



Big Creek Research & Extension Project : One year on





Project objectives

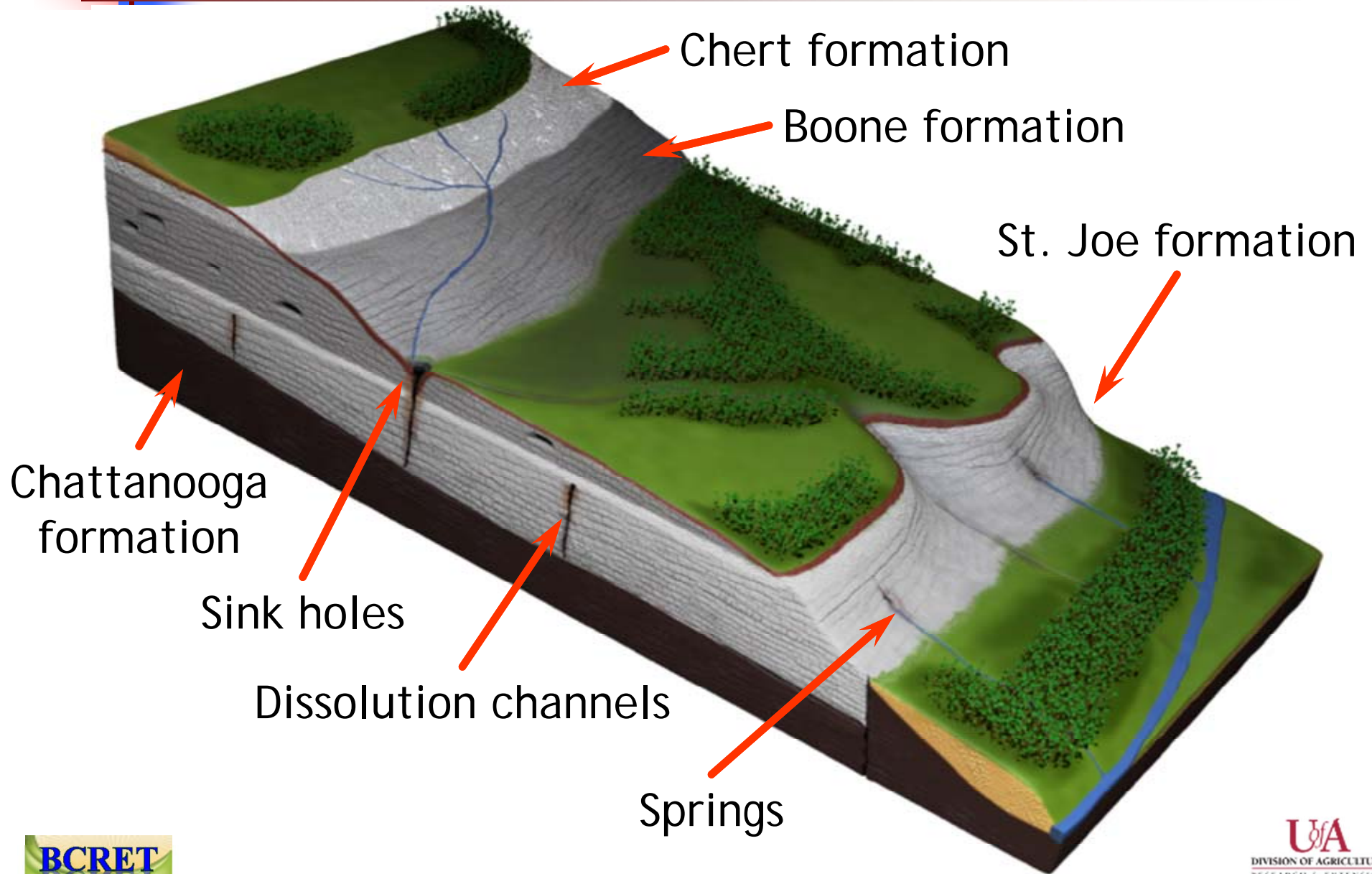
- Monitor fate & transport of nutrients & bacteria from land-applied swine slurry
- Assess impact of farm operations on water quality of springs, streams & ground water on & adjacent to the farm
- Determine sustainability of manure solid-liquid separation that may enhance off-farm export of manure &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



The team

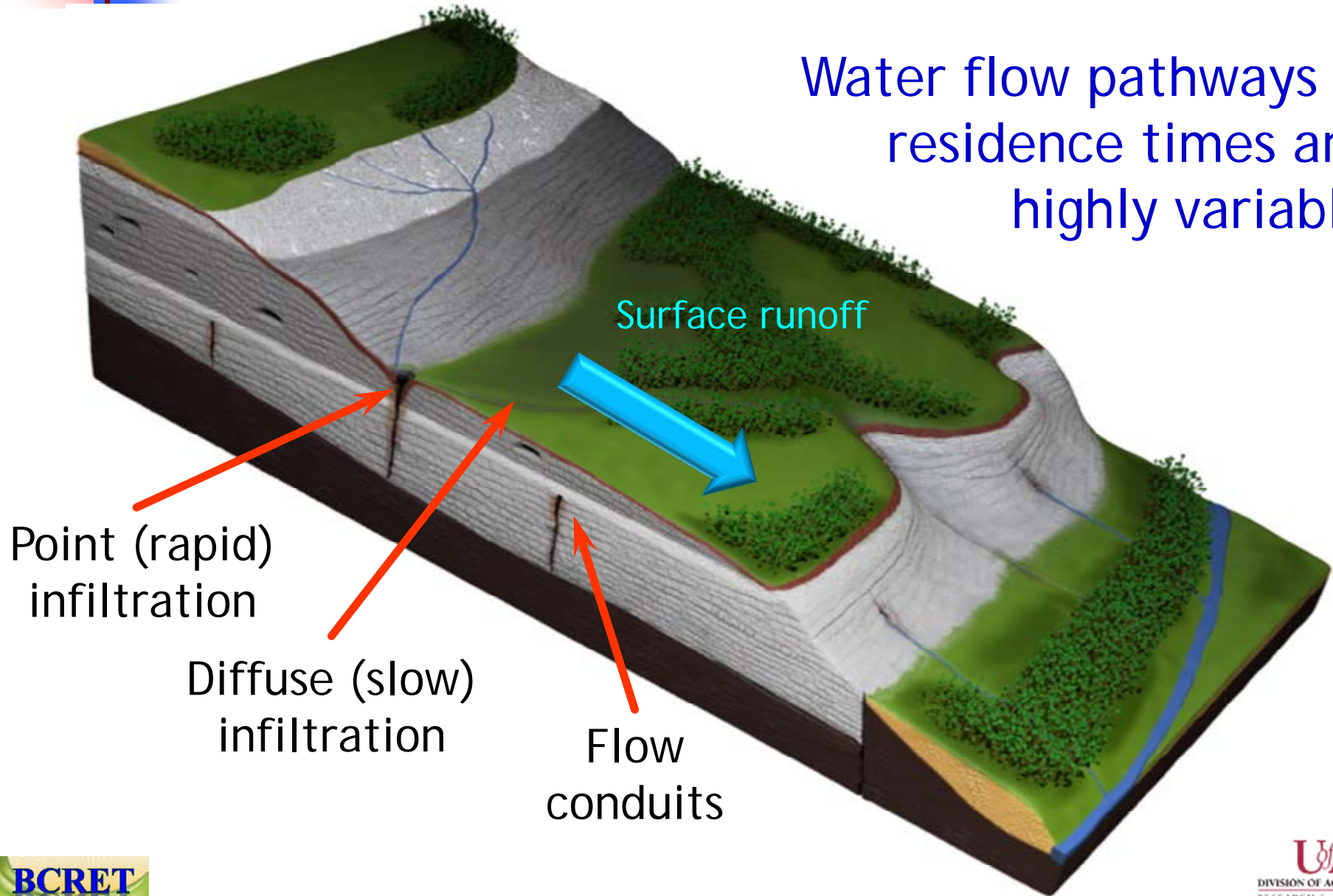
Andrew Sharpley	Soil & water quality, watershed mgt.
Rick Cartwright	Assoc. Dir. Extension for Agric. & Natural Resources
Brian Breaker (USGS)	Hydrology, data collection, & analysis
Kris Brye	Soil physics, pedology, sustainability, nutrient leaching
Mark Cochran	Vice President, U of A System Division of Agriculture
Mike Daniels	Extension water quality & nutrient mgt. specialist
Ed Gbur	Statistical applications to agriculture, expt. design
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

Complex karst systems

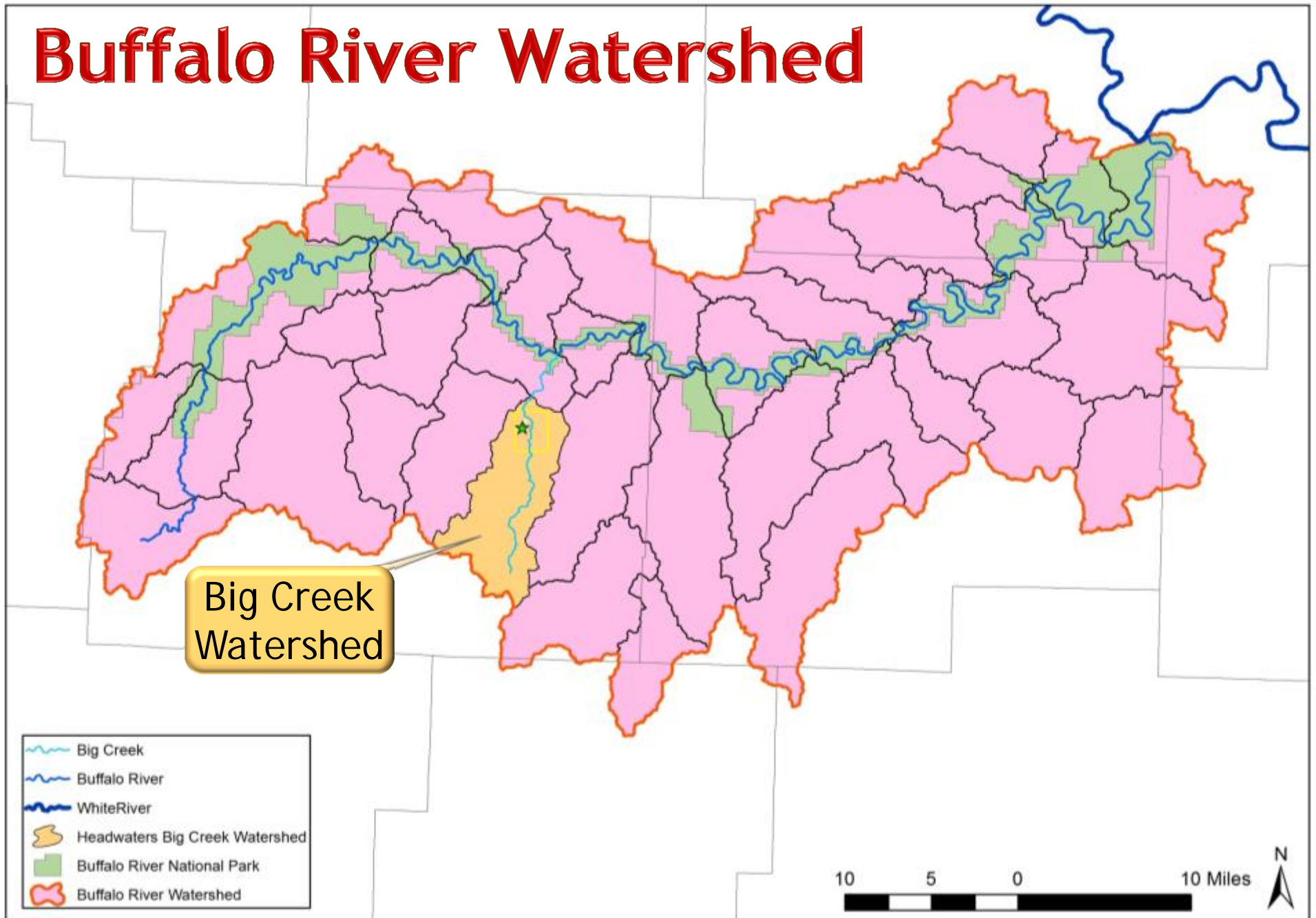


Complex karst systems

Water flow pathways & residence times are highly variable



Buffalo River Watershed

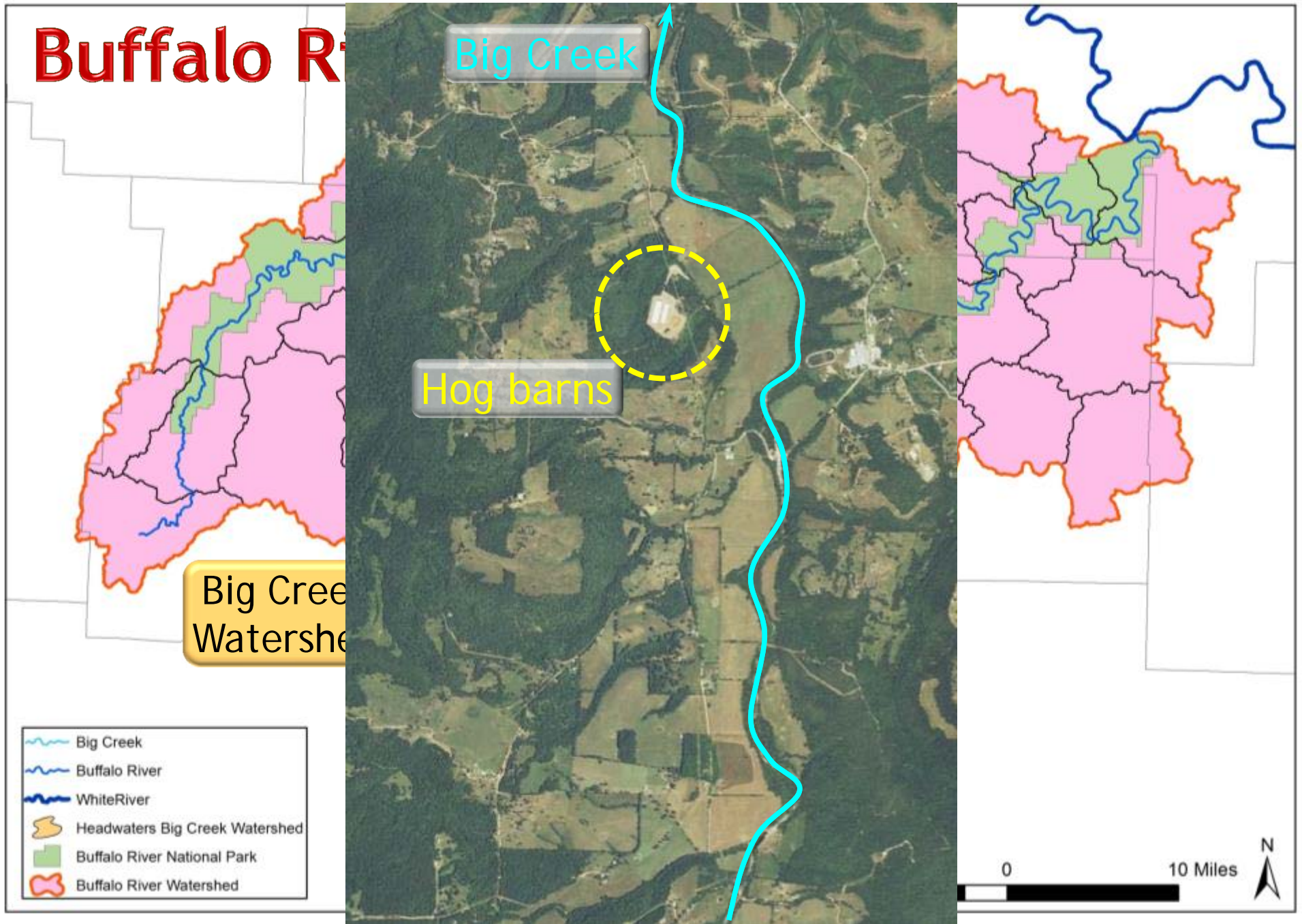


Big Creek Watershed

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



Buffalo River



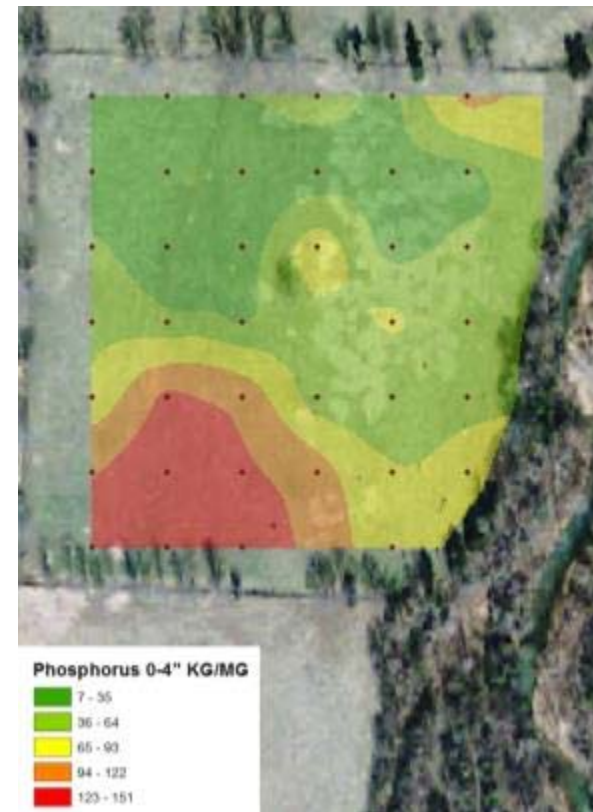
So far, we have

- Conducted
 - LIDAR topographic survey



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 - Grid soil sampling (0.25-acre grid)



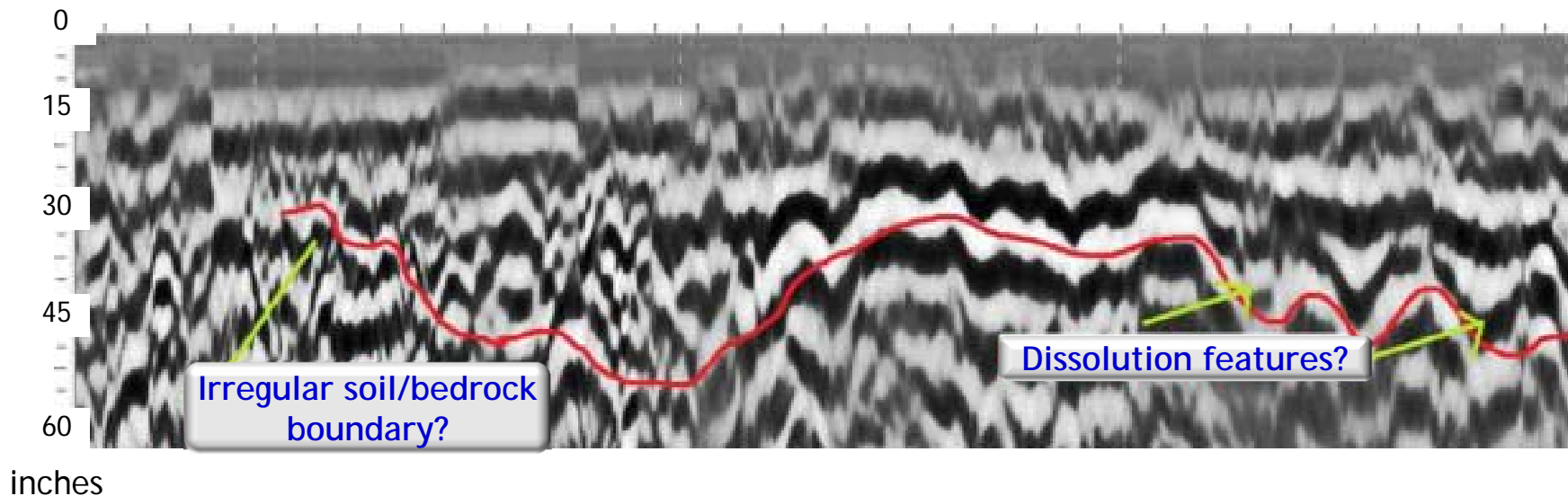
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So far, we have

- 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



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



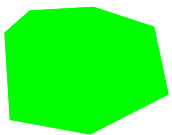
Spring



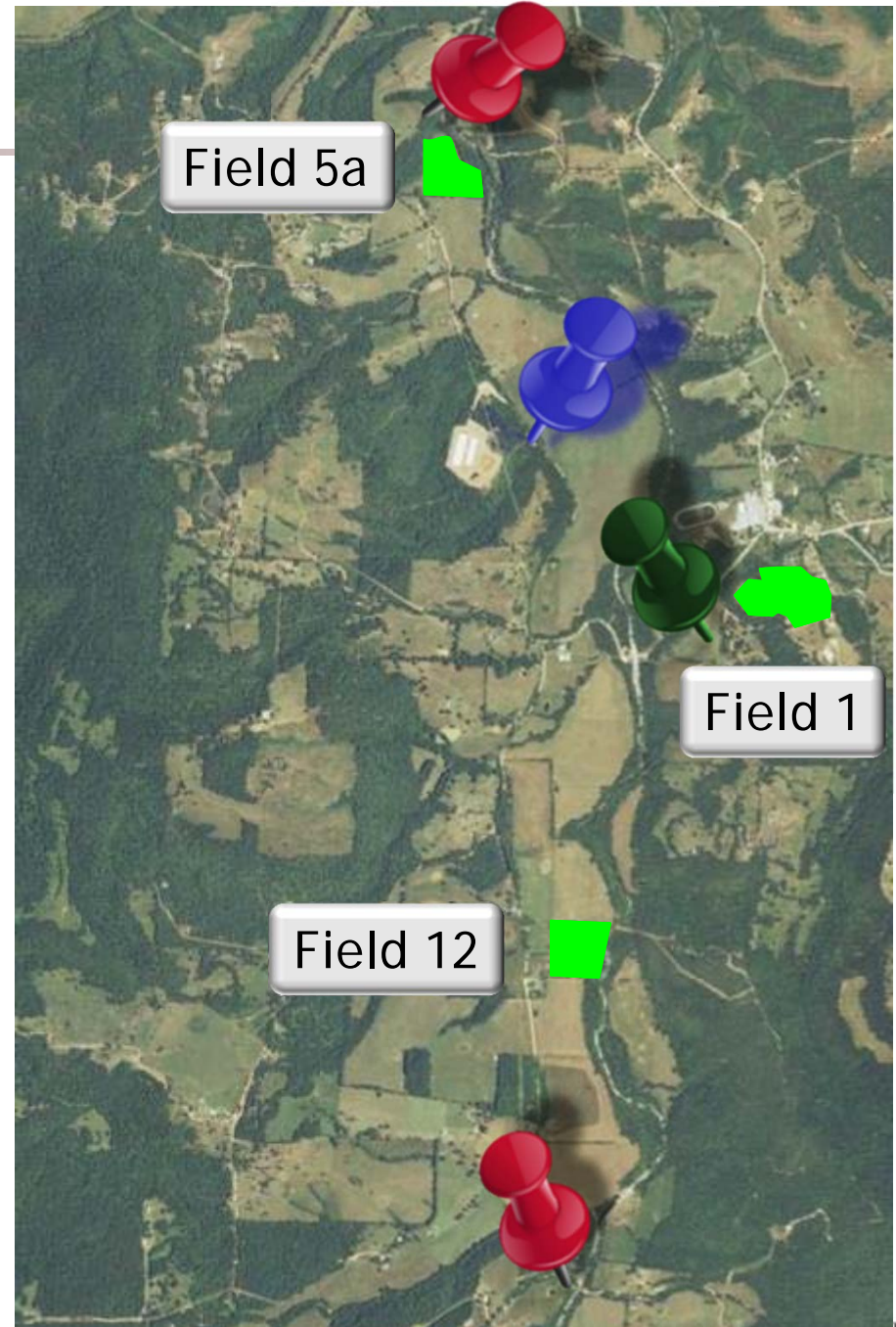
Ephemeral stream



Big Creek



Field runoff sites





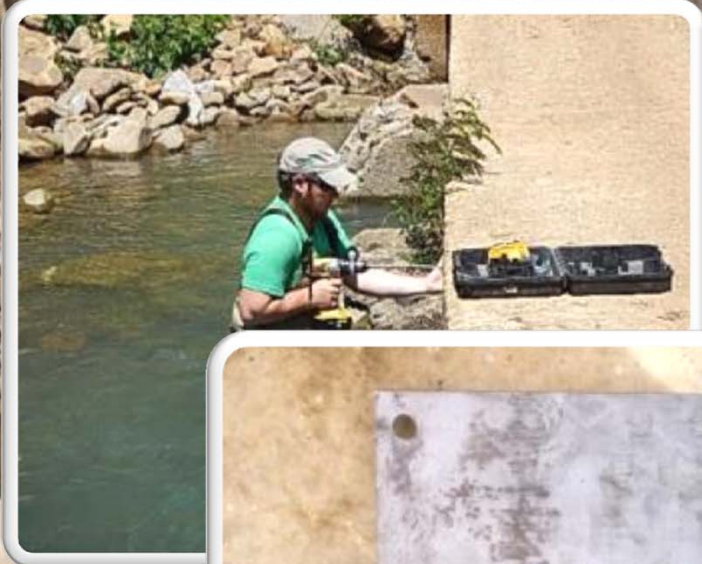
Spring site



Spring box
captures & directs
water to cattle
trough

Upstream site





Downstream site



**USGS gauging
site
downstream
of farm**

**Real time
Flow
Nitrate
Temperature
Rainfall**



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

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

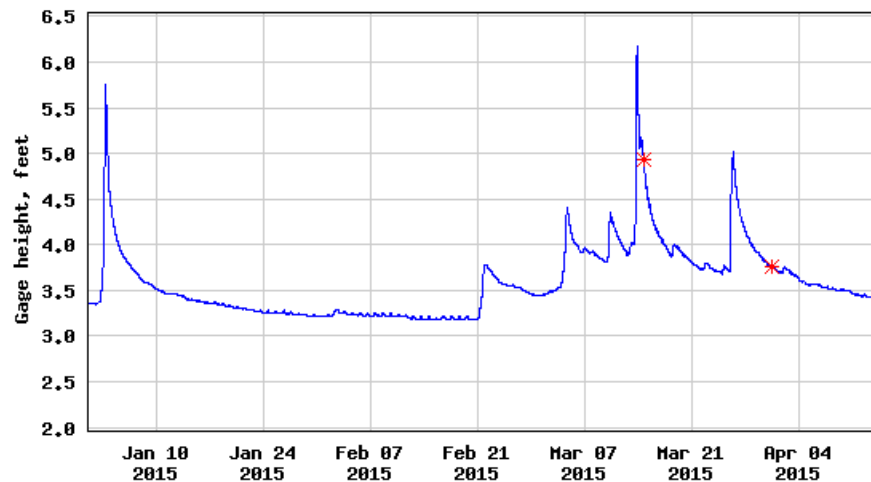
2014-04-22 2014-07-07
2014-04-21 2014-07-07
2014-04-21 2014-07-07
2014-05-22 2014-07-07

Output format

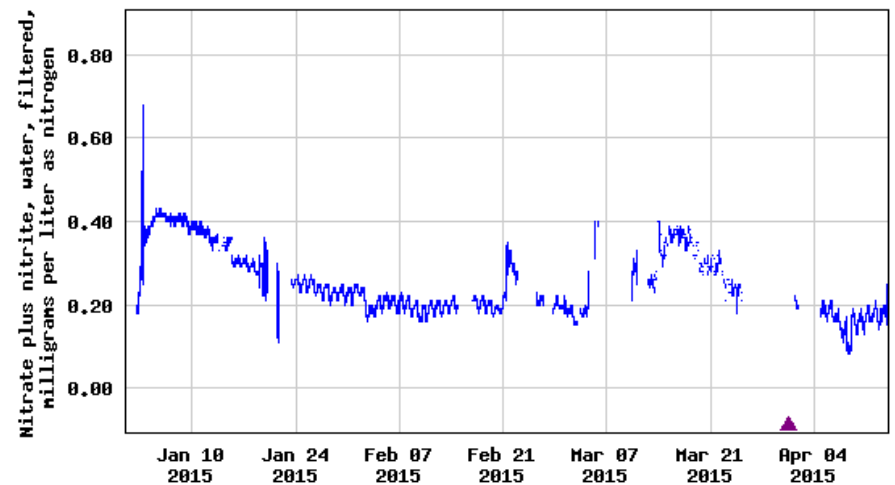
- Graph
- Graph w/ stats
- Graph w/o stats
- Graph w/ (up to 3) parms
- Table
- Tab-separated



USGS 07055790 Big Creek near Mt. Judea, AR



USGS 07055790 Big Creek near Mt. Judea, AR



Ephemeral stream site



Ephemeral stream site

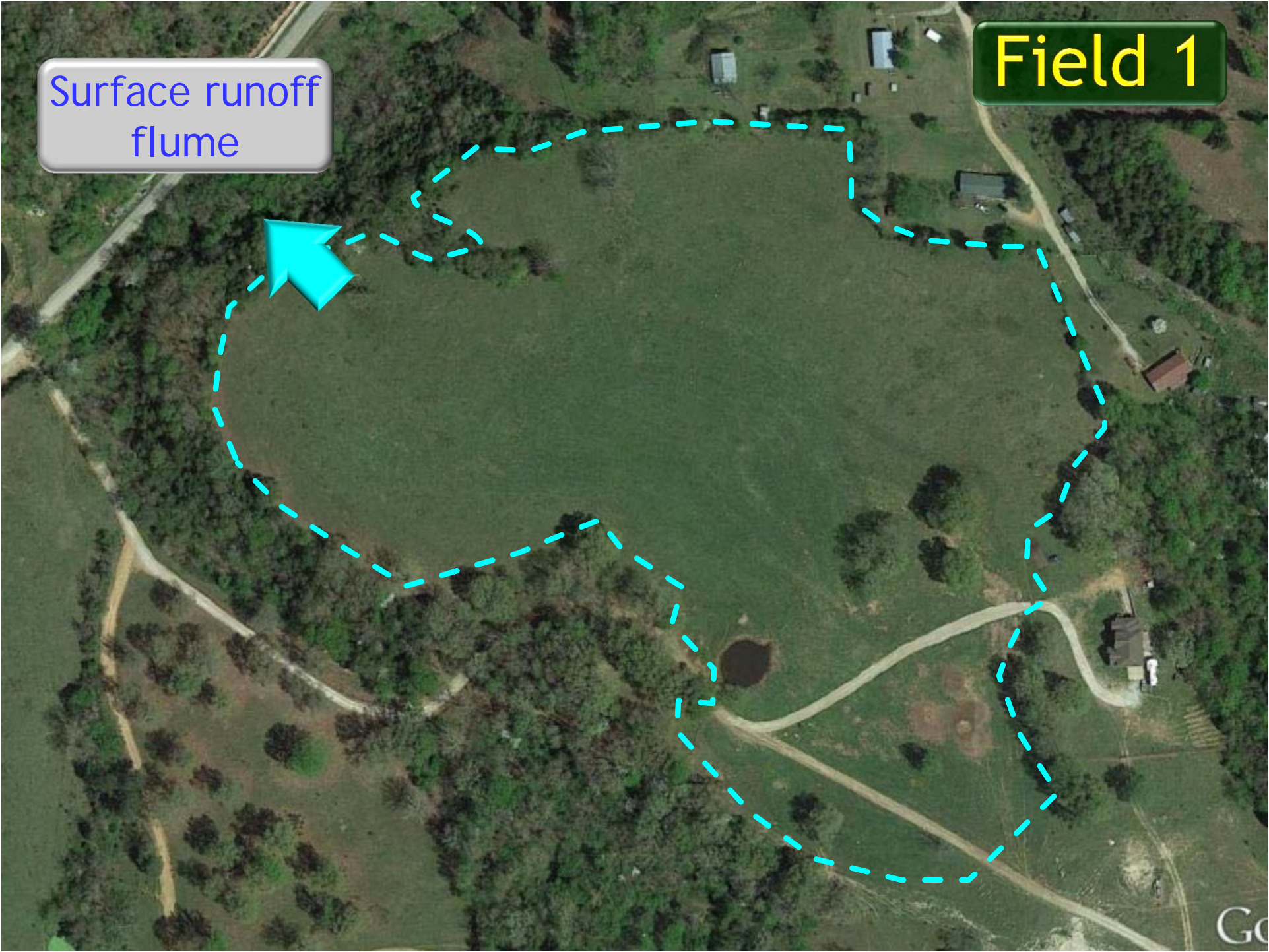


IS Grab sampler



Field 1

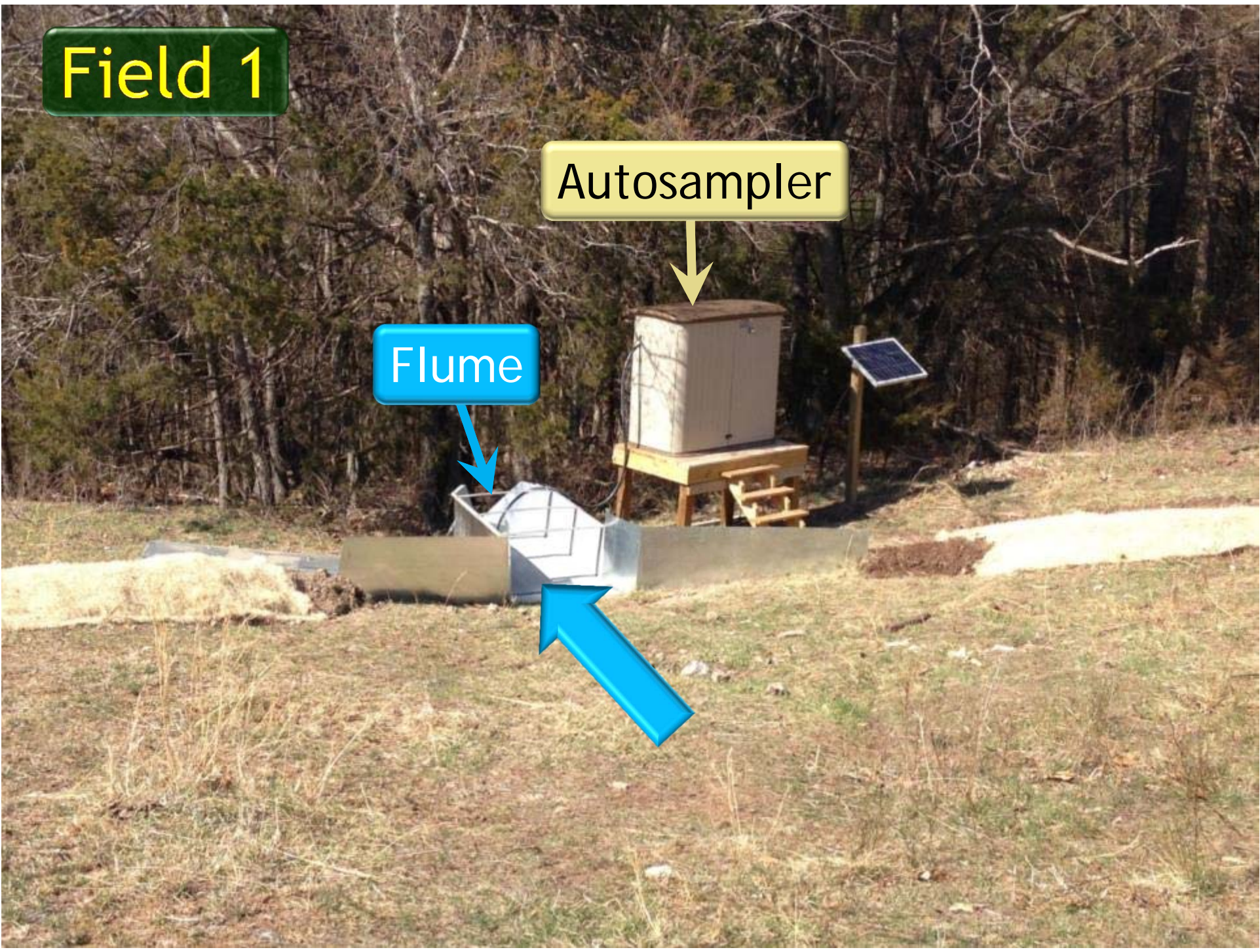
Surface runoff flume



Field 1

Autosampler

Flume



Field 5a

Monitoring wells

Station 4

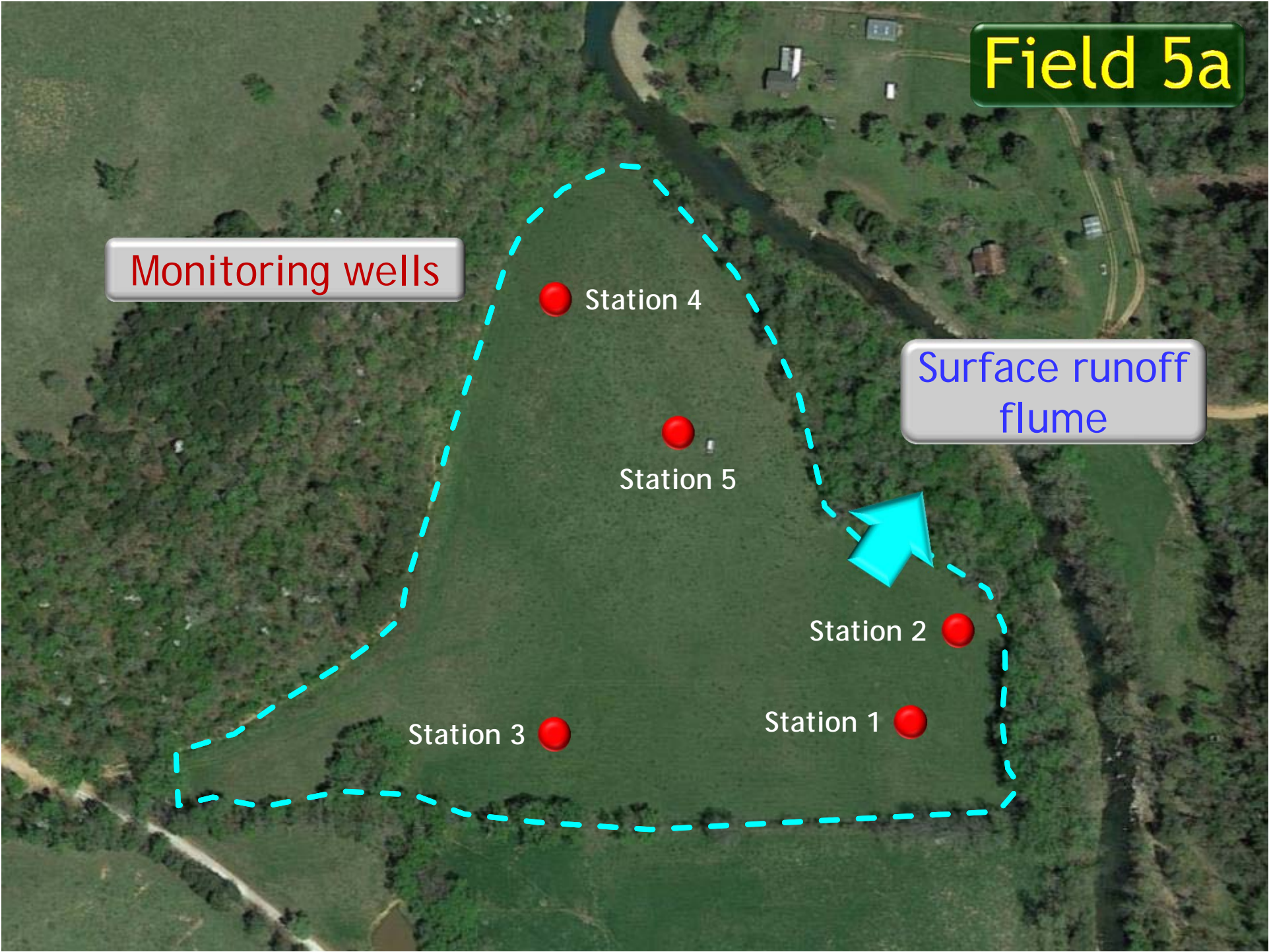
Station 5

Surface runoff flume

Station 2

Station 3

Station 1



Field 5a



Field 5a



Field wells



Field wells



Field 12

Monitoring wells

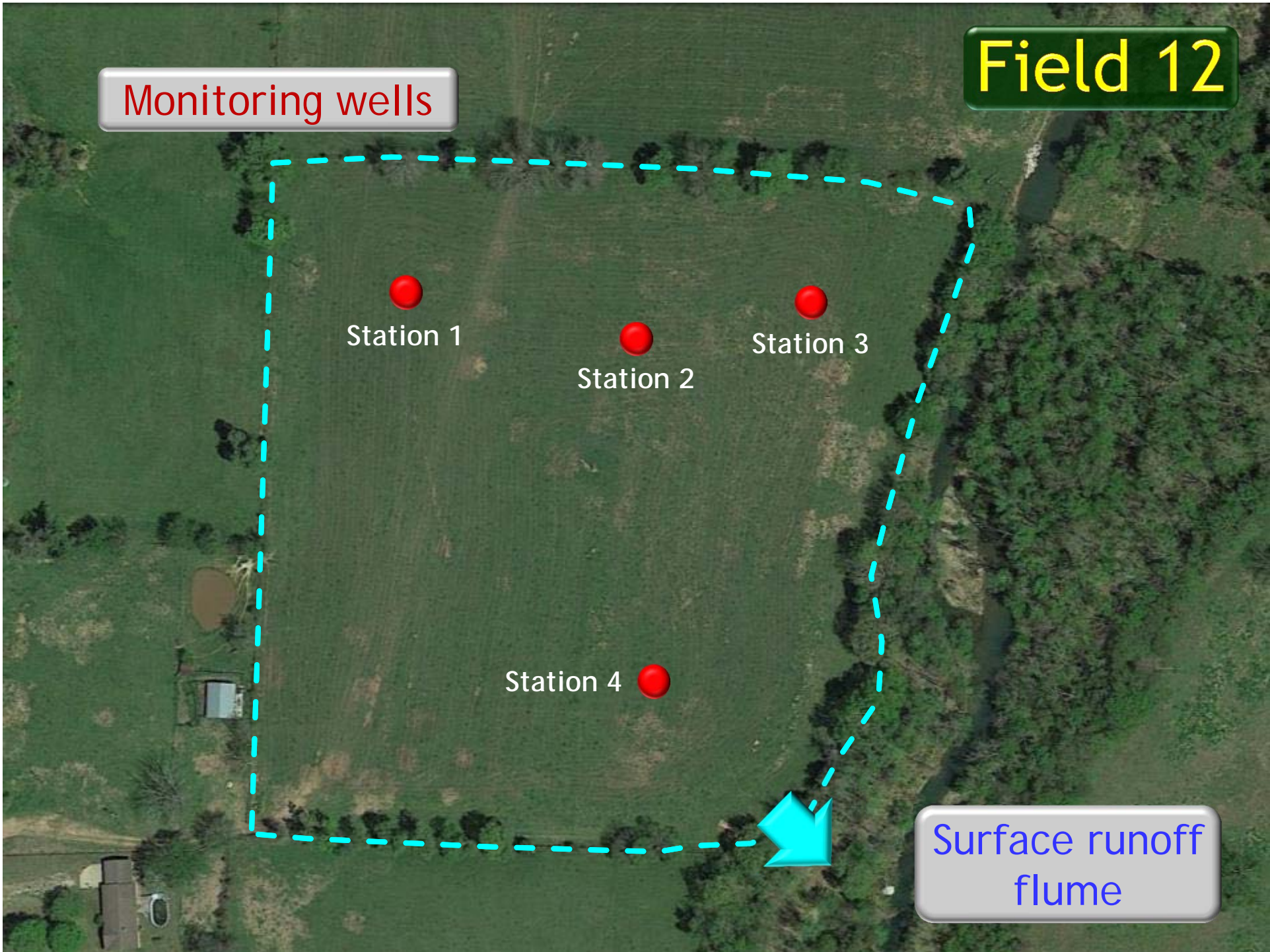
Station 1

Station 2

Station 3

Station 4

Surface runoff flume

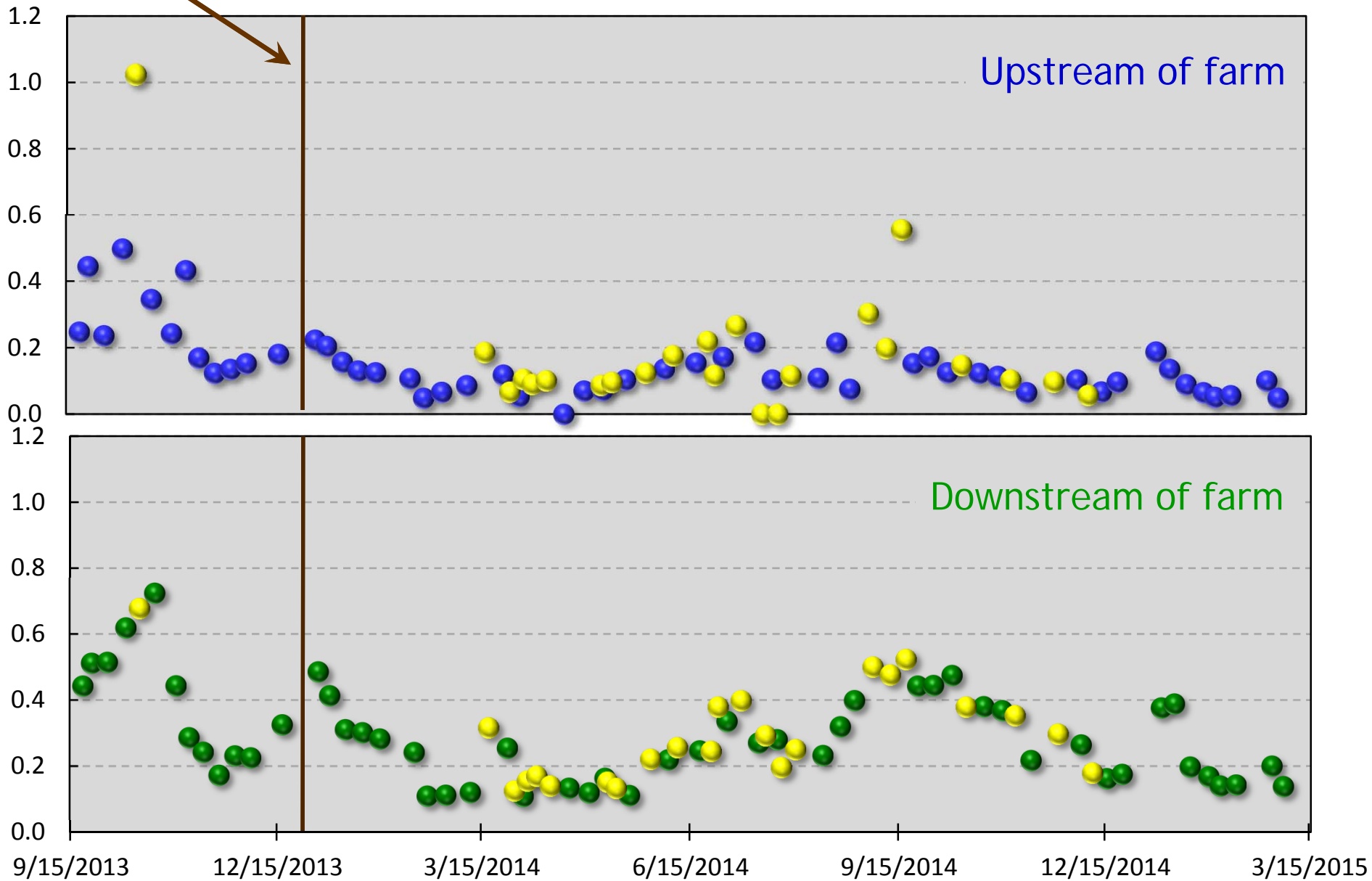


A photograph of a small stream flowing over a series of dark, mossy rocks. The water is clear and creates white foam as it cascades. The stream is surrounded by lush green vegetation, including tall grasses on the left and dense, leafy branches in the foreground and right. The overall scene is bright and natural.

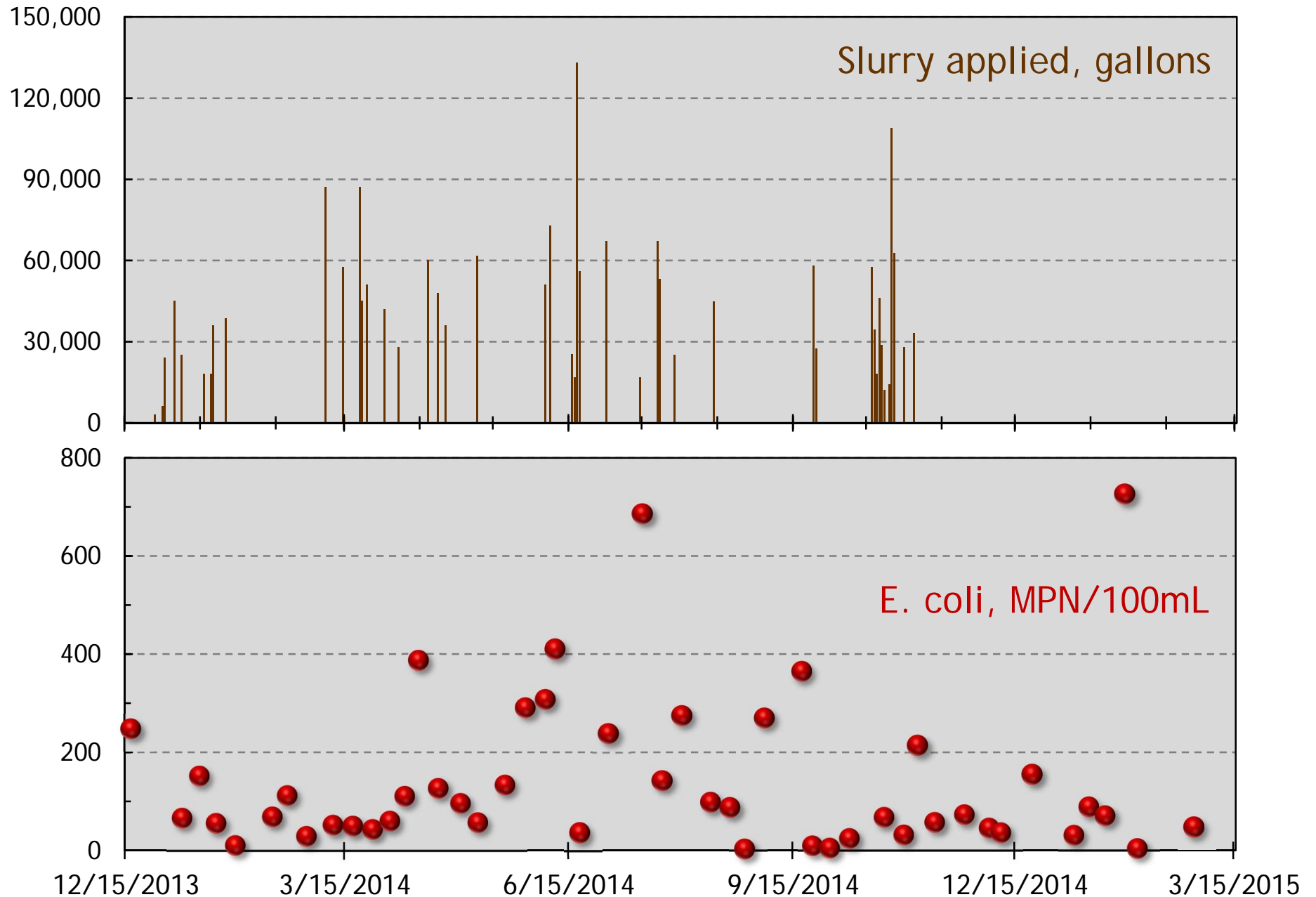
**So, what have we
found so far?**

Slurry applications start

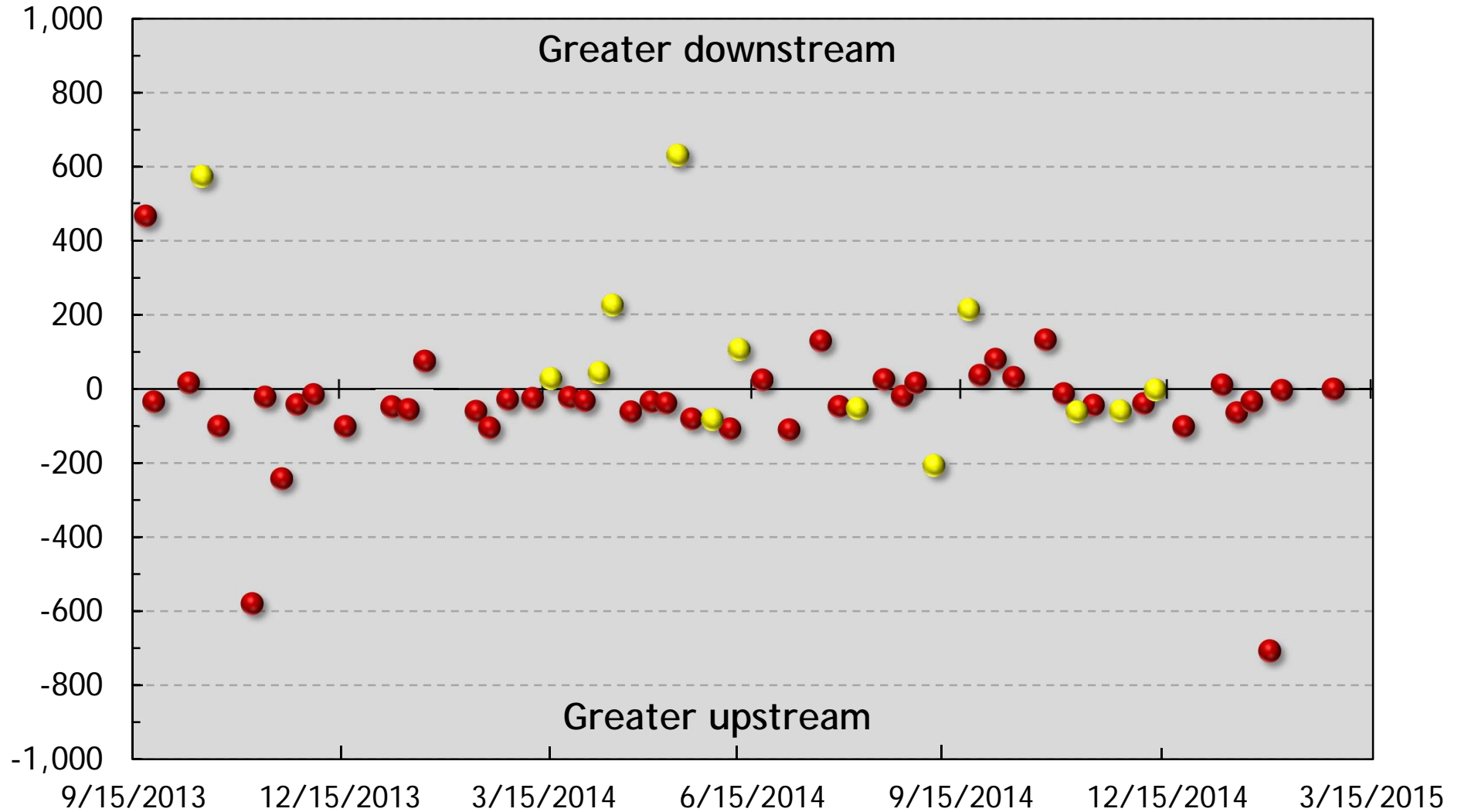
Nitrate-N, mg/L



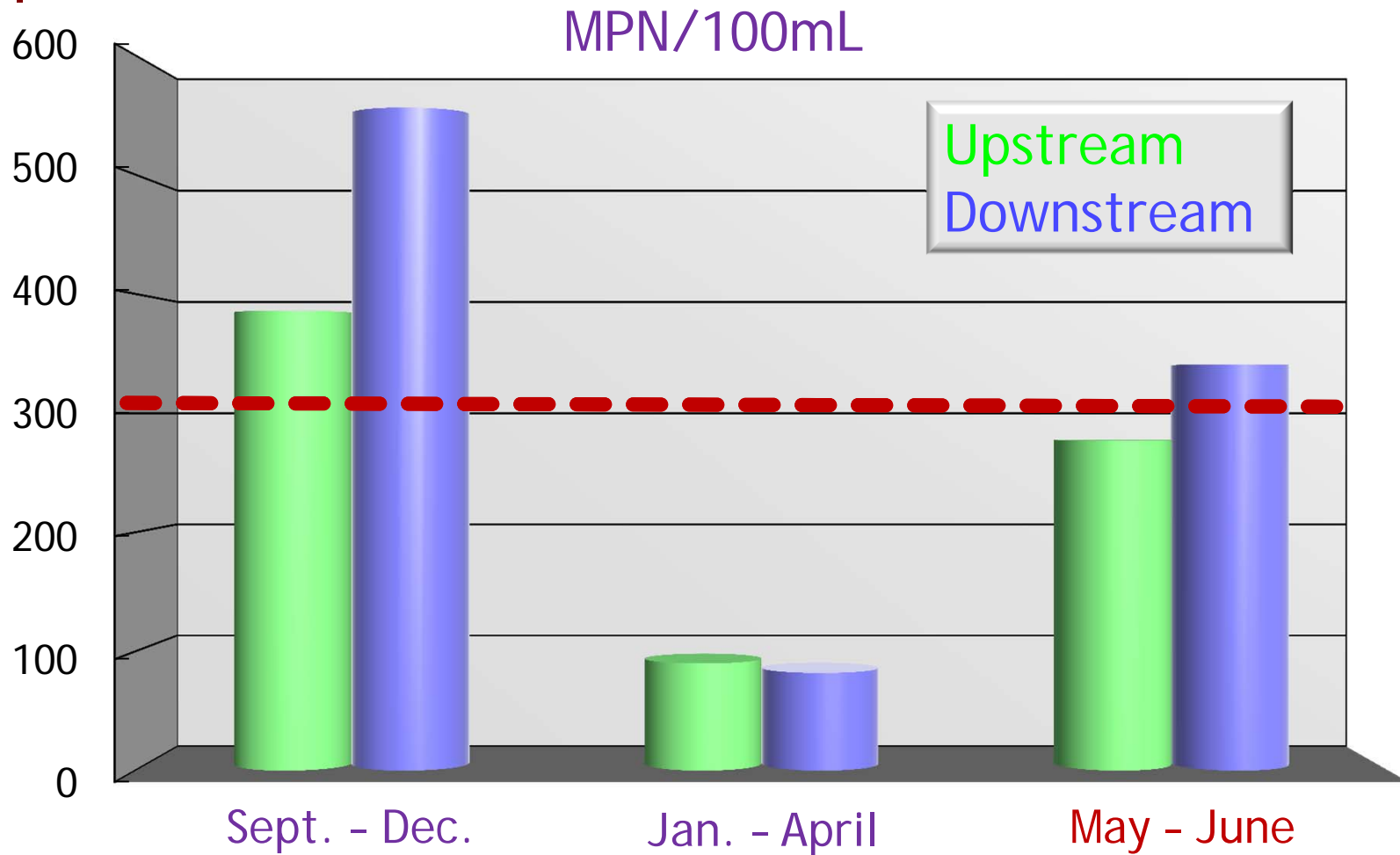
Slurry applications & downstream trends



E. coli (MPN/100mL) difference between down & upstream sites

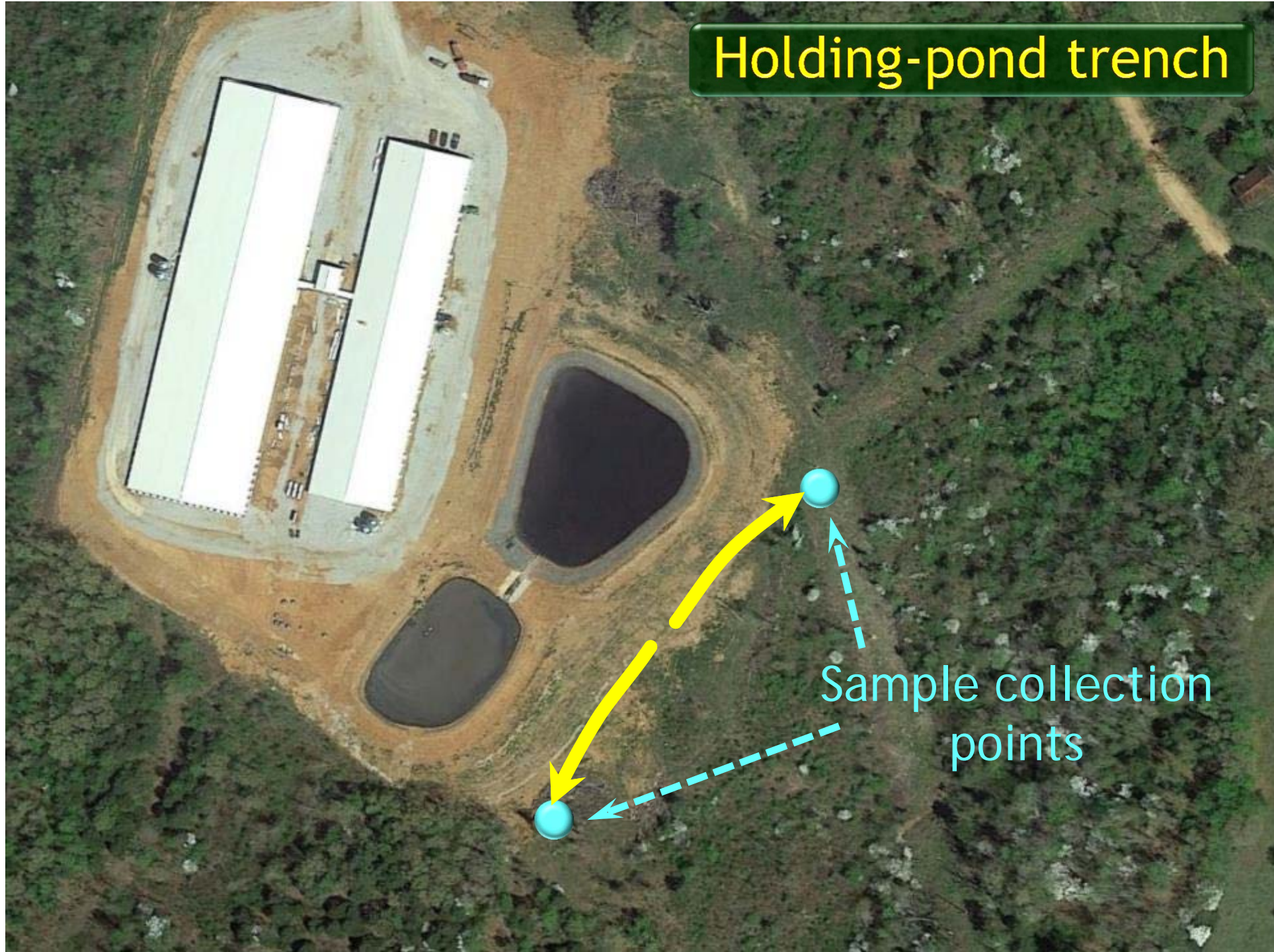


E. Coli counts in Big Creek



Primary contact season, May 1 to Sept. 30 = 298
Secondary contact season, Oct. 1 to April 30 = 1490

Holding-pond trench



Sample collection points



Holding
pond

Trench

Trench construction







What next?

- Karst features exist ~15 - 30' below land surface
- Natural nutrient & bacteria variability in Big Creek
- No consistent trends in Big Creek water quality
- Too early to say if there is or is not an impact

Thank you

