

The logo for BCRET (Big Creek Research & Extension Team) features the acronym in a bold, blue, serif font. The text is set against a background of a green and yellow wavy pattern that resembles a field or water, with a sunburst effect behind the letters.

**BCRET**

A dark green rounded rectangular box with a thin white border, containing the text 'THE BIG CREEK RESEARCH & EXTENSION TEAM' in yellow, bold, sans-serif font.

**THE BIG CREEK RESEARCH  
& EXTENSION TEAM**

A dark green rounded rectangular box with a thin white border, containing the text 'SUSTAINABLE MANAGEMENT OF NUTRIENTS ON THE C&H FARM IN BIG CREEK WATERSHED' in yellow, bold, sans-serif font.

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

The logo for the University of Arkansas System, featuring the letters 'U of A' in a large, red, serif font. To the right of the 'U of A' is the text 'DIVISION OF AGRICULTURE' and 'RESEARCH & EXTENSION' in a smaller, black, sans-serif font, separated by a horizontal line. Below this is the text 'University of Arkansas System' in a smaller, black, serif font.

**U of A** DIVISION OF AGRICULTURE  
RESEARCH & EXTENSION  
University of Arkansas System

# The team

Andrew Sharpley	Soil & water quality, watershed mgt.
Rick Cartwright	Assoc. Dir. Extension for Agric. & Natural Resources
Kris Brye	Soil physics, pedology, sustainability, nutrient leaching
Mark Cochran	Vice President, U of A System Division of Agriculture
Mike Daniels	Extension water quality & nutrient mgt. specialist
Brian Haggard	Ecological engineering, water quality monitoring
Phil Hays (USGS)	Karst hydrogeology and groundwater quality
Tim Kresse (USGS)	Ground and stream water quality
Nathan McKinney	Asst. Dir. Agric. Expt. Station
Mary Savin	Structure & function of microbial communities
Thad Scott	Water quality, stream ecology and response
Karl VanDevender	Extension engineer, manure mgt. & planning
Adam Willis	County Extension Agent - Agriculture
Jun Zhu	Manure treatment technologies, ag. sustainability
Field technicians	Equipment construction, soil & water sampling experts

# 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 off-farm export of manure & nutrients

# Our partners



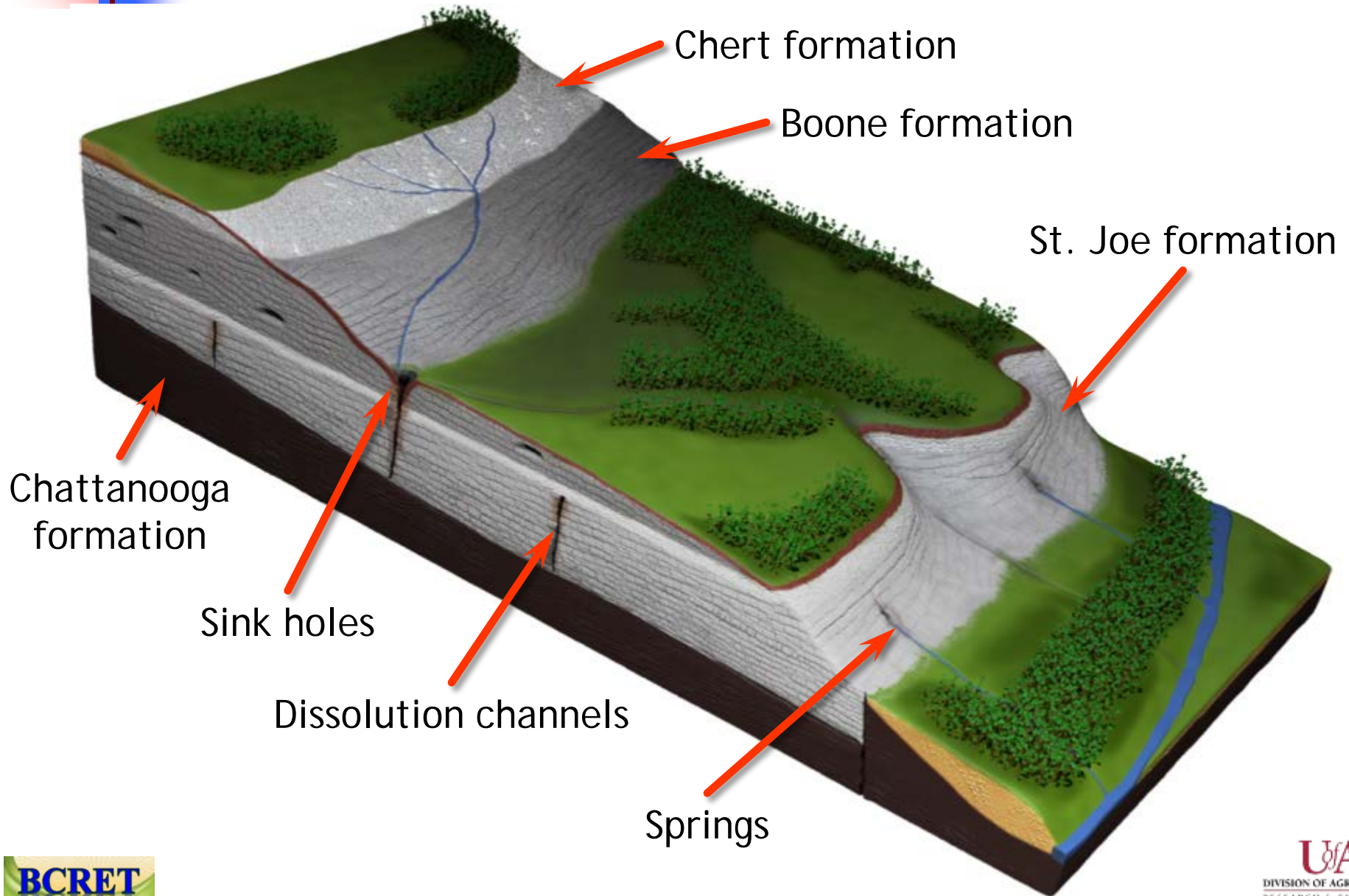
Arkansas Association  
of Conservation Districts



Cooperating with

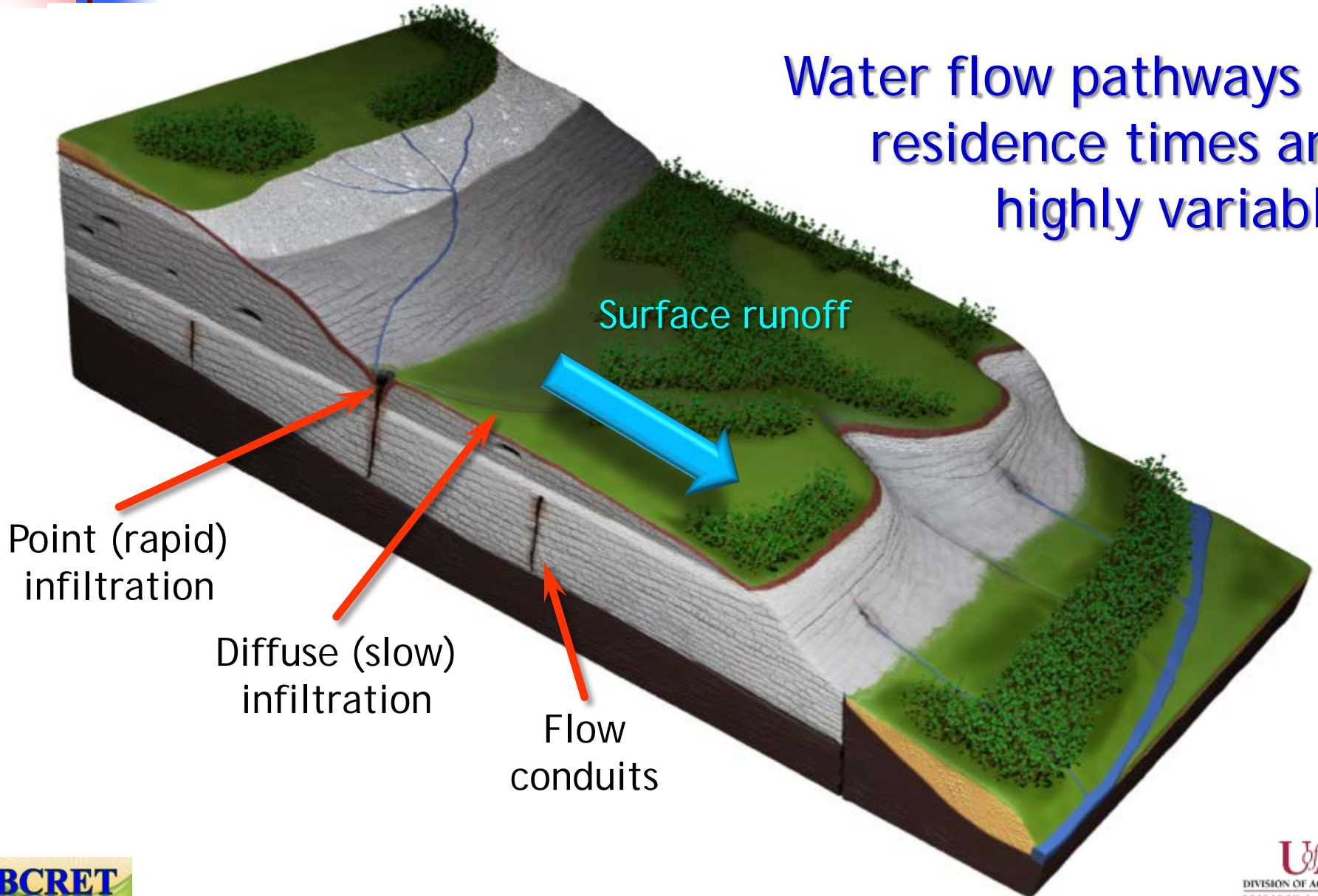


# Complex karst systems

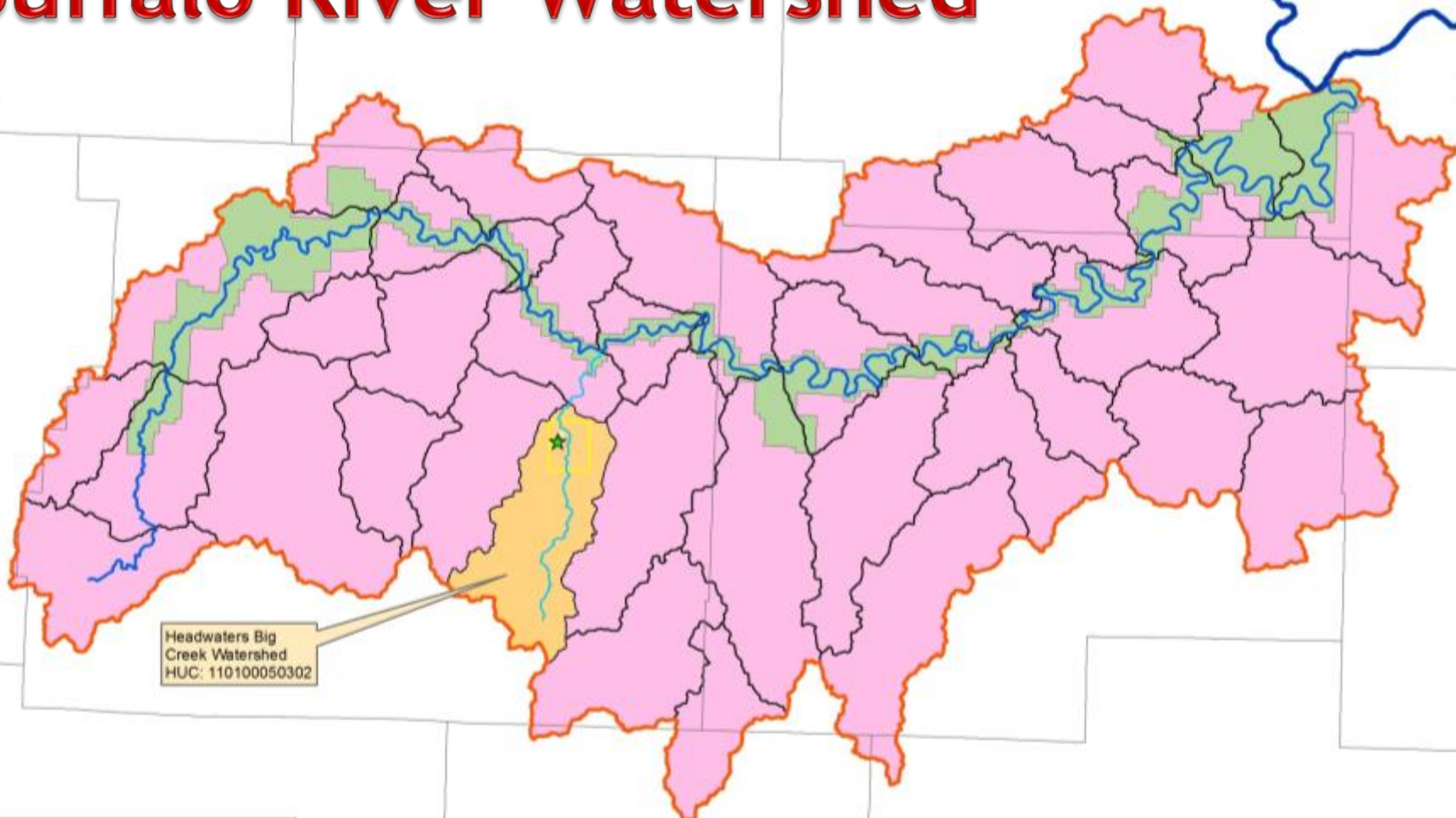


# Complex karst systems

Water flow pathways & residence times are highly variable



# Buffalo River Watershed



Headwaters Big  
Creek Watershed  
HUC: 110100050302

- Big Creek
- Buffalo River
- White River
- Headwaters Big Creek Watershed
- Buffalo River National Park
- Buffalo River Watershed



# Scale of monitoring

Field

Farm

Watershed

- ✓ Field - source management
- ✓ Farm - sustainable operation
- ✓ Watershed - impact on water quality





# So far, we have ....

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- Conducted
  - LIDAR topographic survey
  - Grid soil sampling (0.25-acre grid)
  - Ground penetrating radar
- Installed & monitored
  - Surface runoff - flumes
  - Monitoring wells
  - Springs
  - Big Creek above and below the farm

# Water quality

- ✓ Storm & weekly sampling of base flow in Big Creek & springs samples
  - Nutrients, sediment, bacteria
- ✓ Field runoff & leaching sampling on application fields

# Water sampling



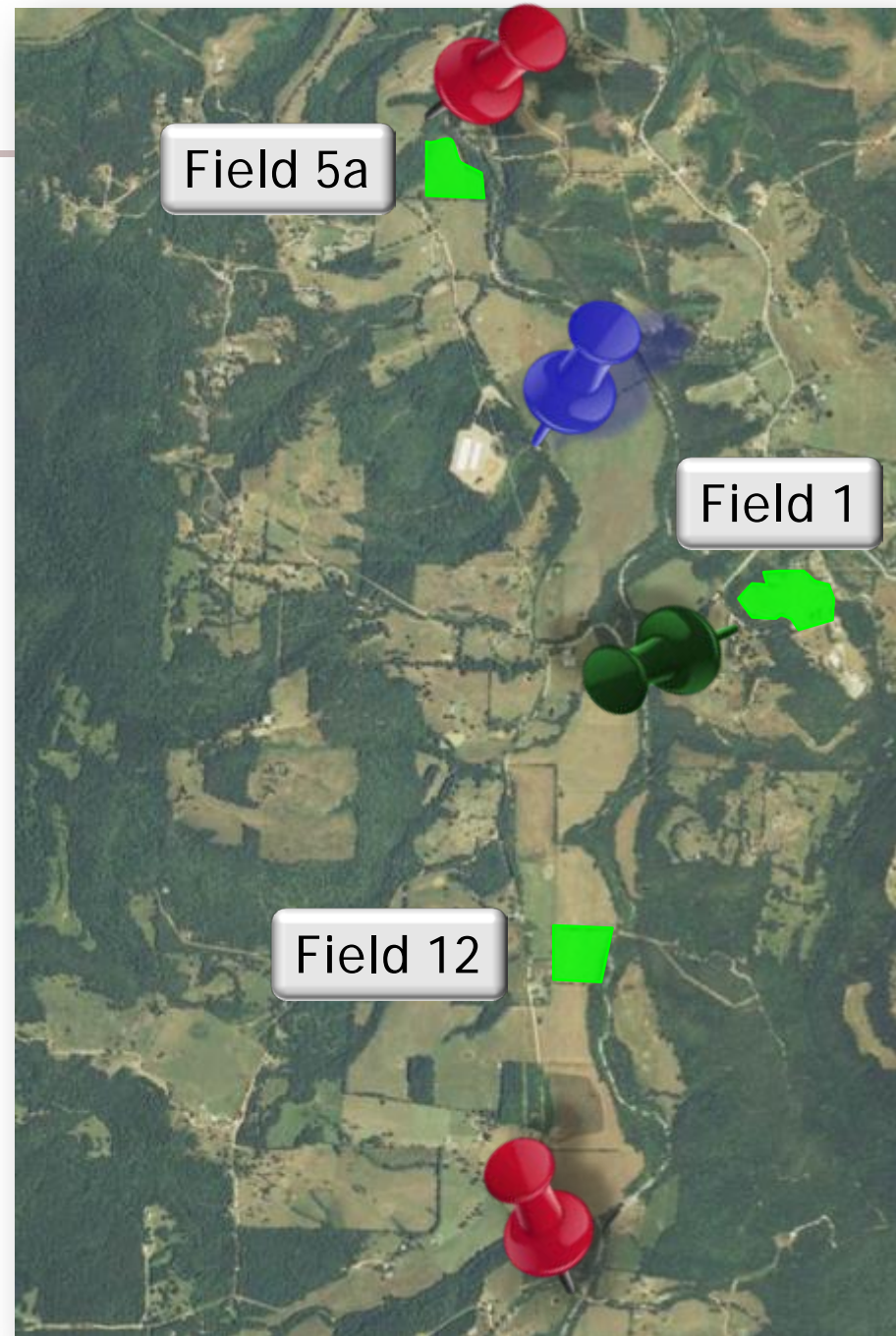
Big Creek



Ephemeral stream



Spring



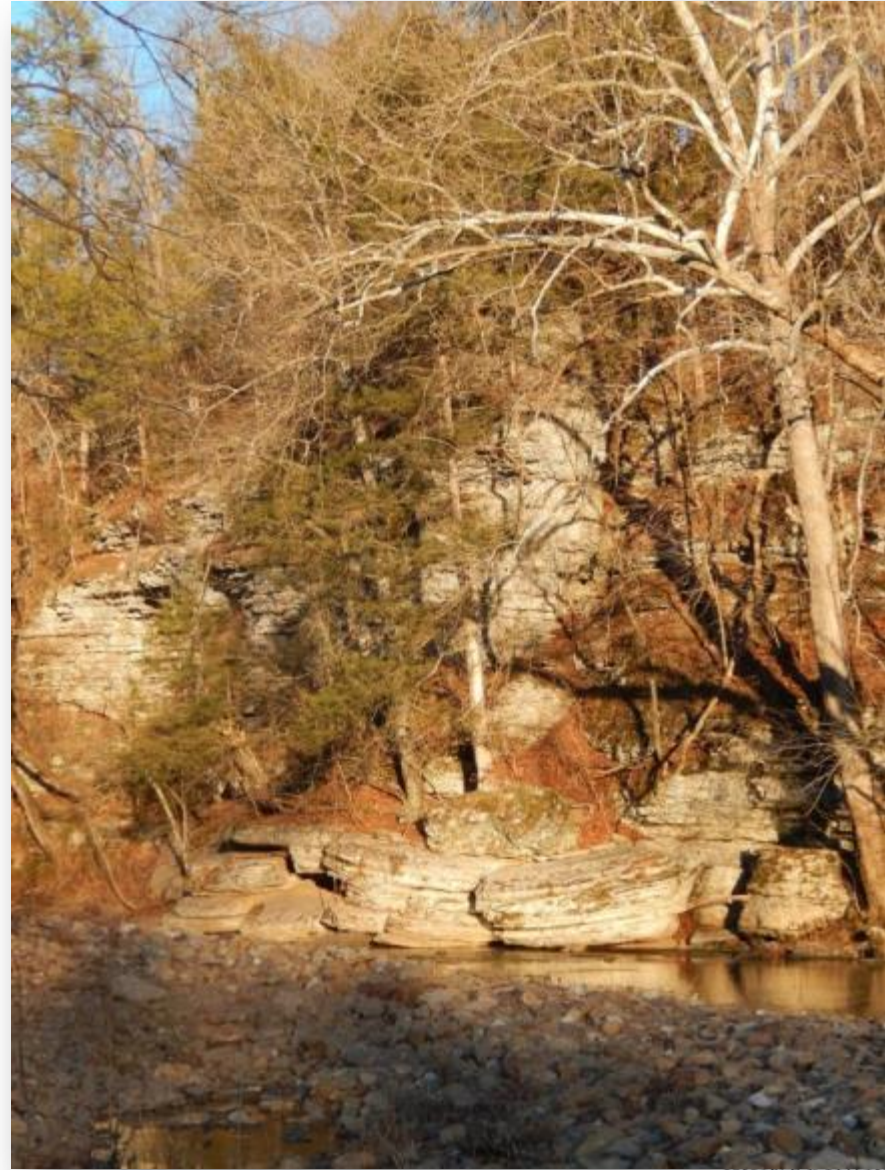
# Upstream of farm







# Downstream of farm



# USGS gauging site downstream of farm

Real time

Flow

Nitrate

Temperature





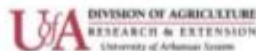


# USGS 07055790 Big Creek near Mt. Judea, AR

## PROVISIONAL DATA SUBJECT TO REVISION

Available data for this site

Click to hidestation-specific text  
Station operated in cooperation with:



[United States Geological Survey](#) [University of Arkansas Division of Agriculture](#)

This station managed by the Little Rock Office.

### Available Parameters

All 4 Available Parameters for this site

00065 Gage height

00045 Precipitation

00010 Temperature, water

00631 NO3+NO2, wf

### Available Period

2014-04-22 2014-07-07

2014-04-21 2014-07-07

2014-04-21 2014-07-07

2014-05-22 2014-07-07

### Output format

Graph

Graph w/ stats

Graph w/o stats

Graph w/ (up to 3) parms

Table

Tab-separated

Days (46) [Summary of all available data for this site](#)

[Instantaneous-data availability statement](#)

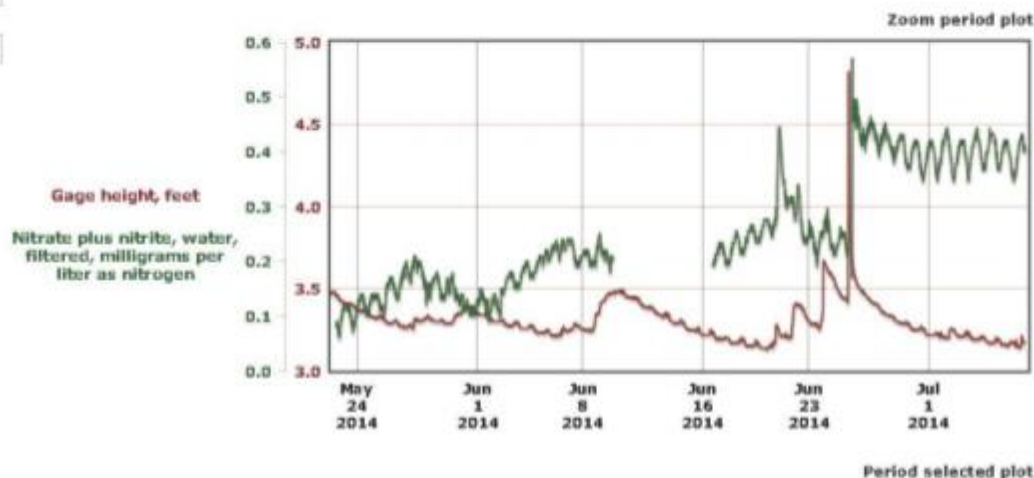
-- of --

Begin date

End date

## USGS 07055790 Big Creek near Mt. Judea, AR

Thursday  
Jun 26  
2014  
12:48



# Big Creek - water quality

----- mg / L -----

--- MPN / 100 mL ---

	Diss. P		Total P		Nitrate-N		E. Coli		Total Colif.	
	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down
Sept	0.015	0.010	0.064	0.024	0.35	0.45	42	190	4470	7357
Oct	0.014	0.021	0.033	0.086	0.47	0.60	206	1017	1685	8604
Nov	0.017	0.019	0.032	0.051	0.21	0.23	1159	939	8525	13192
Dec	0.009	0.007	0.024	0.022	0.17	0.28	138	80	1427	2420
Jan	0.009	0.010	0.022	0.026	0.17	0.36	71	62	457	578
Feb	0.008	0.008	0.019	0.015	0.07	0.15	70	7	258	370
Mar	0.008	0.009	0.033	0.033	0.11	0.20	49	43	409	771
April	0.023	0.013	0.206	0.035	0.07	0.14	171	216	1552	2649
May	0.008	0.008	0.031	0.032	0.09	0.14	302	422	5930	13015



# Spring site



Spring box  
captures & directs  
water to cattle  
trough

# Ephemeral stream site



# Big Creek - water quality

	Spring		
	Diss. P	Nitrate	Coliform
	----- mg/L -----		MPN/100mL
Sept	0.005	0.25	3730
Oct	0.006	0.18	11433
Nov	0.008	1.82	12166
Dec	0.007	0.71	2203
Jan	0.008	2.13	1021
Feb	0.007	0.61	378
Mar	0.008	0.64	1306
April	0.012	0.51	1209
May	0.008	0.39	4312

# Surface runoff monitoring



Field 1

Surface runoff flume





# Field 1



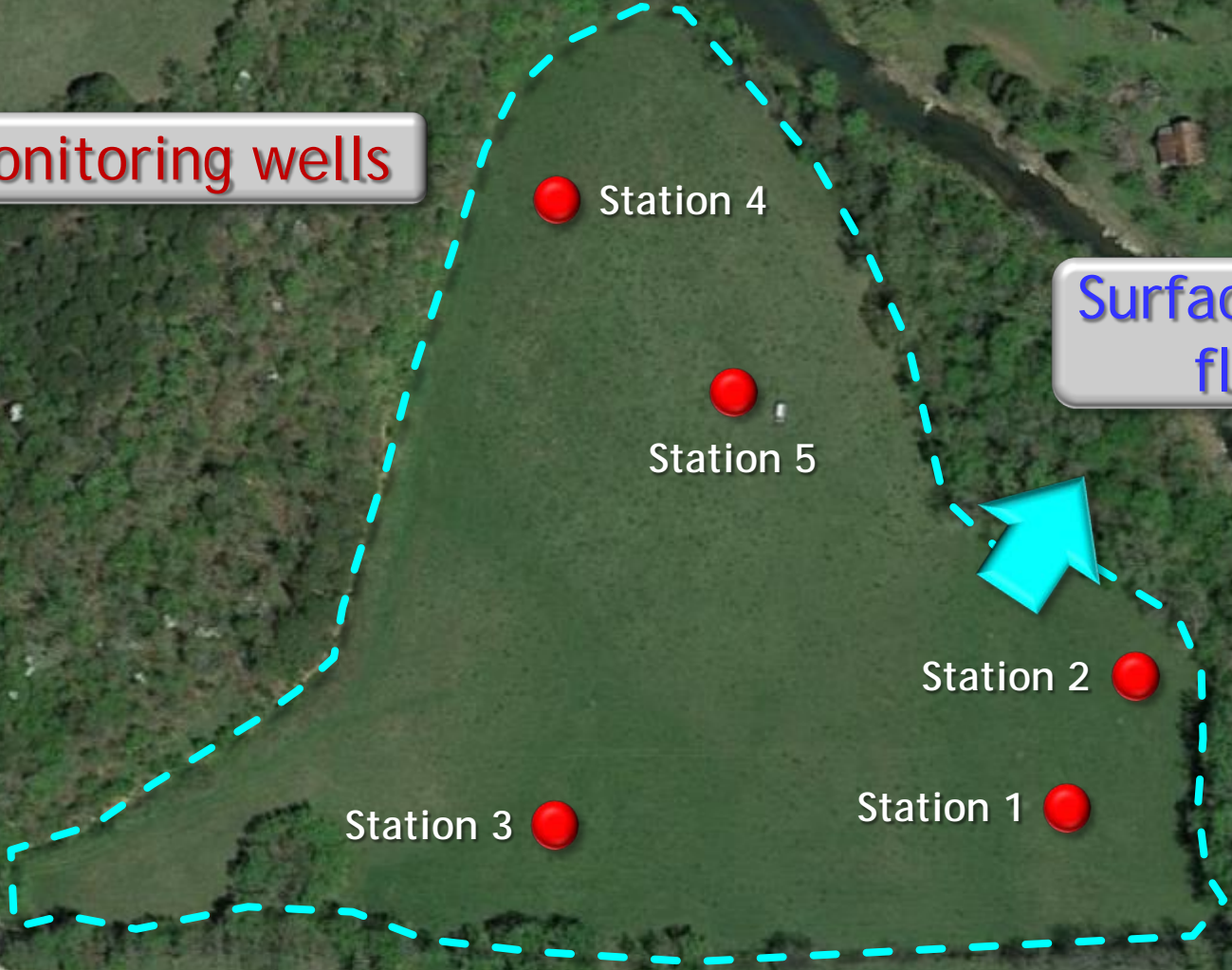
# Field 1



# Field 5a

Monitoring wells

Surface runoff flume



Station 4

Station 5

Station 2

Station 3

Station 1

# Field 5a



Field 5a

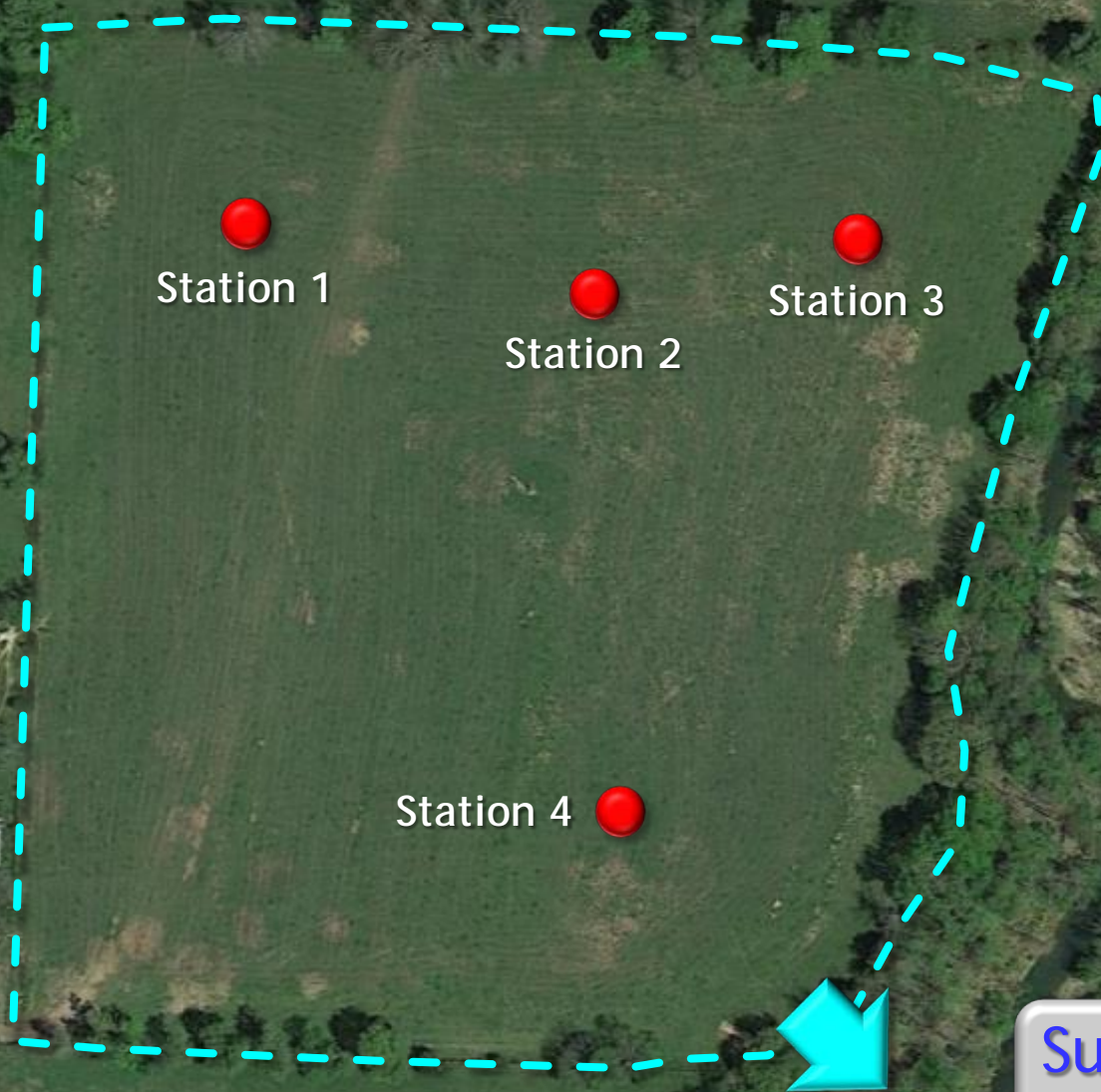


# Field wells



# Field 12

## Monitoring wells



Station 1

Station 2

Station 3

Station 4

Surface runoff flume

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# What's next ?

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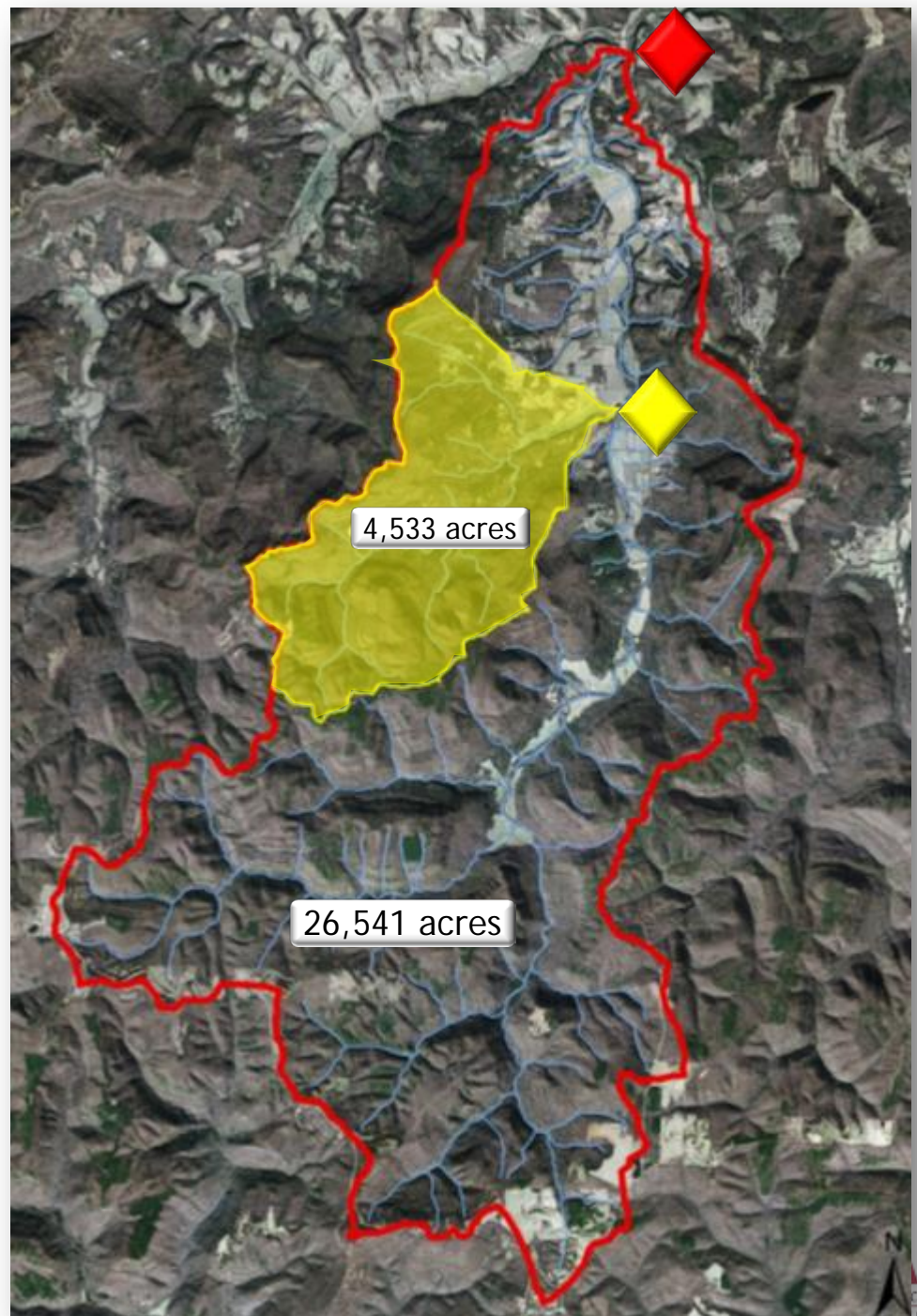
- Tracers of flow pathways
  - Dyes, natural, elec. resistivity
- Trench & wells near ponds
- Biological status of Big Creek & other watersheds
- Monitor Dry Creek
- Repeat grid-soil sampling
- Continue monitoring



Dry Creek  
Watershed



Big Creek  
Watershed

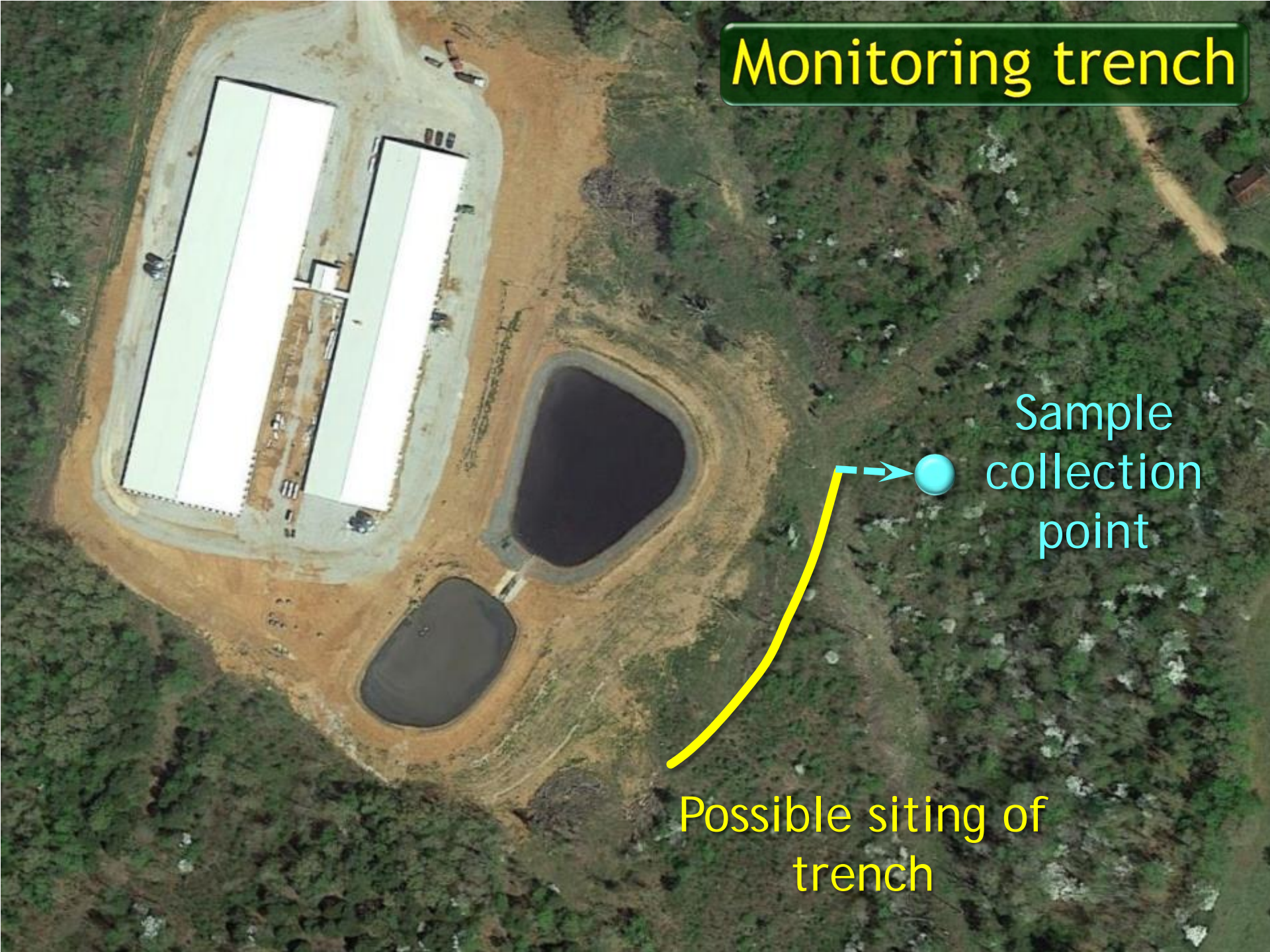


# Monitoring trench

Sample collection point



Possible siting of trench



# Thank you