V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Nutrient Management/Water Quality

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	20%		0%	
111	Conservation and Efficient Use of Water	15%		15%	
112	Watershed Protection and Management	0%		32%	
133	Pollution Prevention and Mitigation	0%		41%	
401	Structures, Facilities, and General Purpose Farm Supplies	10%		0%	
402	Engineering Systems and Equipment	15%		2%	
403	Waste Disposal, Recycling, and Reuse	15%		0%	
404	Instrumentation and Control Systems	10%		0%	
405	Drainage and Irrigation Systems and Facilities	15%		0%	
903	Communication, Education, and Information Delivery	0%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	0.2	0.0
Actual Paid Professional	1.3	0.0	0.6	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
34916	0	149137	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
34916	0	23479	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	234093	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Water quantity and water quality are two emerging issues that will shape the future sustainability of high yield agriculture in Mississippi and the nation. Offsite transport of nutrients applied to agricultural crops, haylands, and pastures are a significant source of non-point source nutrient pollution affecting water quality in local primary water bodies, major river systems (e.g. Mississippi River, Tombigbee River), and the Gulf of Mexico, contributing to environmental concerns such as hypoxia and subsequent effects on coastal economies. Agricultural irrigation is a primary use of groundwater and aquifer overdrafts in recent decades illustrate the need for greater adoption of water conservation. In high yield, intensive agricultural systems such as the Mississippi Delta, the issues of water quantity and water quality are inextricably connected. To address these needs MSU Extension and MAFES work with state and regional advisory groups and serve on work groups to address specific issues and tasks associated with nutrient management and water quality to engage participation of targeted audiences such as agricultural producers in environmental education programs through development of publications, fact sheets, web pages and other educational materials as program support, and reporting documents. Specific programs targeted toward agricultural producers in this plan include environmental stewardship programs, waste pesticide collection and disposal programs, recycling and solid waste management programs, development of agricultural water conservation practices to protect and maintain water resources, pharmaceutical and household chemical management and disposal programs and other initiatives related to water quality and nutrient management.

2. Brief description of the target audience

Stakeholders and customers of research and Extension programs represent a broad section of audiences, including agricultural producers and other rural audiences, agricultural support groups, environmental and water quality agencies, consumers, and traditionally under-served groups.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5235	2235	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	6	6	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of producers attending seminars, workshops, short courses, and demonstrations.

Year	Actual
2012	1245

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of producers adopting new technologies, strategies, or systems.
2	Number of producers improving their environmental stewardship.
3	Number of pounds of waste pesticides, pharmaceuticals and personal care products collected or disposed of properly.

Outcome #1

1. Outcome Measures

Number of producers adopting new technologies, strategies, or systems.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	249

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Irrigation scheduling is a method of managing water to better match the timing and application of water with crop water needs. Understanding soil and crop water relations, irrigation scheduling, and crop water management will enable producers to make water use decisions that are economically and environmentally sustainable. Currently available scheduling tools are usually not accurate in humid areas such as Mississippi, are time-consuming to operate, and require users to install, update and run software to make the management decision.

What has been done
The Mississippi Irrigation Scheduling Tool (MIST) allows users to assess water needs and schedule irrigation according to crop need. MIST is based on the latest scientific knowledge of crop growth and water use, soil hydrology, and weather conditions. MIST queries external soil and weather databases, calculates plant water needs, and recommends timing and amount of water application using a water-balance approach. The system will be delivered to producers through MSU Extension's website, MSUCares.

Results
The MIST will bring farmers greater yields at lower costs when irrigation more closely matches plant needs. This research has developed knowledge of corn and soybean water use for a range of soil types, planting dates, and management practices in MS. The MIST was tested in 2011 and 2012 in seven production fields and three research fields. Preliminary results indicate that the MIST gives a good estimate of crop water use, and indicates when sufficient water has been lost and irrigation is needed. Significant progress has been made in implementing the MIST into the web-based user interface. Water management tools and the web-based irrigation scheduler will improve timing and amount of water applications, improve crop yield and quality, and reduce excess water use in corn production.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
404	Instrumentation and Control Systems
405	Drainage and Irrigation Systems and Facilities

Outcome #2

1. Outcome Measures

Number of producers improving their environmental stewardship.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	199

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Farmers and landowners are faced with two major issues with regard to sustainably managing agroecosystems in the MS Delta region, namely, declining groundwater levels in the MS Delta Shallow Alluvial Aquifer and nutrient loads into the Mississippi River and the Gulf of Mexico. Groundwater depletion is expected to cause severe ecological and economic impacts if irrigation demand continues at the current rate. On-farm water storage (OFWS) systems offer the benefits of providing irrigation water and reducing nutrient runoff from irrigated fields.

What has been done
Preliminary research examines recycling of agricultural water on two farms in MS. Objectives are to 1) estimate the amount of water supply from OFWS systems that could be recycled on farms without interfering with downstream flow levels and 2) establish downstream nitrogen and phosphorus levels of effluent from such systems. The outreach objective is to disseminate

benefits of OFWS systems and increase adoption of irrigation conservation measures to reduce nutrient runoff and minimize water withdrawn from the MS River Alluvial Aquifer.

Results

The amount of water from OFWS systems used for irrigation was recorded throughout the 2012 growing season. A total of 183.51 acre-foot of water from OFWS was used to irrigate corn on the 158-acre Pitts Farm, which translates to a savings of approximately 60 million gallons of water which were not pumped from the aquifer for irrigation. Effluent from OFWS systems at both sites had 50% lower nitrate levels compared to water that entered the systems. Phosphate levels of effluent water in Metcalf and Pitts farms were reduced by 75% and 56%, respectively. Both farms showed higher concentrations of measured parameters in the tailwater recovery ditch and storage ponds because these areas were designed to have higher retention times. Data from this project will also be used to develop nutrient criteria for the MS Delta.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
404	Instrumentation and Control Systems
405	Drainage and Irrigation Systems and Facilities

Outcome #3

1. Outcome Measures

Number of pounds of waste pesticides, pharmaceuticals and personal care products collected or disposed of properly.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

MSU Extension agents and specialists, as well as MAFES faculty, used a variety of recommended methods to gather needed information. Specific strategies will be initiated and utilized for collecting evaluation information to determine program outputs and outcomes (see impact statements for examples).

In FY 2012, MSU Extension agents and specialists were required to submit four quarterly reports (January, April, July, and September). This quarterly report collects information about the number of contacts, types of contacts, and number of programs conducted in each Priority Planning Area. In addition, two narrative Accomplishment Reports are required from each MSU Extension employee each year. Finally, a specific request for impact statements is also made. The evaluation results are a combination of this quantitative and qualitative data.

MAFES scientists operate research programs under an approved Hatch or Hatch-Multistate CRIS project plan of work. Outputs, outcomes, target audiences, and impacts are reported annually through the CRIS (REEport) system. Annual and project termination reports are developed by scientists and reviewed by Department Heads and the Director's office before submission to USDA-NIFA through REEport.

Key Items of Evaluation