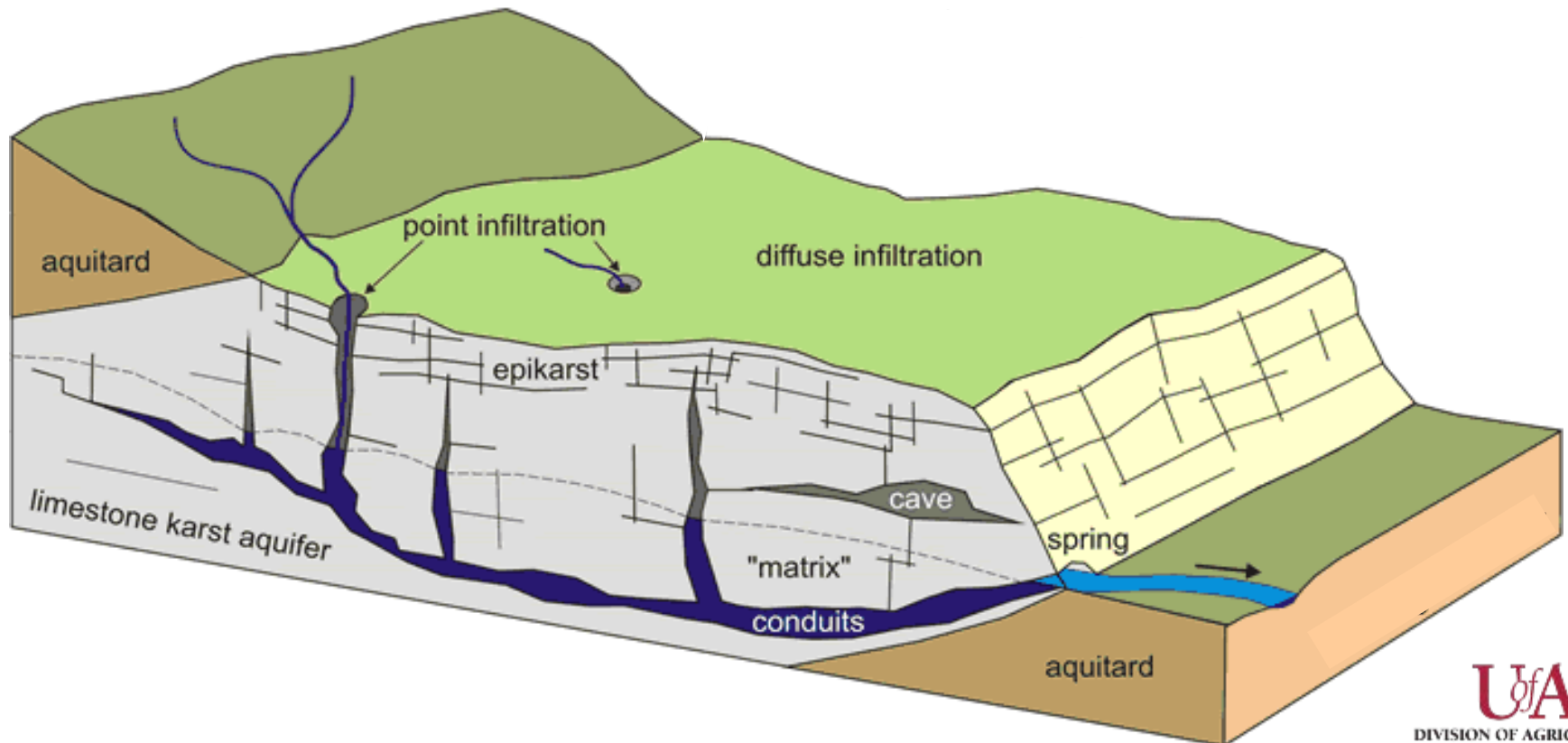
Surface runoff
flume

Area water quality



Complex karst systems

- Water flow pathways and residence times highly variable





Area water quality

- Continuous monitoring of base flow in Big Creek, streams draining the farm into Big Creek, and springs on the farm
 - Determine nutrients, sediment, bacteria, pH, temp., dissolved O₂, pCO₂
- Monitor storm flows in Big Creek, stream, and springs
- No slurry applied yet

Stream monitoring



Farm sustainability





Farm sustainability

- Manure treatment
 - Feasibility of solid liquid separation
 - Chemical treatment of manure
- Possible export of manure off farm
- Economic sustainability



What's next ?

- Dye tracer studies & natural chemical tracers
 - Calcium, Potassium, Boron
 - Rubidium
 - Lanthanum
- Fingerprinting sources of water in springs & Big Creek
- External review

A long-exposure photograph of a river flowing through a canyon. The sky is a deep blue with numerous white star trails. The canyon walls are made of layered rock, and there are trees and bushes along the riverbank. The text "Thank you" is overlaid in the center in a bold, red font.

Thank you