

# **EDGE-OF-FIELD MONITORING FOR THE MRBI AND THE ARKANSAS DISCOVERY FARMS PROGRAM**

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## **What the U of A brings to the table**

1. Leverage already purchased equipment to monitor edge-of-field runoff and automatically collect samples.
2. Salaried technical support for sample collection and analysis, as well as for research and extension coordination.
3. EPA approved QAPP for soil, forage and water sampling and analytical protocols used.
4. Wide stakeholder support as part of the corollary Discovery Farm Program.

## **Project goals & objectives**

Promote and document sustainable and viable farming systems that are cost-effective in an environmentally sound manner. Specific objectives are to;

1. Conduct on-farm monitoring and research to assess the effectiveness of adopted Best Management Practices (BMPs).
2. Provide on-farm verification and documentation of nutrient and sediment loss reductions and water conservation in support of implementing BMPs.
3. Deliver educational programs from Program data to assist farmers achieve both production and environmental goals in support of sustainable farming in Arkansas.

## **How we fit into the MRBI**

Farming in Arkansas is under increasing pressure to manage nutrients in an environmentally sustainable manner as seen by the need for the MRBI. In many sectors of the farming community, this has created severe constraints to remaining economically viable and competitive in today's' global market place. In response, the farming community has proactively supported stakeholder-driven research and demonstration programs, which demonstrate the water quality benefits of current and alternative BMPs.

The most widely accepted approach to reducing nutrient and sediment loss from agricultural operations within a watershed is developing and implementing conservation or BMPs on a farm-by-farm basis. However two simple questions remain; how effective is the conservation process and how can farmers most efficiently, economically, and effectively implement their BMPs?

As most BMP verification has been done at a small plot or field scale, little information is available on how effective these practices are at reducing nutrient and sediment loss, how they may work synergistically, (i.e., the combined benefits of several BMPs is greater than their individual benefit), where they may be most effective, and how long it will be before reduction efficiencies are observable and maximized in a whole-farm setting.

Our role in the MRBI will be to provide expertise on edge-of-field monitoring to document the outcomes of BMP adoption in selected HUC-12 watersheds, in partnership with those charged with conservation implementation. We already have field equipment necessary to

conduct such monitoring at several key sites and seek to acquire operational funds (~\$65,000 / year for sample collection and analysis) through this partnership

We plan to monitor the effectiveness of BMPs installed on two farms in MRBI selected HUC-12 sites that are reflective of typical farming systems. On each farm, three to four sites will be created where we will monitor and collect runoff, nutrients, and sediment from fields with specific BMPs installed. A fourth untreated site will act as a control or baseline. We would plan to monitor the sites for a minimum of 5 years to ensure that realistic water quality response changes can be documented. Much research has already shown that farm and watershed level response to BMP implementation can take several years to be fully realized. Study periods shorter than 5 years may lead to false low reduction efficiencies and thereby inappropriate conservation management recommendations.

USGS has a long and well founded history of conducting high caliber water quality monitoring programs and their involvement will greatly enhance the scientific credibility of the data generated. We see their partnership at the larger watershed level, to scale-up edge-of-field effects to watershed response. In addition to leveraging already secured equipment, a dedicated technician, and research (Andrew Sharpley) and extension (Mike Daniels) coordination, our participation will also leverage the involvement of other U of A Faculty expertise on specific management, economic, and sustainability issues.

#### **Outcomes relevant to Step 4 “Outcome Measurement” of the MRBI**

Several important guiding principles intrinsic to this program are directly relevant:

- The work is done on real commercial farms and addresses a range of types of enterprises and geographical settings in designated priority watersheds.
- Data is collected on both the environmental and economic effects of farm management.
- Open communication about problems and possible solutions is fostered among farmers, non-farmers, and government agencies.
- Quantify and demonstrate on-farm BMP reduction efficiencies for water conservation and nutrient and sediment loss.
- Field days demonstrating BMP operation with fact sheets.
- Verification program for implementation of BMPs to meet compliance goals.
- Identification of socio-economic barriers that need to be overcome to facilitate widespread adoption of selected BMPs.
- Identification of stakeholders’ perceptions of the effectiveness and economic efficiencies of BMPs.

#### **Contacts for more Program information**

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