
BCRET
THE BIG CREEK RESEARCH & EXTENSION TEAM
SUSTAINABLE MANAGEMENT OF NUTRIENTS ON THE C&H FARM IN BIG CREEK WATERSHED
UofA
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

USGS
science for a changing world

NRCS
Natural Resources Conservation Service

Arkansas Association of Conservation Districts

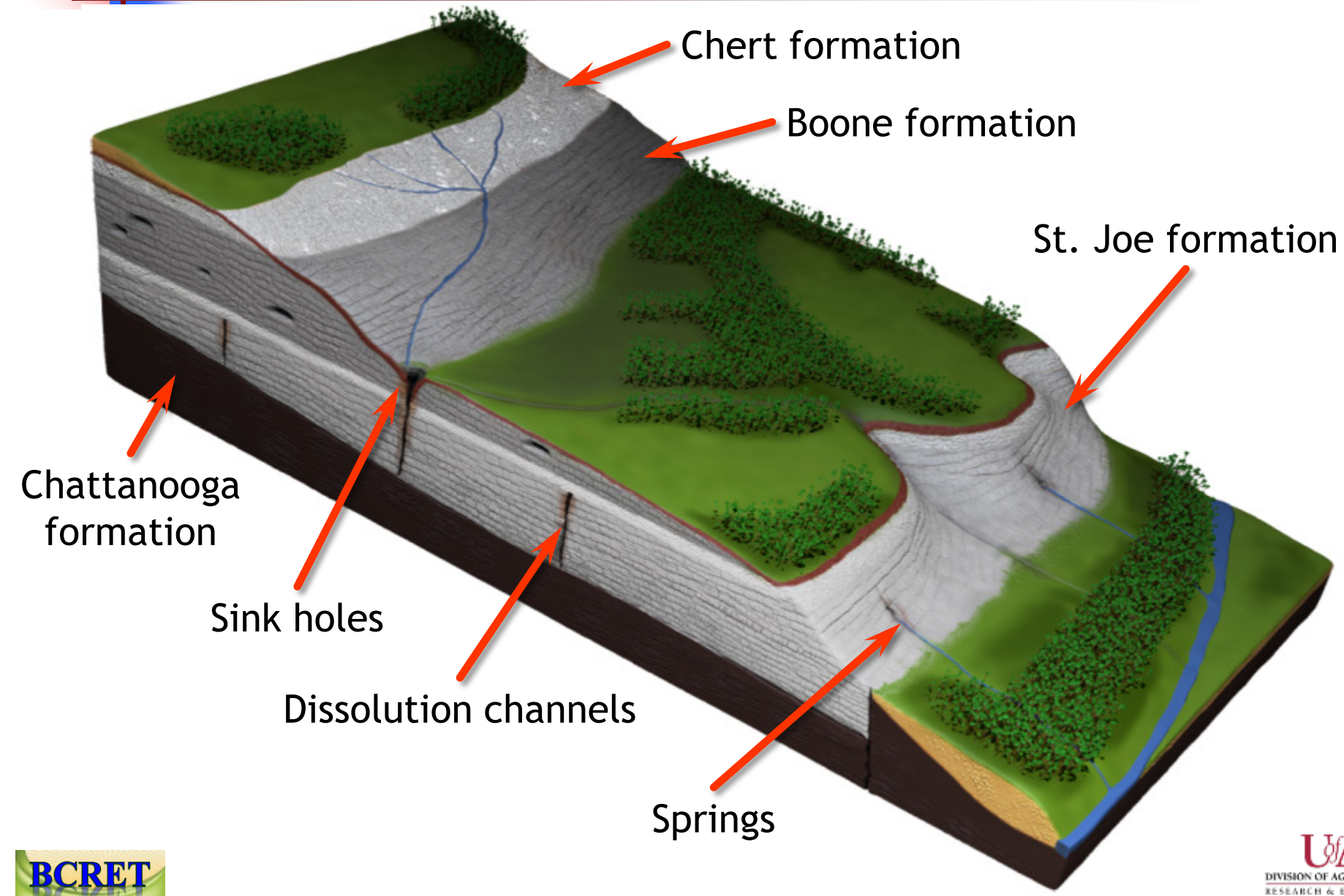
GREAT SEAL OF THE STATE OF ARKANSAS

ARKANSAS NATURAL RESOURCES COMMISSION
CONSERVATION
DEVELOPMENT

Cooperating with

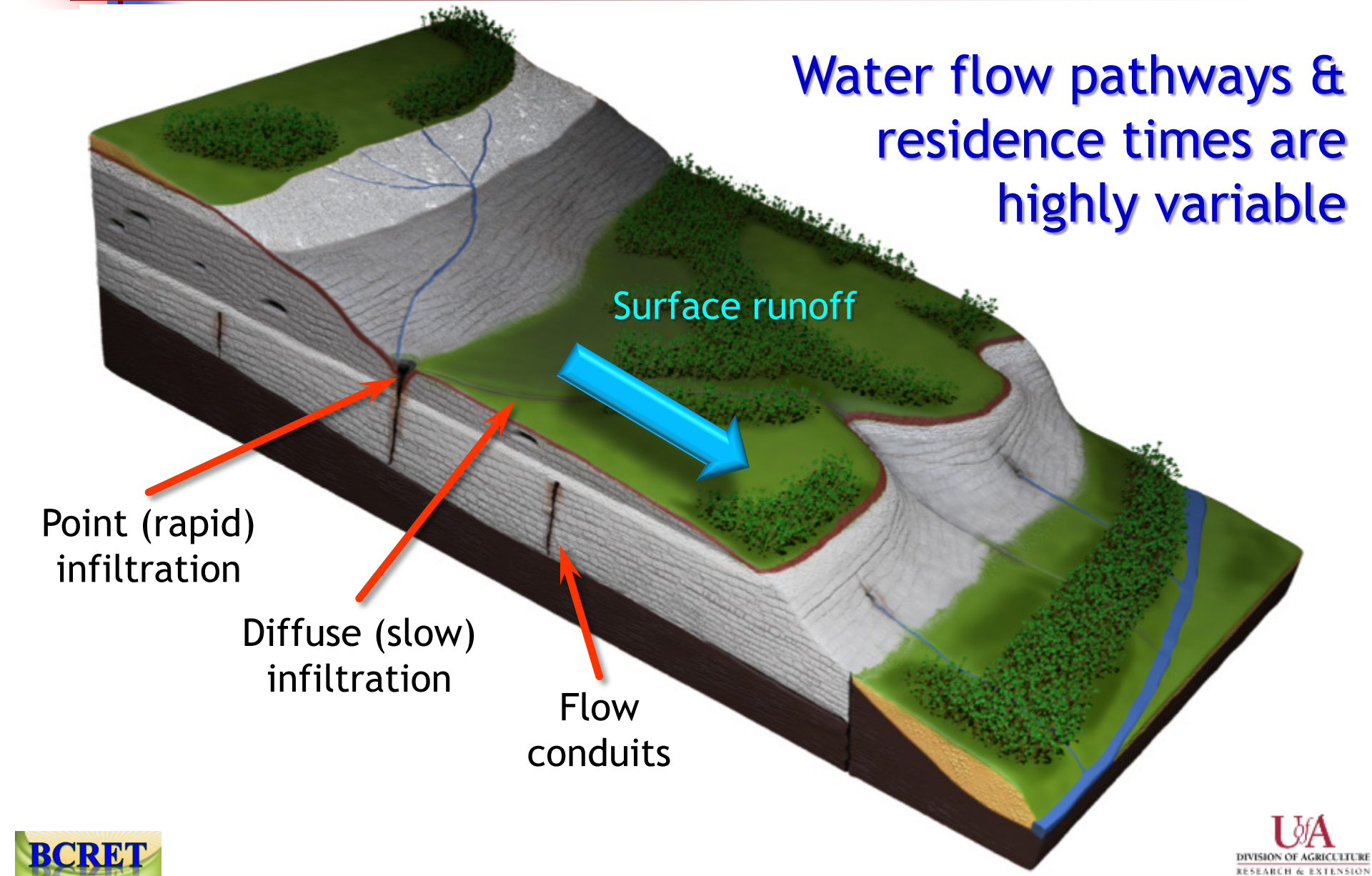
NATIONAL PARK SERVICE

Complex karst systems



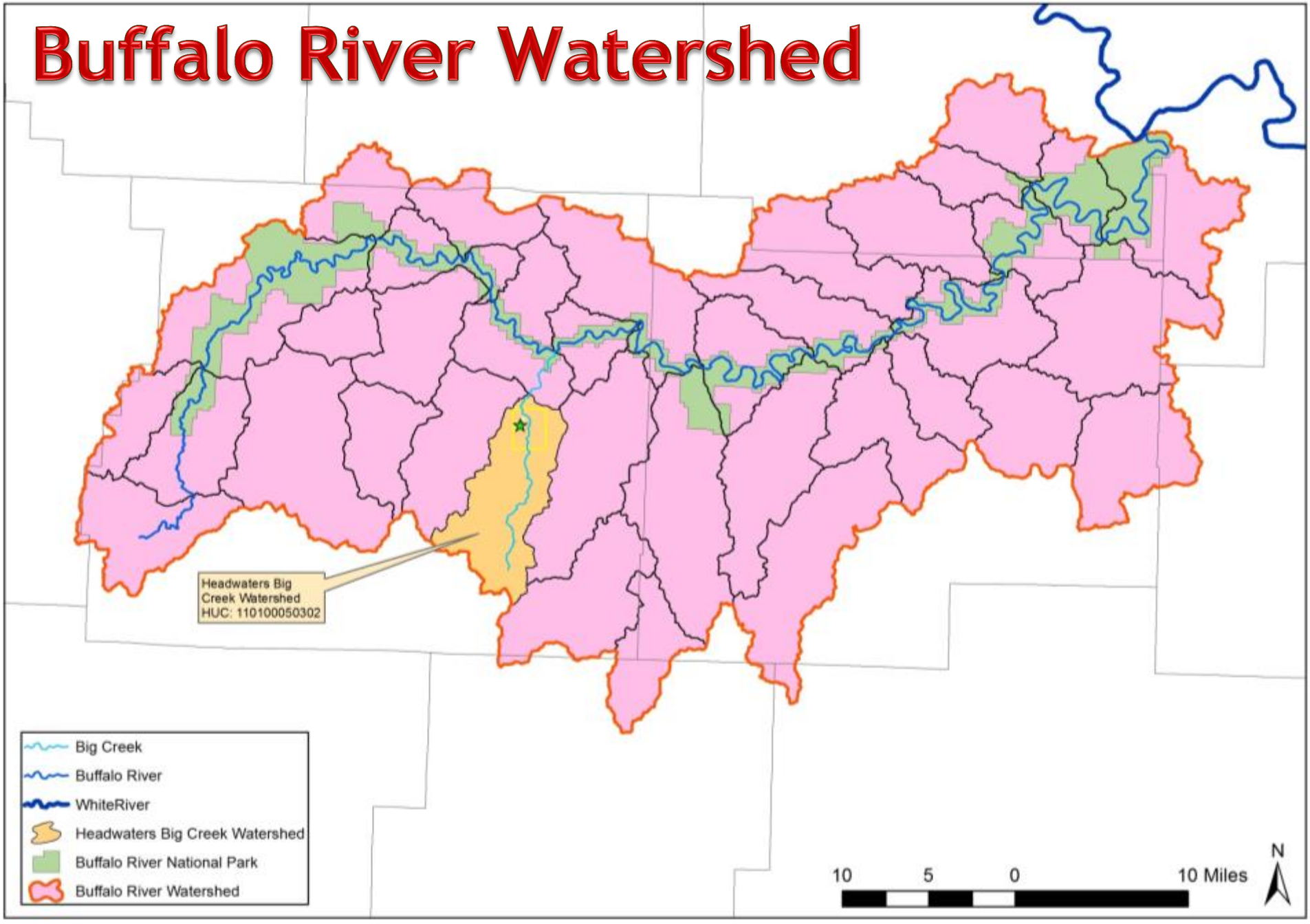
BCRET
U of A DIVISION OF AGRICULTURE RESEARCH & EXTENSION University of Arkansas System

Complex karst systems



BCRET
UA DIVISION OF AGRICULTURE RESEARCH & EXTENSION University of Arkansas System

Buffalo River Watershed



Scale of monitoring

Field → Farm → Watershed

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

So far, we have ….

- 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

BCRET

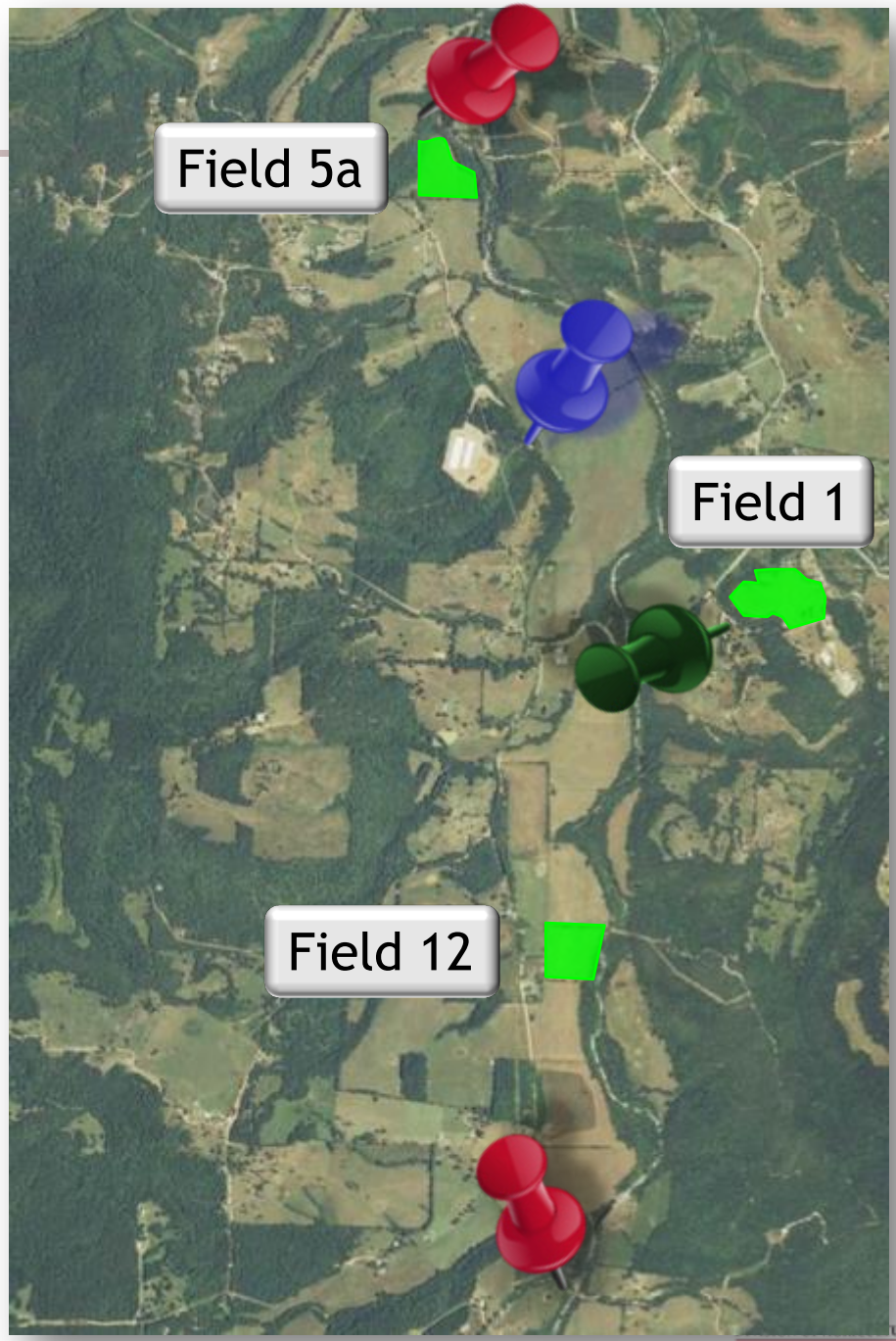
UofA DIVISION OF AGRICULTURE RESEARCH & EXTENSION University of Arkansas System

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



BCRET


Upstream of farm


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

Downstream of farm

USGS gauging site downstream of farm

Real time

Flow

Nitrate

Temperature

BCRET


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

USGS 07055790 Big Creek near Mt. Judea, AR

PROVISIONAL DATA SUBJECT TO REVISION

Available data for this site | Time-series: Current/Historical Observations | GO

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	Available Period
All 4 Available Parameters for this site	
00065 Gage height	2014-04-22 2014-07-07
00045 Precipitation	2014-04-21 2014-07-07
00010 Temperature, water	2014-04-21 2014-07-07
00631 NO3+NO2, wf	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

GO

-- or --

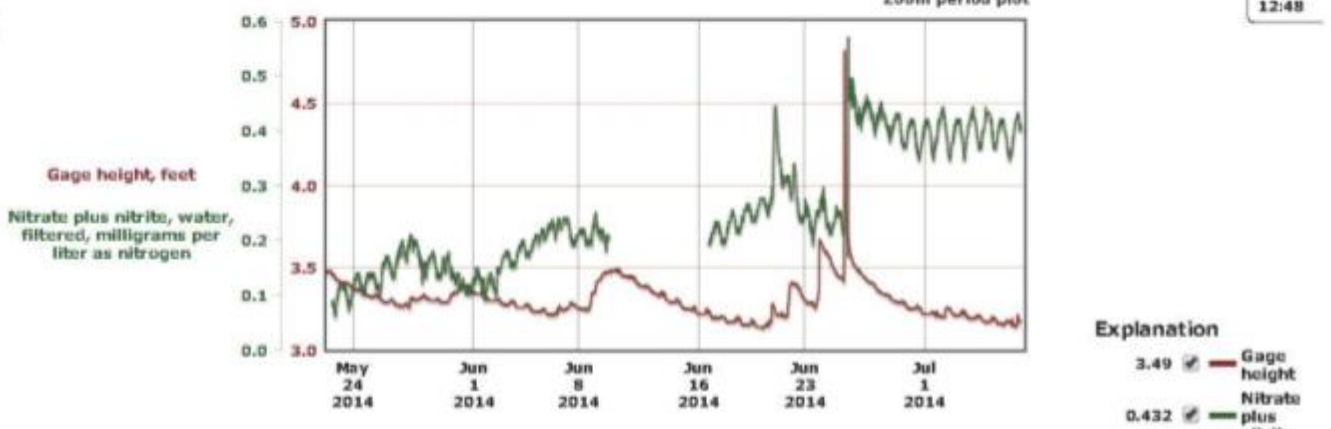
Begin date 2014-05-22

End date 2014-07-07

USGS 07055790 Big Creek near Mt. Judea, AR

Thursda
Jun 26
2014
12:48

Zoom period plot



Period selected plot

Big Creek – monthly averages

	Diss. P		Total P		Nitrate-N		E. Coli		Total Colif.	
	mg / L						MPN / 100 mL			
	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

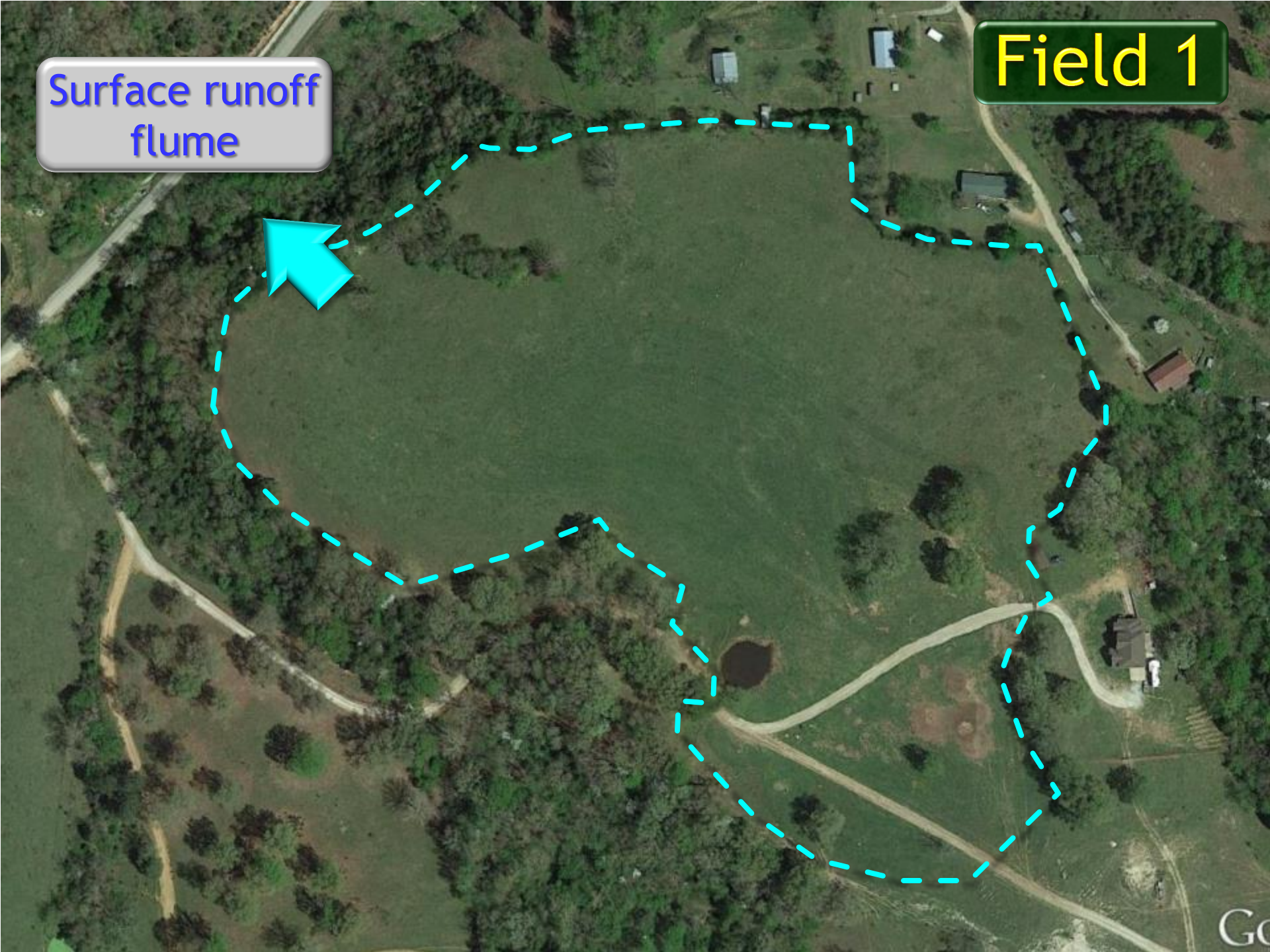
U of A
DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

Ephemeral stream site

Big Creek – monthly averages

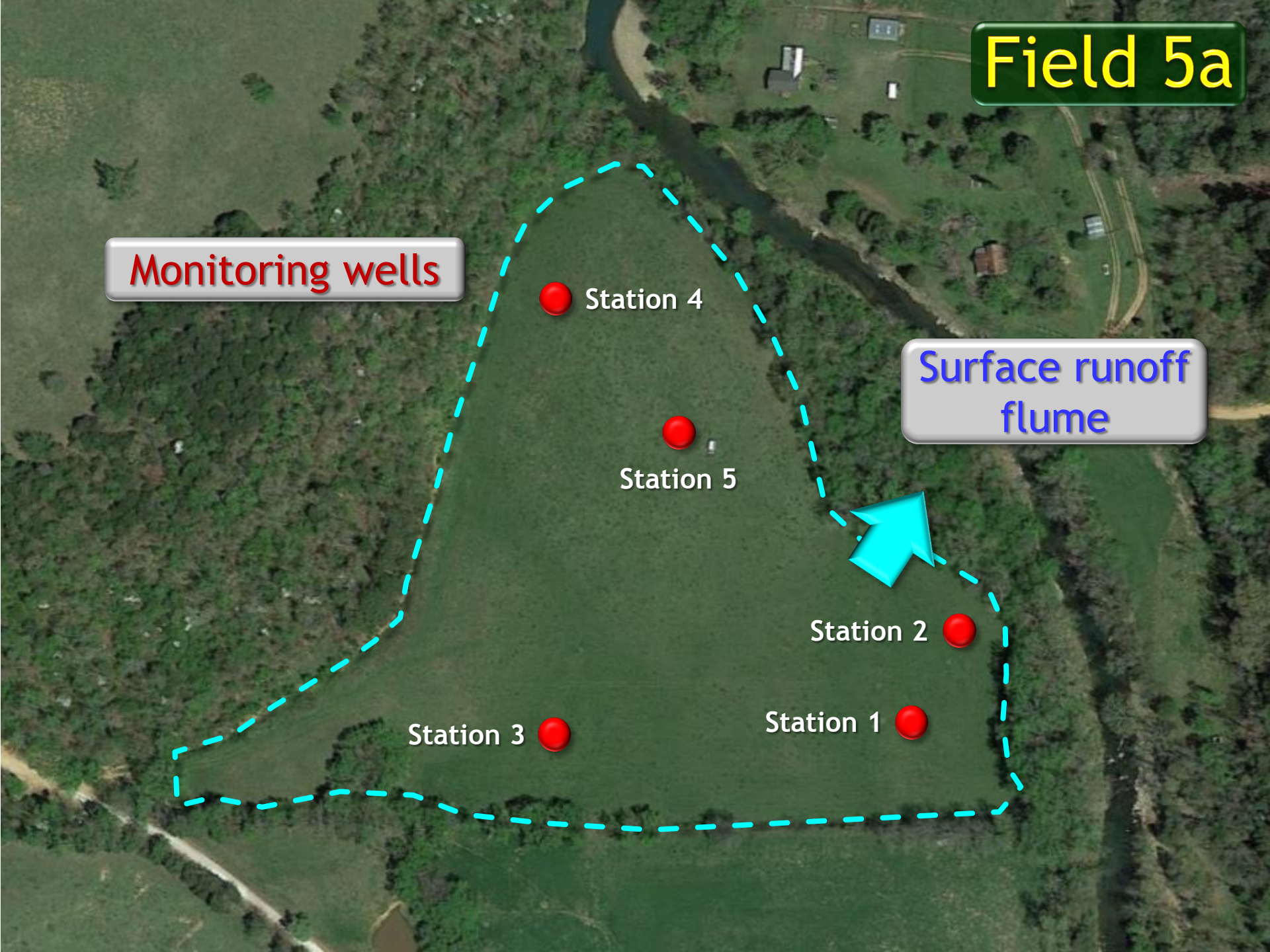
	Spring			Well			Culvert		
	Diss. P	Nitrate	Coliform	Diss. P	Nitrate	Coliform	Diss. P	Nitrate	Coliform
	- - - - mg/L - - - -		MPN/100mL	- - - - mg/L - - - -		MPN/100mL	- - - - mg/L - - - -		MPN/100mL
Sept	0.005	0.25	3730						
Oct	0.006	0.18	11433						
Nov	0.008	1.82	12166						
Dec	0.007	0.71	2203						
Jan	0.008	2.13	1021						
Feb	0.007	0.61	378						
Mar	0.008	0.64	1306	0014	0.50	117	0.007	0.65	365
April	0.012	0.51	1209	0.012	0.50	444	0.010	0.53	1451
May	0.008	0.39	4312	0.010	0.46	86	0.008	0.61	7163


Surface runoff
monitoring
6712
ISCO


Surface runoff flume
Field 1


Field 1
UofA
DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

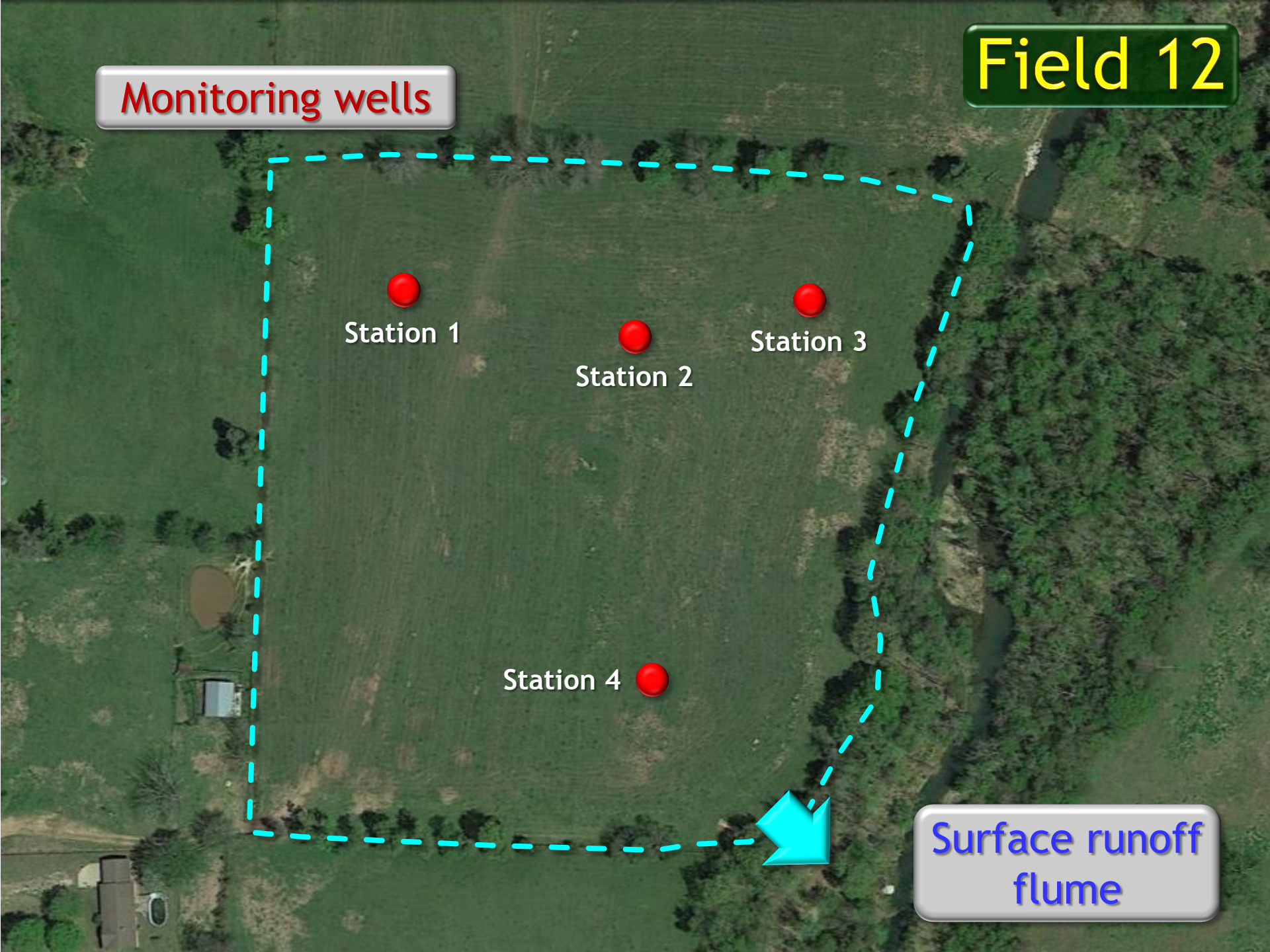

Field 1


Field 5a
Monitoring wells
Station 4
Surface runoff flume
Station 5
Station 2
Station 3
Station 1


Field 5a
U of A
DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System


Field 5a

Field wells


Field 12
Monitoring wells
Station 1
Station 2
Station 3
Station 4
Surface runoff flume


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

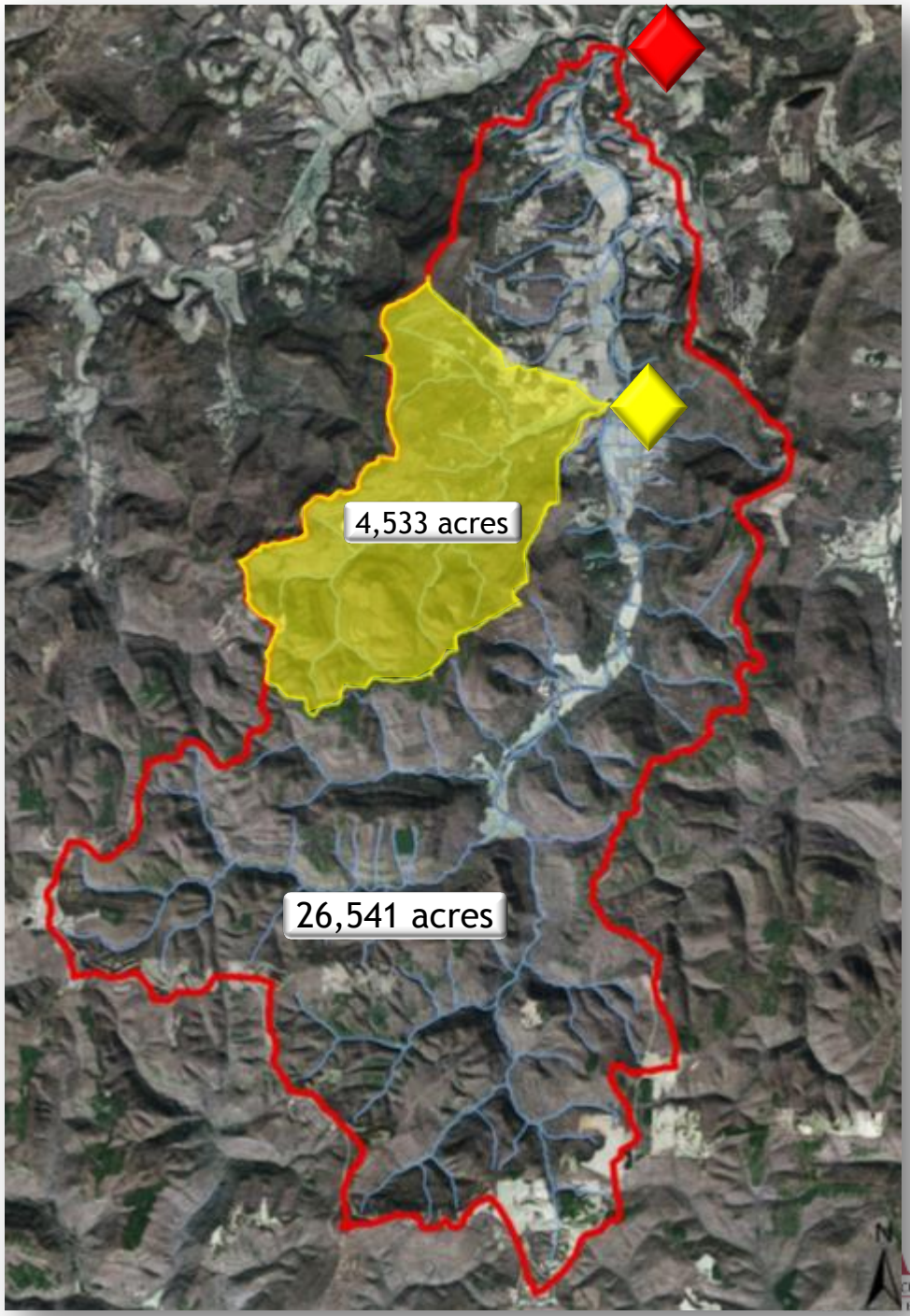

UofA
DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

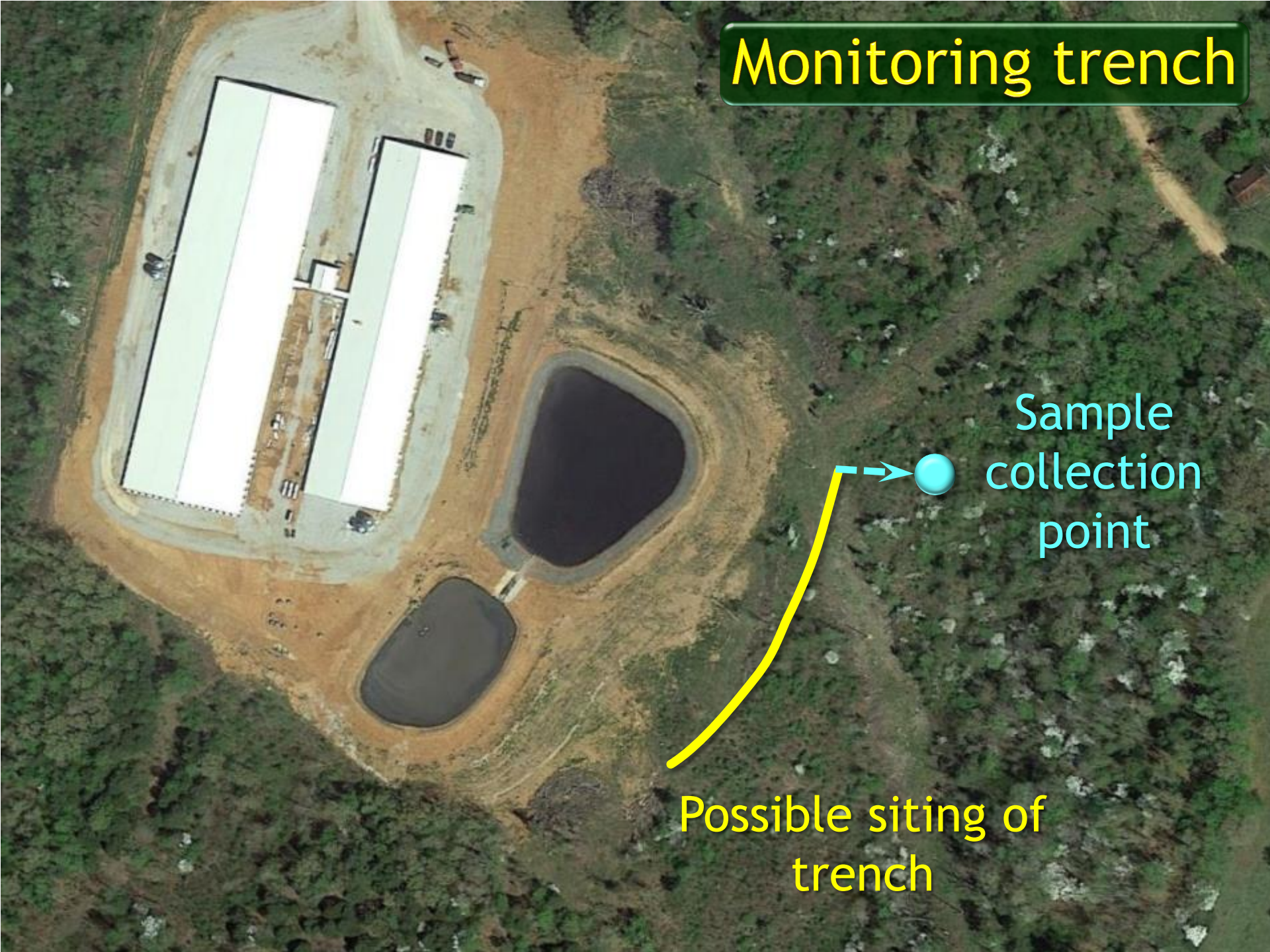
What's next ?

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

Dry Creek Watershed

Big Creek Watershed




Monitoring trench
Sample collection point
Possible siting of trench


Thankyou?
The Boxley Swans