DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

NEWS

Aug. 25, 2014

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Fast Facts:

- First year of study reveals no apparent effects of hog farm on Big Creek
- Monitoring provides regular data on water quality in creek and adjoining fields
- The study is aimed at protecting the Buffalo River watershed

Big Creek scientists take innovative approach to study

FAYETTEVILLE, Ark. — The complexities of water movement around a Newton County hog farm in the Big Creek watershed have prompted researchers to use an innovative approach to discover how nutrients move above and below ground.

A team of research and extension scientists from the University of Arkansas System Division of Agriculture has been collecting data and monitoring the potential impact on water quality in Big Creek for nearly a year as part of a multi-layered, long-term study.

The project is unique in many ways, said Andrew Sharpley, professor and leader of the Big Creek Research and Extension Team. “The methods used to collect data for the study were designed to address the concerns that people have about this farm,” he said.

"One aspect would be that the intensity of the sampling is more detailed than what we have anywhere else in the state," Sharpley said. Monitors have been placed above and below the farm and in the stream to track changes in water flow and detect any entry of nutrients.

Another facet would be the collaboration between the Division of Agriculture, the U.S. Geological Survey and the Natural Resources Conservation Service, Sharpley said. "We've combined forces to monitor different aspects of the farm operation and its potential impact," he said. "By combining forces, you can get experts in those specialized fields – allowing the researchers to do what they do best in the areas in which they are nationally recognized."

Findings so far

"Right now, we have a lot of data and a lot of variability that is normal for these kinds of areas," Sharpley said. "We haven't seen any consistent changes or anything that indicates the farm is having an effect on water quality in Big Creek thus far."

Layered sites

In addition to monitoring sites on Big Creek above and below the farm, water samples taken upstream in areas not included in the hog farm permit reflect the impacts of other land use and natural, forested areas. These are compared with samples collected below the farm so that any impacts on water quality between the two sites can be determined.

"We were able to work with USGS experts who installed sophisticated sensors that continuously and accurately measure flow and nitrate levels in Big Creek, just below the farm," Sharpley said. That data is posted in real time on the USGS website, he said.

The Big Creek data can be seen at:
http://nwis.waterdata.usgs.gov/ar/nwis/uv/?site_no=07055790&agency_cd=USGS

Samples are collected from each monitoring site weekly and analyzed for nutrients, sediment and bacteria, Sharpley said. In addition, the monitoring equipment automatically collects samples during periods of storm flow so that water quality can be measured during higher flows when runoff water can move quickly from the fields into the creek.

Monitoring methods

The team also monitors water flow and quality from three fields on the farm. Two are permitted to receive manure fertilizer and the third is used as a control, Sharpley said. Water samples are collected at these sites to detect any losses of nutrients, sediment, and bacteria from manure applications. Like the monitors in the creek, these also automatically collect samples during storm flows.

Because two of the fields near Big Creek are flat, the team has placed monitors in the soil to monitor fluctuations in the water table and the movement of nutrients applied at the surface down through the soil.

"Hydrologically, we know that excess precipitation in these fields will either run off or percolate downward through the soil," Sharpley said. "We placed instruments in these fields to monitor both runoff and percolation into the soil."

"This way, we can also determine if there's a buildup of nutrients in the soil before they reach the creek," he added.

Two holding ponds on the farm used to collect and hold manure from the hog barns are also being monitored to detect any leakage. Sharpley said the team laid pipe trenches downslope from each pond to collect water samples. Analysis of the water can determine whether liquid might be leaking from the ponds.

The team also took soil samples from a grid pattern laid out in each field and mapped them out. "We found that some areas have more nutrients than others, " Sharpley said. These areas are generally located where farmers feed their cattle, he said.

The team plans to do a more detailed study of the structure of the fields adjacent to Big Creek, on which manure is applied, to see how water moves unseen below the surface, Sharpley said. They have already used ground-penetrating radar to get a look at what's under the surface, but the results were not sufficiently detailed.

Sharpley said that the Big Creek Research and Extension Team has installed extensive instrumentation in Big Creek and fields that will receive manure with equipment that automatically and continuously collect data, so that they will be able to see any changes in the creek.

"We will also be able to detect any increases in the risk of added nutrients getting from the fields to Big Creek over a longer period of time," he said.

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