

Kentucky Agriculture Science and Monitoring Committee

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The Kentucky Agriculture Science and Monitoring Committee (KASMC) was created in 2009 and now includes over 20 members who represent a wide range of state, federal, and local agencies, academic institutions, and the agricultural industry. The objective of the Committee is to coordinate agricultural science and monitoring efforts in Kentucky in order to promote sustainable agriculture and a healthy environment. With this goal in mind, KASMC will identify focal points for agricultural science and monitoring activities that effectively target and address the most critical issues. KASMC enables cooperative science and efficient collaboration among researchers from all applicable entities within Kentucky and the region.

Currently, KASMC is focused on the promotion of agricultural research, the collection of defensible surface water and groundwater quality and quantity data for monitoring purposes, the continuation of outreach activities, and the fostering of collaboration.

There are, presently, 14 long-term surface water monitoring stations in Kentucky that have been identified as key monitoring stations to quantify water quality trends and loading of nutrients to the Mississippi River. Many of these surface water stations have some combination of adequate data and (or) funding (through multiple agencies and KASMC partners), while others are in need of resources to effectively provide defensible data.

Long-term groundwater observation data are decades out-of-date or otherwise limited or lacking in many parts of Kentucky, and presently only one long-term groundwater observation well is actively being monitored. To make statistically significant and defensible decisions regarding groundwater availability and groundwater quality, the network of long-term groundwater observation wells needs to be expanded to include all agricultural areas within Kentucky. Outreach activities and collaboration are on-going and KASMC members have had great success in

collectively promoting the mission and working together.

In many cases, 10 years of monitoring data are the minimum required to make significant statements regarding critical determinations such as flow conditions, trends, and constituent loading (Searcy, 1959; specific requirements are described at length in Helsel and Hirsch, 2002); this period of record is a longer duration than many targeted research projects. Placement of these monitoring stations is therefore critical and must be optimized to minimize waste of both time and resources. Once these stations are established, it is expected that they operate in place for years if not decades.

These long-term monitoring records are critical to determining BMP effectiveness, developing and supporting nutrient management strategies, evaluating drought planning and mitigation, and identifying other issues that relate to Kentucky agriculture. Long-term monitoring sites are, generally, more difficult to maintain as long-term funding for a stable network is not as common as short-term grants for targeted research.

Monitoring points are typically "integration points" and quantify contributions from all upstream contributing areas. Given this, monitoring must be coordinated at multiple points along the stream system and the type of monitoring required at each point will vary according to significance. For

example, some stations on the main-stem of the Ohio River do not have, and likely do not require, real-time data collection as the upstream contributing area is vast and, statistically, there is little to be gained from this increased resolution at many stations. For this reason the USGS established a real-time monitoring station on the Ohio River near the confluence with the Mississippi River (Olmsted Lock and Dam) and samples on a scheduled basis at other, upstream locations such as the Ohio River at Cannelton, Indiana (located between major tributaries).

However, real-time or higher resolution data can more readily identify fate and transport mechanisms at smaller scales such as the confluence of the Green River and the Ohio River.

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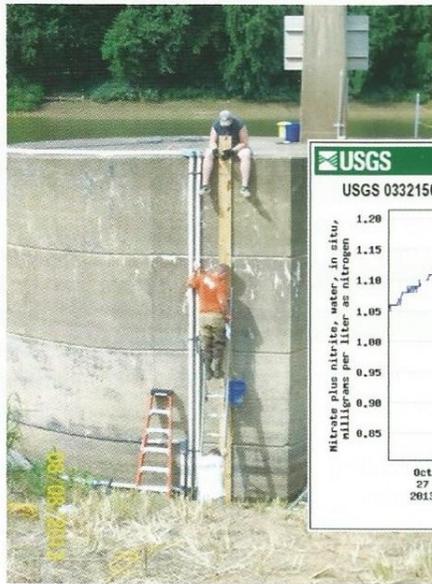
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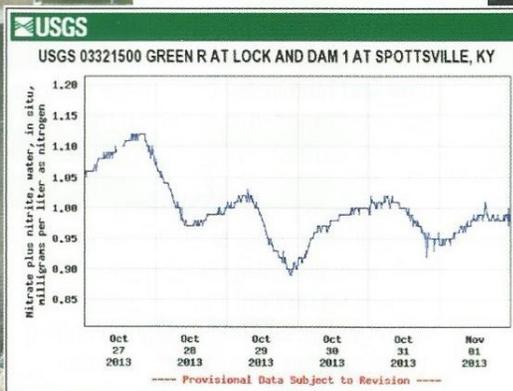
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A long-term goal of KASMC is to develop studies to better quantify agriculture-related processes such as stormwater runoff; fate and transport of nutrients, pesticides, and pathogens; and BMP effectiveness. Ideally these studies would occur at, or near, production agriculture facilities to enable “real-world” applications, data sharing, and cost effectiveness. KASMC members from the Kentucky Governor’s Office of Agricultural Policy and USGS partnered to construct and operate a critical monitoring station at the mouth of the Green River in western Kentucky to monitor nutrients from this basin where land use is predominately agricultural.

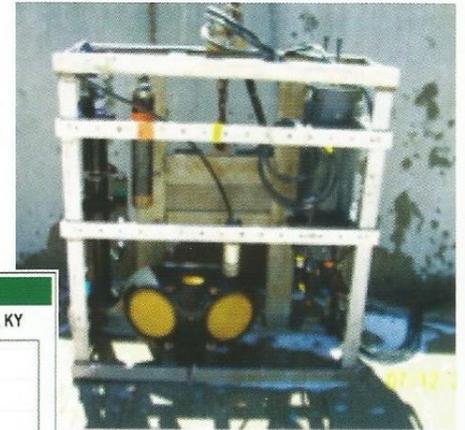


Monitoring station located at the mouth of the Green River at Spottsville, KY and example of real-time nitrate data. This monitoring station was constructed and will be operated through 2015 under a KASMC-based partnership between the Kentucky Governor’s Office of Agricultural Policy (GOAP) and US Geological Survey (USGS).

laboratory “wet-chemistry” analysis inside the sensor; the sample is collected, reagents are mixed with the sample by robotic mixing coils, and the solution is analyzed in a manner very similar to what occurs in a standard laboratory - except that this all occurs underwater in the middle of the river. The unit also carries on-board check standards - so critical QA/QC will be



very helpful in designing and installing a custom mounting system - this alone was quite an investment as you can see in the photo below. This protective mounting system or “cage” rides on a track mounted on the lock at a strategically



placed location; this location is critical because whenever you measure water quality at a point in a larger stream or river, you have to ensure proper mixing has occurred (in some locations, water quality can vary significantly as you move across the river - you have to ensure your selected location is thoroughly mixed by periodic manual measurements across the channel). In the photo, the large yellow disks are the acoustic sensors for determining how fast the water is moving (velocity) and the tubes mounted throughout the cage are the various water-quality sensors.

The USGS has recently installed and will begin to operate a phosphate sensor at Olmsted Lock and Dam (Olmsted Dam is located on the Ohio River just before it reaches the Mississippi River). With this new sensor, this will be one of the few places in the country with this level of accurate information regarding nutrients!

This phosphate sensor is very unique in that it actually performs a standard

performed at every step. For more information on the sensor itself, go to the manufacturer’s page at:

<http://sea-birdcoastal.com/cycle-po4>

The phosphate sensor has been ordered through the USGS Hydrologic Instrumentation Facility (HIF) in Vicksburg, Mississippi and is currently being manufactured, so the USGS should have it installed sometime this summer. Note: this equipment (sensor, mounting system, telemetry, etc.) is all custom-made, so it takes time to build and install. In the case of Olmsted, the US Army Corps of Engineers has been

So, take a moment and check out any of the 13 parameters now being transmitted from the Olmsted site to the link below - and watch for the 14th parameter to be added this summer!

http://waterdata.usgs.gov/ky/nwis/uv/?site_no=03612600

The contents of this article were obtained from the KASMC 3-year scope of work and work plan (2014-2016). Much more information can be found on the KASMC web page:

<http://go.usa.gov/W7VP>

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