



2012 ANNUAL REPORT:

**ASSESSING THE IMPACT OF THE MRBI PROGRAM IN THE POINT
REMOVE AND L'ANGUILLE WATERSHEDS**



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Agreement No. 68-7103-10-393

PROJECT PURPOSE:

The purposes of this agreement is to provide funding to the University for completion of a 3-year assessment project involving edge-of-field monitoring designed to determine the impacts of implementation of the Mississippi River Basin Initiative (MRBI) Program on representative program-enrolled farms in the Point Remove and L' Anguille watersheds.

PROJECT BENEFITS:

The MRBI program offers a new, innovative voluntary approach to addressing regional water quality issues related to agricultural nonpoint source pollution. However, previous funding has not provided for monitoring to assess the actual impact of the program. Quantifying impact is a critical component to demonstrating the effectiveness of voluntary conservation efforts in terms of justifying continued expenditures and implementing future programs.

THE UNIVERSITY WILL:

1. Establish one (1) "Discovery Farm" in the Point Remove Watershed and two (2) "Discovery Farms" in the L' Anguille watershed.
2. Install and maintain, on the Discovery Farms, all sampling equipment necessary to monitor edge-of-field water quality and water use.
3. Insure that all necessary samples are collected and monitored according to established scientific protocols.
4. Collaborate with the U.S. Geological Survey to conduct stream flow, nutrient, and sediment discharge at the 12-digit HUC scale that encompasses edge-of-field monitoring sites.
5. Utilize the previously-developed, calibrated SWAT model for the Point Remove and L' Anguille Watersheds.
6. Insure that the project will achieve the following:
 - Measured of reduction efficiencies at edge-of-field of selected MRBI-approved practices under real-world conditions,
 - Quantified cause and effect relationships between selected practices and receiving water quality parameters,
 - SWAT estimates of BMP implementation scenarios on nutrient loss reductions.

PROGRESS:

L'Anguille Watershed

04-01-2011 to 06-30-2011:

Installation of monitoring sites was completed at both the Woods and Clements Farms. This included installation of culvert gauges, flumes, and weirs to measure runoff water volumes, construction of stands to house the automatic water samplers, and bringing everything on-line. See photos below.

07-01-2011 to 09-30-2011:

A total of 24 water runoff samples were collected from 9 storm flow events and have been analyzed for nutrient and sediment content.

10-01-2011 to 12-31-2011:

A total of 6 water runoff samples were collected from 2 storm flow events and have been analyzed for nutrient and sediment content. Concentrations will not be reported until a sufficient number of events have been collected to ensure reliability of the results.

1-1-2012 to 3-31-2012:

- a. Work was conducted at monitoring sites to maintain all equipment in working order. This involved removing transducers to monitor flow during January, when the risk of freezing conditions destroying the transducers was too high.
- b. A total of 4 water runoff samples were collected from 1 storm flow event and have been analyzed for nutrient and sediment content.

4-1-2012 to 6-30-2012:

- a. A total of 26 water runoff samples have been collected since flume installation at the middle of last year. In 2012, a total of 5 samples have been collected and analyzed for nutrient and sediment content.
- b. To date, concentrations of all forms of phosphorus and nitrogen measured in runoff from both conventional and conservation sites monitored in the L'Anguille sites have been extremely low. Averaging <0.050 mg/L dissolved P, <0.20 mg/L total P, < 0.10 mg/L nitrate, and <2.00 mg/L total N.
- c. Water sampling will continue.

7-1-2012 to 9-30-2012:

- a. Water sampling continued.
- b. Drought during this period has limited activity at these sites to mainly maintenance.

10-1-2012 to 12-31-2012:

- a. Water sampling continued.

- b. Data for 2011 and 2012 compiled and presented in Table 1.
- c. We are working with Dharmendra Saraswat to run the SWAT model on the L'Anguille Watershed. Dr. Saraswat has completed some initial model calibration and will complete more detail simulations over the next several months to assess the relative effects of BMP implementation on nutrient and sediment runoff in the L'Anguille Watershed.

Point Remove Watershed

04-01-2011 to 06-30-2011:

- a. Construction of a second cattle crossing was completed, which was then used as the point of water flow monitoring into the wetland area.
- b. Installation of monitoring sites was completed at the Willow Bend Farm. See photos below.

07-01-2011 to 09-30-2011:

- a. A total of 7 water runoff samples were collected during 7 storm flow events and have been analyzed for nutrient and sediment content.
- b. A grid soil sampling protocol was established for Willow Bend Farm. This soil sampling will be conducted in October, 2011.

10-01-2011 to 12-31-2011:

- a. A total of 2 water runoff samples were collected from 2 storm flow events and have been analyzed for nutrient and sediment content. Concentrations will not be reported until a sufficient number of events have been collected to ensure reliability of the results.
- b. Grid soil sampling of the Willow Bend Farm was completed in conjunction with Ron Day, NRCS, Conway County, the MRBI, and EQIP. Soils are being analyzed for nutrients by the U of A Soil Testing Laboratory.
- c. Flow at both sites in the Point Remove Watershed is flowing into the wetland area. Thus, the second site will be moved to a new location in the Watershed to evaluate another pasture management BMP. This will be completed in the next quarter, in order that runoff samples can be collected during the wet spring period.
- d. On October 27th, 2011 we sponsored an open meeting at the Willow Bend Farm to discuss MRBI-related progress followed by a Discovery Farm Committee meeting to discuss site selection, equipment installation and future plans. The meeting was attended by about 100 farmers, NRCS, ANRC, AACD, and Legislative Staff personnel.

1-1-2012 to 3-31-2012:

- a. Completed grid soil sampling at Willow Bend Farm, collated analyses and prepared report for land owner.
- b. Work was conducted at monitoring sites to maintain all equipment in working order. This involved removing transducers to monitor flow during January, when the risk of freezing conditions destroying the transducers was too high.
- c. A total of 3 water runoff samples were collected during 3 storm flow events and have been analyzed for nutrient and sediment content.
- d. We continued to look for additional sampling edge-of-field monitoring sites at the Willow Bend Farm and other locations in the Point Remove Watershed.

4-1-2012 to 6-30-2012:

- a. Compiled soil nutrient maps for the farm, which will be provided as soon as available.
- b. A total of 21 water runoff samples have been collected since flume installation at the middle of last year. In 2012, a total of 8 samples have been collected and analyzed for nutrient and sediment content.
- c. Water sampling will continue.
- d. With the help of Crash Caruthers and Alice Weeks, we located another farmer in the Point Remove Watershed who was willing to have us install monitoring equipment on three fields in the Khun Bayou Watershed (HUC 11110203304 – Pope County; Figure 1). The farmer is John Maus and he has completed a Discovery Farm application and plans to complete a Memorandum of Understanding with the Division of Agriculture, University of Arkansas to proceed with monitoring. The initial plan is to monitor runoff from three fields with and without cover crops (an approved MRBI Conservation Practice in this watershed).

7-1-2012 to 9-30-2012:

- a. Water sampling continued.
- b. We met at the Watershed Irrigation District Office to discuss progress and to develop a new farm on the watershed.
- c. Visited with J. Maus as to the potential of using his property to conduct a Discovery Farm assessment of water quality impacts of conservation.
- d. Maus agreed to be a Discovery Farm and a MOU signed.

10-1-2012 to 12-31-2012:

- a. Water sampling continued.
- b. Fields located for assessment of cover crop effects on nutrient and sediment runoff.
- c. Data for 2011 and 2012 compiled and presented in Table 1.
- d. Funding obtained from EPA Region VI to monitor nutrient and sediment concentrations in Khun Bayou, adjacent to the edge-of-field monitoring sites. A Quality Management Plan (QMP) and Quality Assurance Plan of Procedures (QAPP) is being prepared for approval by EPA prior to any work being able to start.
- e. We are working with Dharmendra Saraswat to run the SWAT model on the Point Remove Watershed. Dr. Saraswat has completed some initial model calibration and will complete more detail simulations over the next several months to assess the relative effects of BMP implementation on nutrient and sediment runoff in the Point Remove Watershed.

Table 1. Concentrations of phosphorus, nitrogen, and sediment in runoff from edge-of-field monitoring sites in the L'Anguille and Point Remove Watersheds.

Site	Date	Management	Dissolved P	Total P	Nitrate-N	Total N	Sediment
			----- mg L ⁻¹ -----				g L ⁻¹
Cherry Valley							
CVC1	2011	Rice	0.076	0.115	0.03	3.18	406
	2012	Soybeans	0.089	0.496	0.16	1.56	976
CVC2	2011	Rice	0.068	0.24	0.11	2.64	686
	2012	Soybeans	0.030	0.108	0.23	1.07	501
CVC Well	2011		0.017	0.137	0.58	0.78	405
	2012		0.011	0.164	0.28	0.58	419
CVW1	2012	Soybeans	0.064	0.745	0.66	1.65	729
CVW2	2012	Soybeans	ND	ND	ND	ND	ND
CVW3	2012	Soybeans	0.081	0.344	0.34	1.21	532
CVW4	2012	Soybeans	0.183	0.554	0.75	1.85	640
CVW Well	2011		0.041	0.167	0.17	0.84	501
Morrilton							
Mor 1	2011	Pasture	3.030	3.119	0.42	1.66	229
	2012	Pasture	2.597	3.803	0.20	2.47	177
Mor 2	2011	Pasture	2.416	2.683	0.176	1.23	185
Wetland	2012		1.799	2.036	0.08	1.36	177

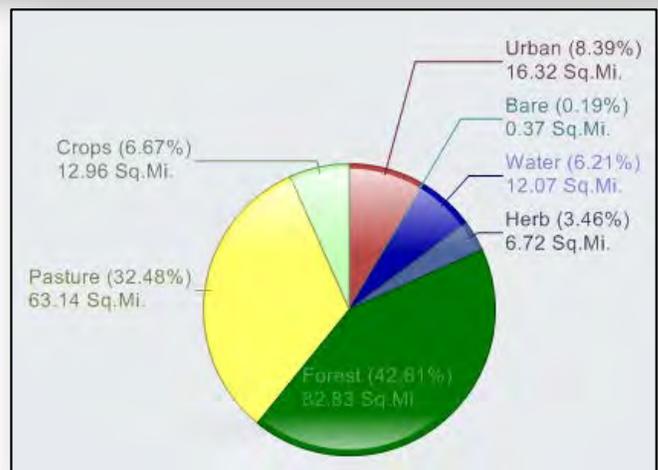
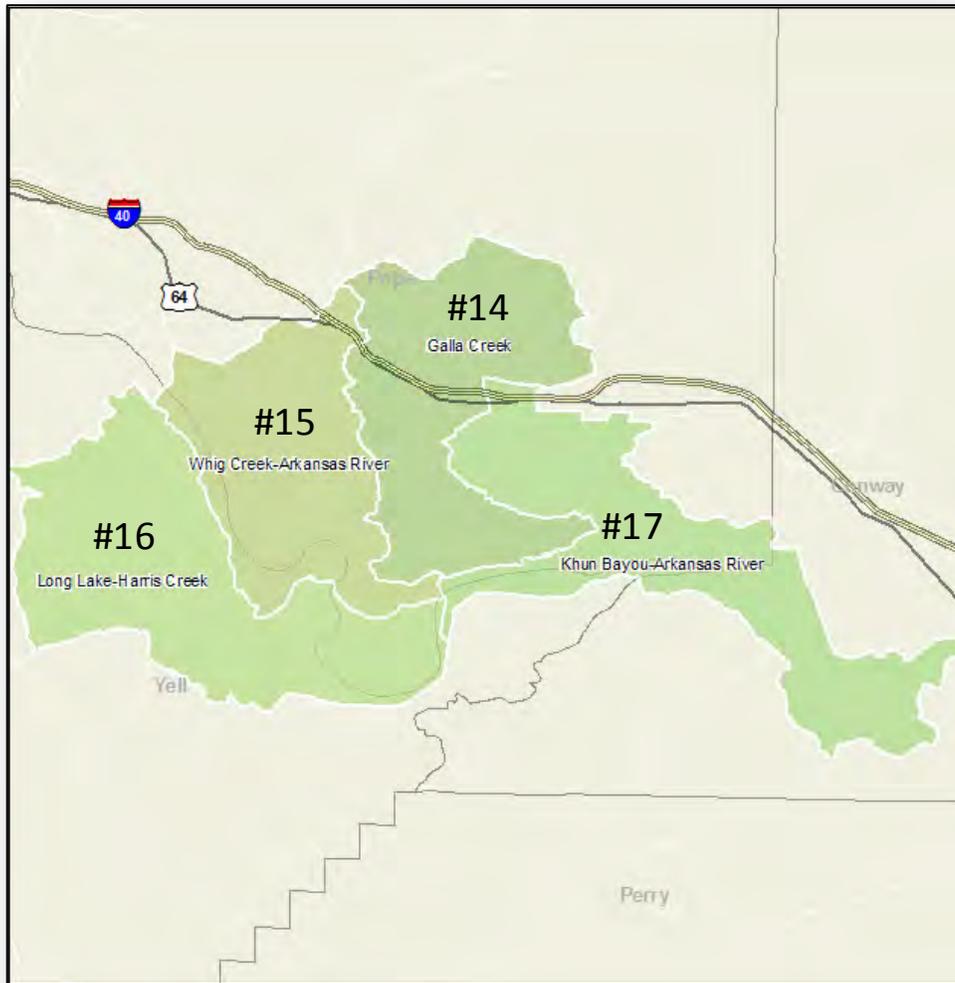


Figure 1. Khun Bayou– Arkansas River and 2006 land use (12-digit HUC level; from Arkansas Watershed Information System, CAST & ANRC - <http://watersheds.cast.uark.edu/viewhuc.php?hucid=1111020303>).

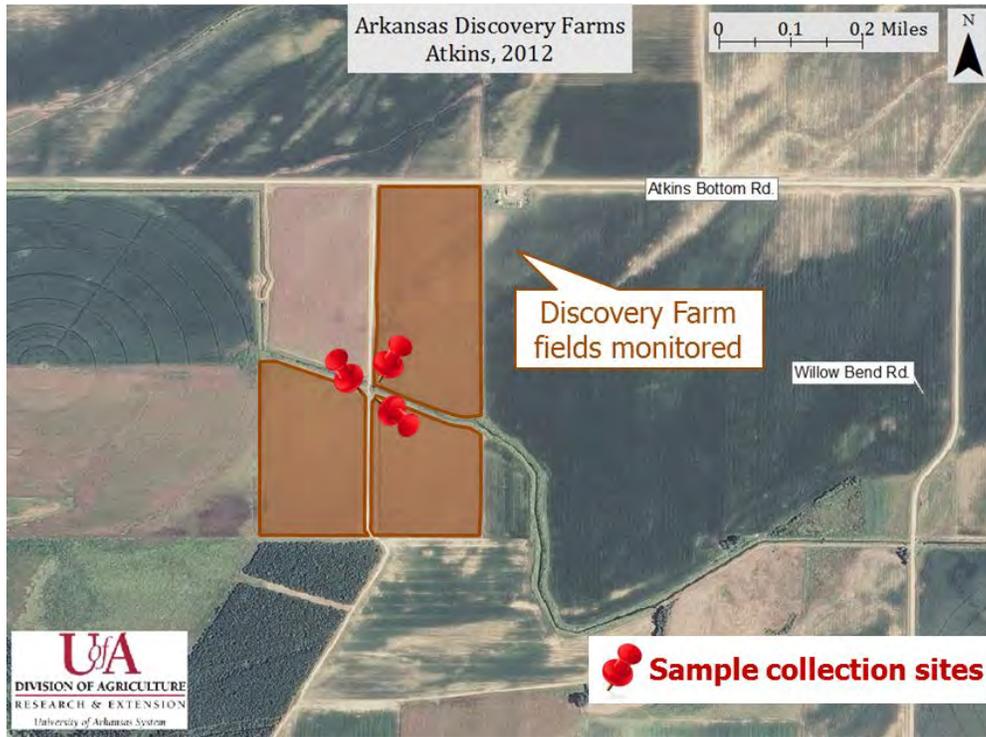
The L'Anguille Site, Cherry Valley



The Point Remove Site, Morrilton



Location of Maus Discovery Farm, Atkins, AR.



Approximate location of in-stream sampling near Lateral S to Joiner Lake, AR.

