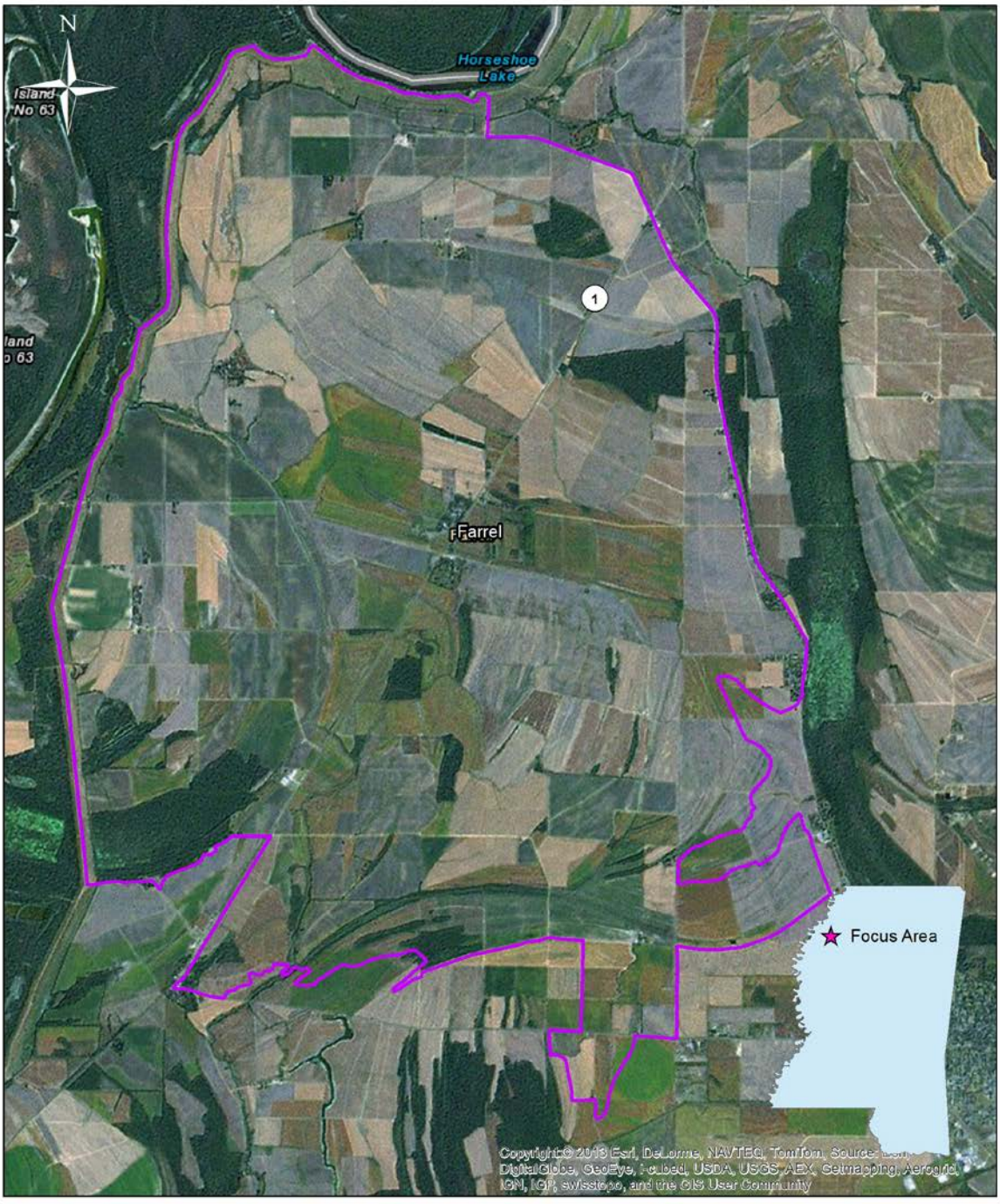
Watershed Implementation Plan for Overcup Slough



Overcup Slough Watershed

HUC 080302070301

Overcup Slough

0 0.75 1.5 2.25 3 Miles

DELTA F.A.R.M.

WATERSHED IMPLEMENTATION PLAN (WIP)
FOR OVERCUP SLOUGH, MS

Prepared for:

Overcup Slough Watershed Implementation Team

and the

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1.0 PLAN GUIDANCE

1.1 Vision Statement

Overcup Slough and its watershed are places where agriculture is productive and profitable, and its practices contribute to adequate water supply and quality to support fishing, swimming, and aquatic life. It is a place where people want to live, work, recreate, and raise a family.

1.2 Mission Statement

Sustain agricultural profitability while attaining designated water body uses through effective management of water quantity and quality.

1.3 Overcup Slough Watershed Implementation Team

Members of the Overcup Slough Watershed Implementation Team are:

- Jim Humber, producer
- Pete Hunter, producer
- Mark Crumpton, producer
- John Sherard, producer
- Parker Fullen, producer
- Mississippi Department of Environmental Quality
- U.S. Environmental Protection Agency
- Delta F.A.R.M.
- Delta Wildlife
- Delta Council
- U.S. Geological Survey
- Mississippi State University
- Natural Resource Conservation Service

2.0 WATERSHED DESCRIPTION

2.1 Geography

Overcup Slough is a tributary of Harris Bayou and of the Sunflower River in northwest Mississippi (Figure 2.1). The 20,846 acre Overcup Slough Watershed (HUC # 080302070301) is located in Coahoma County, Mississippi, in the Delta physiographic region, and Mississippi Alluvial Plain Northern Holocene Meander Belts ecoregion. Geology in this area consists of mostly unconsolidated deposits of sands, silts, and clays dating back as far as the Pleistocene (Stewart 2003). The landscape is dominated mostly by ridge and swale topography, although portions of the watershed have been landformed to facilitate agricultural irrigation and reduced erosion.

The City of Clarksdale is located near the South Eastern portion of the watershed (Figure 2.2). Several smaller communities are scattered throughout the watershed including Sherard, Stovall, and Farrell. State Highways 61 and 1 pass through the watershed. Cleveland and Tunica are two larger municipalities within 40 miles of the watershed.

2.2 Soils

Soils in the Mississippi River Alluvial Plain physiographic region are primarily young soils (inceptisols) formed on alluvium, and range from mildly acidic to mildly alkaline (Stewart 2003). Soils in the watershed are of the Dundee (moderately to somewhat poorly drained fine sandy loam to silty clay loam) and Forestdale (somewhat poorly to poorly drained silty clay loam) series.

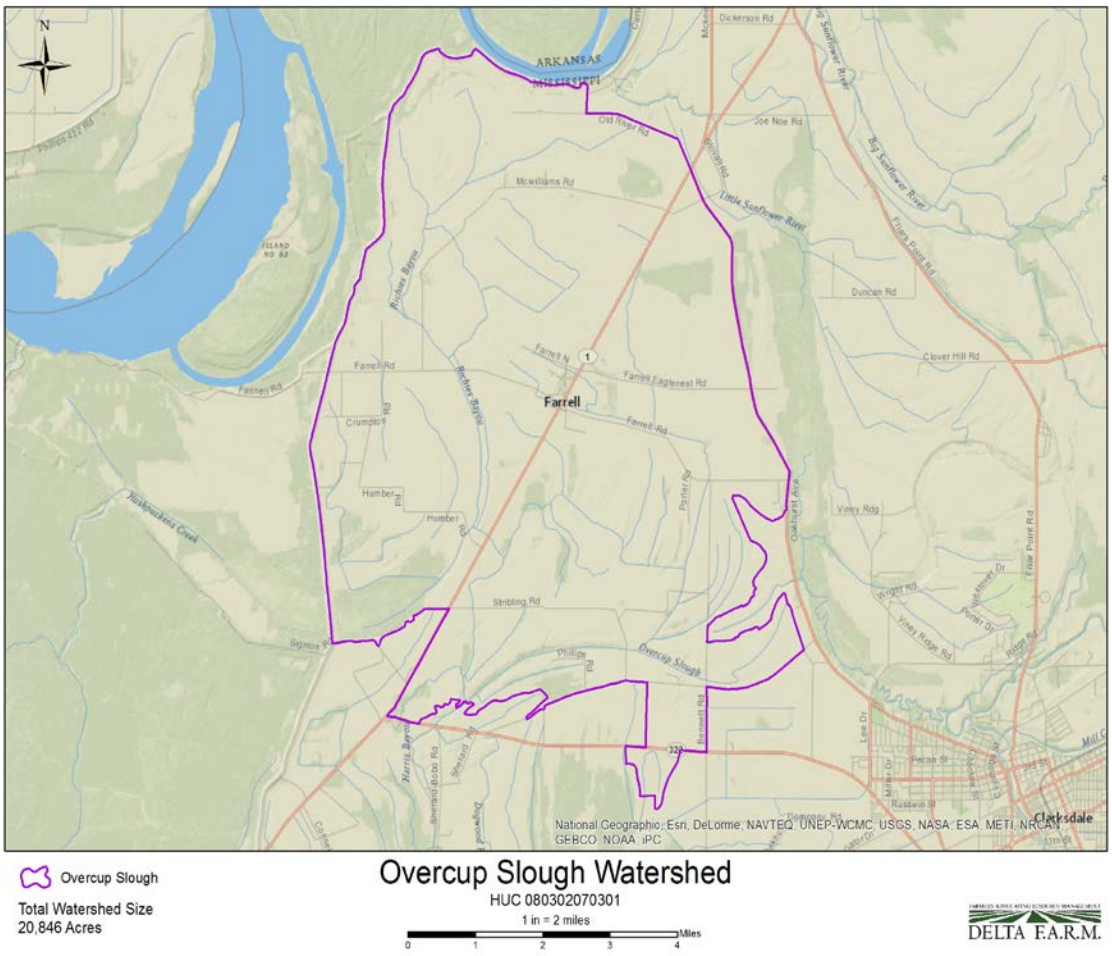

Figure 2.1 Location of Overcup Slough Watershed

2.3 Hydrology

Overcup Slough (HUC #080302070301) begins in west central Coahoma County, northwest of Clarksdale. Richies Bayou (headwaters of Overcup Slough) originates around Stovall, MS. Richies Bayou merges with another tributary southeast of Farrell to form Overcup Slough. Overcup then merges with another large tributary in the southern portion of the watershed and turns east eventually emptying into the Big Sunflower River. Non-storm flows in Delta streams decrease during the summer months due to low rainfall. However, in the Overcup Slough watershed, irrigation water often supplements summer non-storm flows by providing a source of runoff throughout the growing season.

2.4 Land use

Much of the original ridge and swale landscape in Overcup Slough watershed has been developed; fields have been land formed, and drainage infrastructure has been improved. A map of watershed land use is shown in Figure 2.3. While 83% (17,378 acres) of the watershed is in production agriculture, no particular crop is dominant. Corn, cotton, soybeans, and rice are all common. In addition to production agriculture, there are 1,660 acres of wetland, approximately 500 acres is fallow and the remainder is urban.

2.5 Socioeconomics

2.5.1 Demographics

Estimated July 2008 population for Coahoma County it was 27,272. The 2008 estimated population was around 3% less than the population reported in the 2000 census.[1]

[1](http://www.olemiss.edu/depts/sdc/estimates/2008/CO-EST2008-01-28.htm

2.5.2 Economy

The Delta region of Mississippi where Overcup Slough is located is classified as economically depressed. The estimated 2008 median household income for Coahoma County ($28,320) was below the state median household income ($37,818), and were in the lowest 11% of the state.2 The economy in the Overcup Slough watershed is dominated by agribusiness.

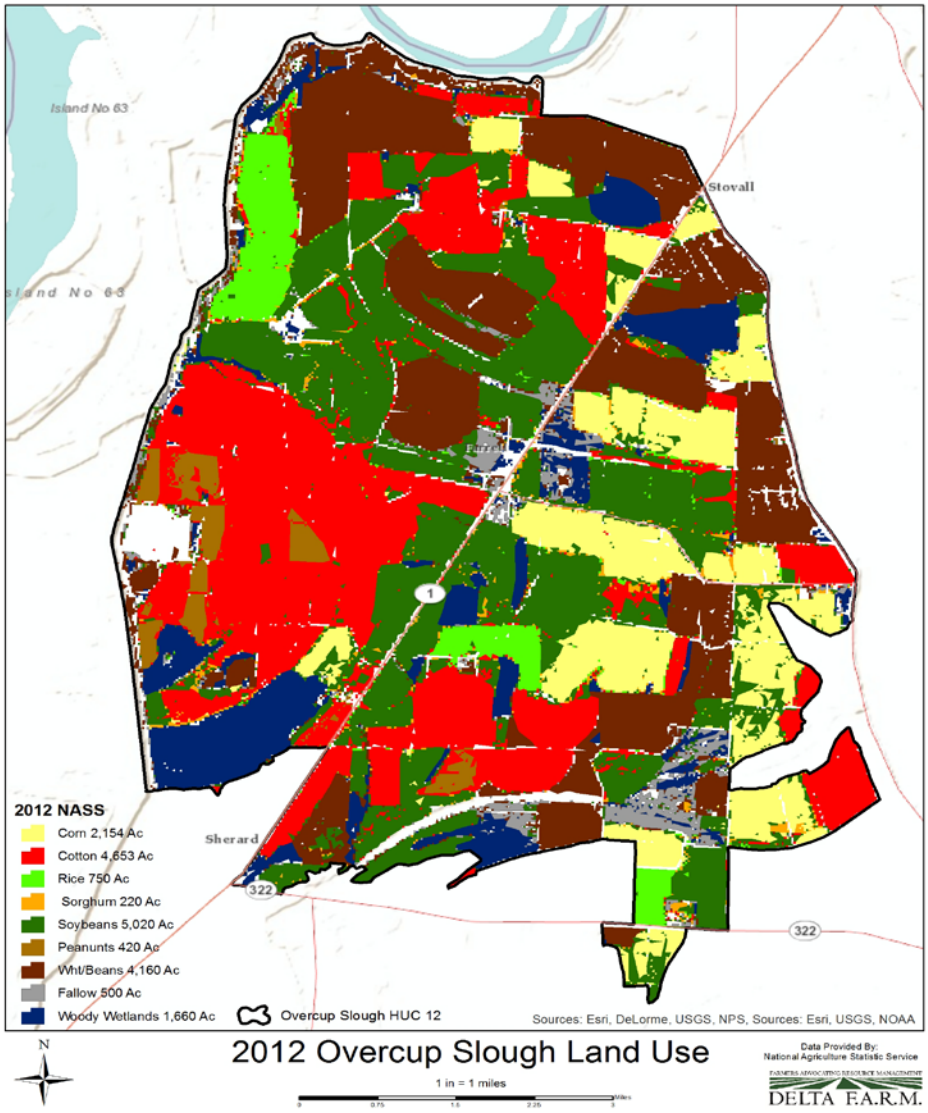

Figure 2.2. Land Use in Overcup Slough Watershed

[2]http://www.census.gov/did/www/saipe/data/index.html

2.6 Regulations

Federal and state regulations that apply in the Overcup Slough watershed may be useful tools, or impediments to achieving the vision for the watershed.

2.6.1 Federal Regulations

2.6.1.1 Clean Water Act

2.6.1.1.1. NPDES Point sources

There are two permitted wastewater discharges in the watershed (enSearch, accessed). The Publicly Owned Treatment Works (POTW) for the community of Farrell (MS0045187) and, Mascot Planting Company, which is permitted to discharge domestic wastewater (MS0022225).

2.6.1.1.2. NPDES Storm water

The Overcup Slough watershed is not subject to MS4 storm water permitting under the Clean Water Act. Under state law, storm water permits are required for construction in the watershed.

2.6.1.1.3. Section 303(d) and TMDLs

Water bodies in the Overcup Slough watershed were included on the Mississippi 2006 Section 303(d) List of Impaired Water Bodies (MDEQ 2007a). Overcup Slough, and Richies Bayou were listed due to evaluated causes of sediment, organic enrichment/low dissolved oxygen, and nutrients (Figure 2.4). The Clean Water Act requires that total maximum daily load (TMDL) studies be completed for all water bodies included on the 303(d) list. Table 2.1 summarizes the TMDLs addressing Overcup Slough water quality impairments that have been completed as of 2008 . Because these TMDLs have been completed, these water bodies do not appear on the 2010 303(d) list (MDEQ 2010).

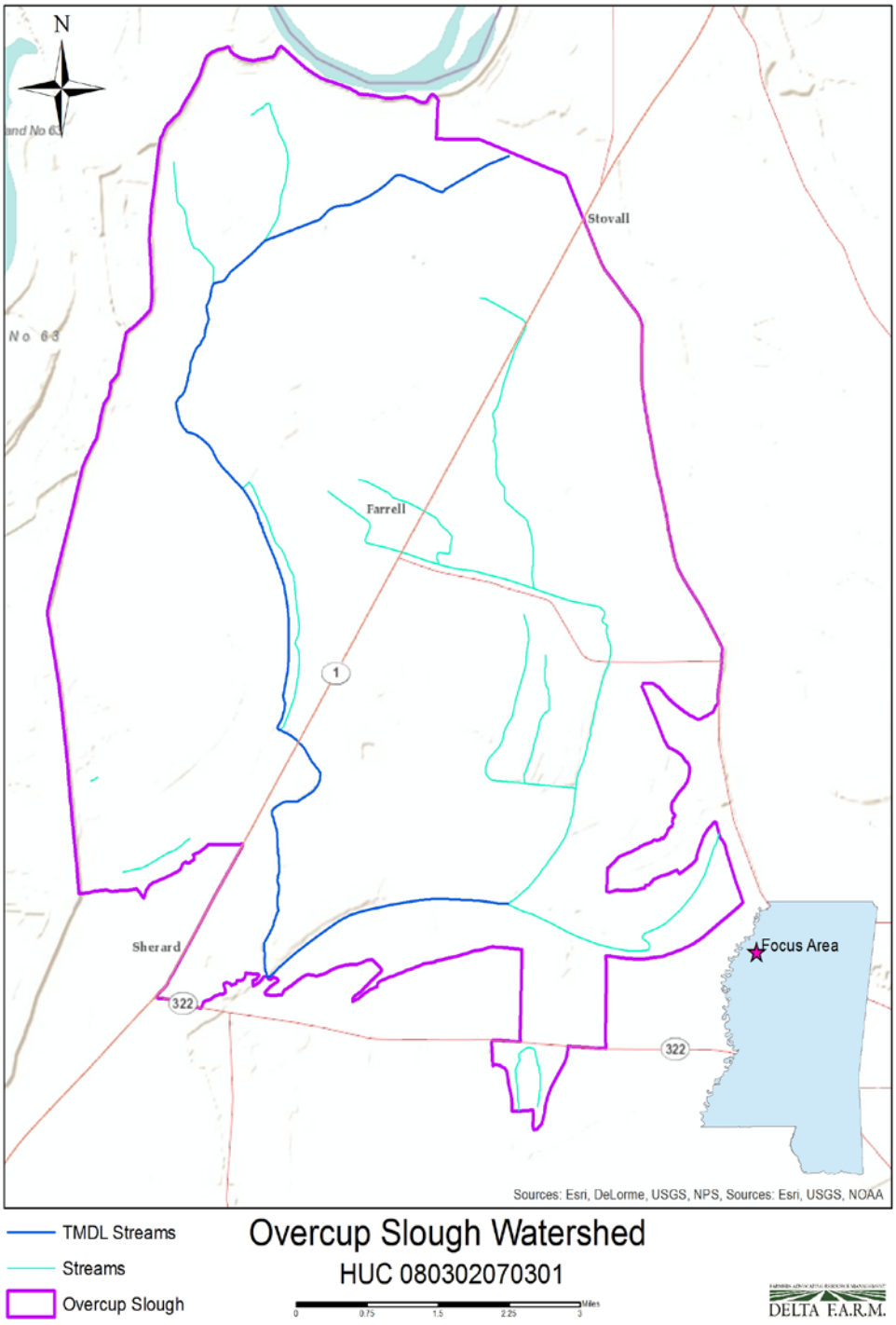

Figure 2.3. Impaired Water Bodies in Overcup Slough Watershed with Completed TMDLs

Table 2.1. TMDLs For Overcup Slough Watershed Water Quality Impairments

Parameter	Waterbody	TMDL Approval Date	Source to be Reduced	Recommended % Reduction
Total nitrogen	Overcup Slough	June 2008	NPS	84.32%
	Richies Bayou	June 2008	NPS	85.11%
Total phosphorus	Overcup Slough	June 2008	NPS	95.24%
	Richies Bayou	June 2008	NPS	95.49%
Sediment	Overcup Slough, Richies Bayou,	April 2008	NPS	NA (estimate 80%)
Legacy pesticides	Overcup Slough, Richies Bayou,	November 2005	NPS	NA

2.6.1.1.4. Navigable Waters

Several sections of the Clean Water Act deal with controlling impacts to navigable waters. Section 404 of the Clean Water Act controls the placement of dredge or fill materials into wetlands and other waters of the US. Section 401 of the Clean Water Act requires MDEQ to certify that a project requiring a Section 10 (see 2.6.1.2) or Section 404 permit will not violate the state water quality standards. These sections of the Clean Water Act require that impacts to qualifying waterbodies be avoided or minimized. Where impacts are unavoidable, mitigation may be required. Qualifying waterbodies include wetlands and "Other Waters of the US". The basic definition for Other Waters of the US, for the purpose of Section 404, is any waterbody that displays an ordinary high water mark (OHWM). This includes lakes and ponds that have a hydrological connection to a qualifying waterbody, and perennial, intermittent, or ephemeral stream channels which exhibit an OHWM. The US Army Corps of Engineers (USACE) administers the regulations associated with both of these sections.

The USACE commonly issues two types of permits under Section 404; Individual Permits and Nationwide Permits (NWPs). Individual Permits are required when 1) impacts to wetlands exceed 0.5 acre, and/or 2) greater than 300 linear feet of a qualifying waterbody is to be impacted. This Individual Permit includes a period of public review, and processing generally

takes between 60 and 120 days. The processing time can be greater if public hearings or environmental statements are required, or if all required information on the permit application form is not provided. NWPs are general permits typically used when minor impacts are necessary to wetlands (less than 0.5 acre) or a qualifying waterbody (any impacts less than 300 linear feet). Processing time is generally less and no public review period is necessary.

Mitigation for both wetland losses or stream function and value losses may be required by the USACE for a project authorized under either an individual or nationwide permit. The extent of the mitigation is dependent upon the size, quality, and functionality of the wetland or waterbody to be impacted.

2.6.1.2 **Rivers and Harbors Act**

Section 10 of the Rivers and Harbors Act regulates activities that have the potential to obstruct navigation in waters of the US, including wetlands.

2.6.1.3 **Farm Bill**

Under the Federal Food Security Act (Farm Bill), initially passed in 1985, all US farm operators are required to meet soil erosion control standards specified in the law. Compliance with these standards is a prerequisite for participation in most federal farm programs. Subsequent amendments to the Farm Bill have added programs that provide incentives to farm operators for enhancing water quality through such actions as taking highly erodible lands out of production, and restoring wetlands. One such program is the Mississippi River Basin Healthy Watersheds Initiative (MRBI). The MRBI is being implemented through NRCS programs funded by the Farm Bill, including the Cooperative Conservation Partnership Initiative, Wetlands Reserve Enhancement Program, and Conservation Innovation Grants. The Overcup Slough watershed is a target sub-watershed of the Sunflower River watershed for the MRBI.

2.6.1.4 **National Flood Insurance Program**

The National Flood Insurance Program (NFIP) is a non-regulatory federal program, which is administered by the Federal Emergency Management Agency (FEMA). However, this program provides mechanisms that can be used to restrict development in floodplains, which can

have beneficial effects on water quality. The NFIP supports development and enforcement of floodplain management plans and ordinances. All of the unincorporated areas of Coahoma Counties participate in the NFIP, as well as the City of Clarksdale.[3]

2.6.1.5 **Safe Drinking Water Act**

All drinking water systems serving 25 people or more are considered public drinking water systems and are subject to EPA regulation through the Safe Drinking Water Act. Elements of the Safe Drinking Water Act include the Enhanced Surface Water Treatment Rule, Disinfection Byproducts Rule, and the requirement for Source Water Assessment and Protection. In Mississippi, the Safe Drinking Water Act is administered by the Mississippi State Department of Health. The lists of public water utilities provided on the Mississippi State Department of Health website indicate that there are four public water utilities serving the residents of the Overcup Slough watershed.[4] Information about these utilities and their compliance with Safe Drinking Water standards are summarized in Table 2.2

Table 2.2. Public Drinking Water Utilities in Overcup Slough Watershed from the EPA Safe Drinking Water Information System5

Utility	Water Source	Population Served	Water Quality Violations
Farrell Utilities	groundwater	246	coliform 2000, 2007
Sherard Water Association	groundwater	147	TTHM: Oct 2007 through Mar 2009

2.6.2 State Regulations

2.6.2.1 **Water quality standards**

The water use classifications are established by the State of Mississippi in the document *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* (MDEQ, 2007b). The designated beneficial use for the listed segments is Fish and Wildlife

[3] http://www.msema.org/insurance/floodplain.html, accessed
[4] http://msdh.ms.gov/msdhsite/_static/30,0,76,256.html, accessed

(MDEQ 2008a,b,c) The water quality standard applicable to the use of the water body and the pollutant of concern is defined in the *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* (MDEQ, 2007b). Mississippi's current standards contain a narrative criteria that can be applied to nutrients which states "*Waters shall be free from materials attributable to municipal, industrial, agricultural, or other discharges producing color, odor, taste, total suspended or dissolved solids, sediment, turbidity, or other conditions in such degree as to create a nuisance, render the waters injurious to public health, recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated use* (MDEQ, 2007b)."

The standard for dissolved oxygen states, "DO concentrations shall be maintained at a daily average of not less than 5.0 mg/l with an instantaneous minimum of not less than 4.0 mg/l." In addition, thUo ii92e State water quality standard regulations include a natural condition clause which will be used to determine the appropriate DO for Overcup Slough under critical conditions. Natural conditions are defined as background water quality conditions due only to non-anthropogenic sources. The criteria herein apply specifically with regard to substances attributed to sources (discharges, nonpoint sources, or instream activities) as opposed to natural phenomena. Waters may naturally have characteristics outside the limits established by these criteria. Therefore, naturally occurring conditions that fail to meet criteria should not be interpreted as violations of these criteria.

Since no water quality data have been collected in this watershed, no violations of state water quality criteria have been documented. However, MDEQ has judged that conditions in the watershed are likely to result in violations of these water quality criteria.

2.6.2.2 **Highway Construction Runoff**

The Mississippi Department of Transportation (MDOT) is responsible for implementation of erosion and sediment control practices on highway construction. MDOT is required to apply to MDEQ for a Certificate of Permit Coverage for construction projects to be permitted through the state construction storm water general permit. As of August 21, 2013, there are no active water permits for highway construction in the Overcup Slough watershed (MDEQ enSearch).

2.6.2.3 **On-site wastewater treatment regulations**

State regulations addressing on-site wastewater treatment systems are administered through the Mississippi State Department of Health. Regulations are in place to address single-family residence on-site wastewater treatment systems, as well as on-site systems serving recreational vehicle campgrounds, developments, and multi-family dwellings. These regulations require approval and certification of all new installations of on-site wastewater treatment systems, including replacement of old systems. Certification is not required for systems in use prior to enactment of the regulations, providing they meet criteria specified in the regulations.[6]

2.6.2.4 **Fish consumption advisories**

Fish tissue sampling is conducted by MDEQ for the purpose of identifying potential human health threats. These data are used by a multi-agency task force to evaluate the need for fish consumption advisories in Mississippi. Overcup Slough is included in the Delta-wide consumption advisory for toxaphene and DDT. This advisory recommends that people limit consumption of carp, buffalo, gar, and catfish larger than 22 inches to no more than one meal every two weeks (MSDH 2001).

2.6.2.5 **Water Withdrawals**

Mississippi law, all wells drilled with a casing diameter of 6 inches or greater are required to have a water use permit. In addition, water use permits are required for surface water withdrawals, and construction of water storage impoundments. Permits are good for 10 years. The Yazoo Mississippi Delta Joint Water Management District (YMD) is responsible for processing water use permits in the Delta, including the Overcup Slough watershed. Water use permits are issued by the MDEQ State Permit Board.

[5] http://www.msdh.ms.gov/msdhsite/_static/30,0,78.html, accessed

2.7 Existing management

Producers in this watershed have a history of recognizing environmental concerns and voluntarily addressing them through assistance programs such as EQIP and CRP. Sediment concerns have been addressed by ongoing efforts. Low flows in water bodies such as the upper Sunflower River have prompted actions such as well fields and weirs.

Overcup Slough is primarily used for agricultural drainage and as a source for irrigation water. The NRCS sponsored some watershed protection and flood prevention work in the watershed around 2003 (CFR 68(10):2007) and Environmental Quality Incentives Program [EQIP] (7 CFR Part 1466).

3.0 RESOURCES AND CONDITION

3.1 Water quality

USGS and MSU began water quality sampling in 2010 within the watershed. MSU began sampling at edge of field and near field locations in order to monitor water leaving agricultural fields. USGS began sampling in tributaries farther downstream. These monitoring efforts have led to a greater understanding of water quality within the watershed and leaving crop fields. As noted in Section 2.6.1.1.3, water bodies in this watershed have been identified by MDEQ as not having water quality adequate to support its designated uses. However, these determinations were based on evaluated assessments, not on water quality data.

3.2 Water quantity

Water supply is a growing concern in the region. Ground water depletion in the Mississippi Alluvial Plain has resulted in lower flows in many streams, including the Sunflower River (MS Museum of Natural Science 2005). Groundwater is withdrawn for drinking and irrigating crops.

3.3 Wildlife and Habitat

The U.S. Fish and Wildlife Service has identified three endangered species that may occur in Coahoma County. These include the Pallid Sturgeon (Found In Mississippi River), Least Tern (Shore Bird), and Fat Pocket Book Mussel. Habitats that are identified as important for the species of concern and that occur in or in close proximity to the Overcup Slough watershed include, oxbow lakes, bottomland hardwood forests, artificial ponds, ephemeral ponds, and streams. Overall, streams in the Delta are classified as critically imperiled because of the widespread degradation of stream habitats in this region.

3.4 Evaluation of Overcup Slough Fish Community

This evaluation of the Harris Bayou (HUC 10) watershed that encompasses the Overcup Slough watershed fish community is based on sampling performed by EDRC (Engineering Development and Research Center, US Army Corps of Engineers, Vicksburg, MS). Sampling was performed as part of stream community monitoring conducted by ERDC to assess the condition of fish communities in MS Delta streams. The sampling data provided the basis for the development of an index of biotic integrity *sensu* Karr (1981). The index uses metrics that capture the variety of feeding types (e.g. insectivores, predators), habitat selection (e.g. preferring current vs. pools) and taxonomy (e.g. sunfish and minnows) present in a sample of fish. Sampling was conducted with seines according to a standardized protocol. Each sampling site was assigned an IBI score based on the values of the population metrics. Streams were categorized as large unregulated or small, and flowing or non-flowing. Higher IBI scores indicate a more diverse fish community.

Harris Bayou was placed in the small non-flowing category. Fish sampling was conducted at a single location on June 6, 2006 and showed an IBI value of 14. This value is compared with other streams in both the flowing and non-flowing categories in Table 3.1. The results show that, at the time of sampling, the quality of the fish community could be described as "intermediate" among similar streams. The applicability of these results, which were obtained in 2006, would depend on whether significant changes in habitat and water quality have occurred between 2006 and the present.

Table 3.1. Comparison of ERDC IBI Values for 3 Delta Water Body Categories with the Harris Bayou IBI Value from June 6, 2006 Sampling

Percentile	Small Non-flowing	Small Flowing	Small Flowing + Non-Flowing
25	11	13	13
50	14	15	15
75	17	17	17
Harris Bayou Mouth	14	--	--

3.5 Recreation

There are very few opportunities for in-stream recreational use on Overcup Slough and its contributing tributaries. Low water levels, flows, and dissolved oxygen during late summer months limit the existence of desirable fish species. Also, public access to Overcup Slough is very limited.

4.0 STAKEHOLDER INTERESTS/ISSUES

Producers living or farming in the Overcup Slough watershed identified watershed issues they would like addressed through a Watershed Implementation Plan. These included sediment, nutrients, pesticides, declining water table and stream flows, water management, loss of coastal marsh, and financing. This plan will also address the water quality impairments identified in the 2006 303(d) list for which TMDLs have been completed. These issues, and their causes and sources are discussed in greater detail below.

4.1 Water Management

Water management issues include both flooding and drought. The stakeholders identified flooding as an issue in the Overcup Slough watershed, as well as the need for improved water use efficiency and storage capacity.

4.1.1 Locations Where Water Management is an Issue

Stakeholders were concerned that irrigation water be managed better so that less is lost downstream. Flooding was also raised as an issue, however, no specific locations were identified as particularly problematic. Given the flat topography and presence of poorly drained soils, it is likely this is an issue throughout the watershed.

4.1.2 Causes

During storms, water backs up and causes flooding. During the growing season, rainfall and surface water are not adequate to support crops.

4.1.3 Sources

Terrain in the watershed is relatively flat, making it less likely to drain well during storms. In addition, stakeholders have identified sedimentation as contributing to flooding by reducing the conveyance capacity of ditches and streams. Regional climate determines the natural availability of water during the growing season.

4.2 Water Level Declines

Groundwater levels in the Overcup Slough watershed have declined to the point that producers have to drill deeper wells to access the water. Regional estimates of groundwater level change in the Delta indicate that between 1998 and 2008 the average groundwater level decline in the area of the Overcup Slough watershed ranged from zero to 0.9 foot per year (YMD 2008). Stakeholders are also concerned about decreased water levels in the Sunflower River, used as a source of irrigation water and recreation.

4.2.1 Locations Where Water Level Declines are an Issue

Groundwater levels are declining throughout the watershed (YMD 2008). Recharge of the shallow aquifer occurs from the Sunflower River, other streams, lakes and impoundments that incise the confining layer overlaying the aquifer (Renken 1998). The majority of recharge is from infiltration of rainfall, despite the fact that soils in the Delta tend to be poorly drained (Arthur 2001).

Declining water levels in the Sunflower River are also a concern of Overcup Slough stakeholders.

4.2.2 Cause

Water is being withdrawn from the aquifer faster than it is being recharged. Base flows in most Delta streams naturally decrease during the summer months due to less rainfall. The decline in the Sunflower River water levels has occurred because the groundwater levels have declined below the level of the Sunflower River (Renken 1998).

4.2.3 Sources

Irrigation accounts for the majority of the ground and surface water withdrawals in the Overcup Slough watershed. As noted in Section 3.2, groundwater is also used to supply drinking water in the watershed.

4.3 Sediment

Stakeholders noted that sedimentation in ditches and streams contributes to flooding. They also expressed concern that the presence of Herbicide-resistant weeds in the watershed may result in increased cultivation (i.e., decreased no-till practice), which could increase erosion and sediment loads. MDEQ has determined that there is a high probability that sediment loads in Richies Bayou and Overcup Slough are at levels that interfere with fish and other wildlife. High sediment loads can affect aquatic life by causing reduced visibility (when the sediment is suspended in the water column) or by changing stream habitat when the sediment is deposited (e.g., covering spawning areas). The sediment TMDLs for these water bodies recommend that sediment loads to these water bodies be reduced, although the recommended reduction is not explicitly specified.

4.3.1 Locations Where Sediment is an Issue

Stakeholders identified drainage ditches and streams as places where sedimentation is an issue. MDEQ identified Richies Bayou (near Sherard from headwaters to confluence with Overcup Slough) and Harris Bayou (near Beverly from headwaters at Richies Bayou to the Big Sunflower River as areas where sediment was expected to be a water quality issue.

4.3.2 Cause

Sediment is the pollutant causing sedimentation and turbidity issues in these water bodies. Sediment is created by erosion of soil particles from land surfaces in the watershed and detachment of soil from the banks and beds of water bodies. Soils in the watershed tend to be fine grained, which could make them more susceptible to erosion.

4.3.3 Sources

On the Mississippi 2006 303(d) list, nonpoint sources are listed as the sources of sediment causing the impairments in the listed water bodies in the Overcup Slough watershed. In the sediment TMDL that addresses these impairments, a number of likely sediment sources were identified (MDEQ 2008d). These included agriculture, construction sites, roads, urban areas,

mass wasting, gullies, channel instability, channel modification, and historical land use activities. Locations of gullies and other erosion "hot spots" in the Overcup Slough watershed will be identified as part of the implementation of management activities described in this plan. The majority of sediment loading to streams occurs during rain storms as a result of runoff and high velocity flows (Meade et al. 1990).

4.4 Nutrient Enrichment

Stakeholders identified nutrients in runoff as an issue of concern. Stakeholders also expressed concern about the costs associated with variable-rate fertilizer applications (i.e., precision agriculture). MDEQ has determined that there is a high probability that nutrient concentrations in Richies Bayou and Overcup Slough are at levels that can create conditions harmful to fish and other wildlife. High nutrient concentrations can support unusually high growth of algae or other aquatic plants. When the algae die, their decomposition uses oxygen from the water, which can result in low oxygen levels that are harmful to fish and other aquatic life. The TMDLs for these water bodies recommend reductions of total phosphorus loads by about 95%, and reductions of total nitrogen loads by about 85% (see Table 2.1).

4.4.1 Locations Where Nutrient Enrichment is an Issue

Stakeholders did not identify specific locations where nutrients are a water quality issue. The following stream reaches were identified in the 2006 303(d) list as having impaired water quality due to nutrient enrichment:

- Richies Bayou from the headwaters near Sherard, MS to the confluence with Overcup Slough;
- Overcup Slough from the headwaters at Richies Bayou near Beverly, MS to the confluence with the Sunflower River.

4.4.2 Cause

Nitrogen and phosphorus are the pollutants that are suspected of causing eutrophic conditions in these water bodies with high productivity and low dissolved oxygen levels. Total nitrogen and total phosphorus are the species of these nutrients that were addressed in the TMDLs (MDEQ 2008a,b,c).

4.4.3 Sources

Nutrient loads are contributed by point sources and nonpoint sources in the watershed.

4.4.3.1 **Point Sources**

Two NPDES permitted point sources discharge to Overcup Slough or its tributaries. They are Farrell POTW (MS0045187), and Mascot Planting Company (MS0022225) (enSearch accessed). Both permits are for the discharge of treated domestic wastewater (i.e., treated sewage). The NPDES permit for the Farrell POTW includes limits for ammonia thatwill go into effect in 2012. The NPDES permit for the Mascot Planting Company does not include limits for nutrients. Treated domestic wastewater often contains phosphorus and other nitrogen species (e.g., nitrate) (EPA 2009).

4.4.3.2 **Nonpoint Sources**

Total nitrogen is a combination of the many forms of nitrogen found in the environment. Inorganic nitrogen can be transported in particulate and dissolved phases in surface runoff. Dissolved inorganic nitrogen can enter groundwater through infiltration, and may enter a water body through groundwater seepage or discharge. Finally, atmospheric gaseous nitrogen may enter a water body through diffusion, and dissolved and particulate nitrogen species can enter through atmospheric deposition.

Phosphorus is primarily transported in surface runoff when it has been sorbed to eroding sediment. Phosphorus may also be associated with fine-grained particulate matter in the atmosphere and can enter streams as a result of dry fallout and rainfall (EPA 1999). Phosphorus may also be contained in the surface runoff due to fertilizers and animal excrement or watersheds with naturally occurring soils that are rich in phosphorus (Thomann and Mueller, 1987).

Watersheds with a large number of failing septic tanks may also deliver significant loadings of phosphorus to a waterbody. Phosphorus levels are also high in groundwater in the Delta, so phosphorus in surface waters can also come from groundwater seepage or discharge. USGS has an ongoing sampling program to quantify the cause of phosphorus in groundwater.

On the Mississippi 2006 303(d) list, nonpoint sources are listed as the sources of nutrients causing the impairments in Richies Bayou and Overcup Slough. In both nutrient TMDLs, cropland was assumed to contribute the majority of the nutrient load to the water bodies (MDEQ 2008a,b,c). As noted in Section 2.5, there are approximately 17,877 acres of cropland in the Overcup Slough watershed.

4.5 Organic Enrichment and Low DO

The presence of high levels of organic material in water bodies can reduce water oxygen levels such that aquatic life cannot be supported. The TMDLs addressing these impairments state that reducing nutrient loads is expected to reduce organic enrichment and low dissolved oxygen conditions (MDEQ 2008a,b,c). Therefore, no reduction is specified in the TMDLs for organic material (TBODu).

4.5.1 Locations Where Organic Enrichment and Low DO are Issues

The following stream reaches were identified in the 2006 303(d) list as impaired due to organic enrichment and low dissolved oxygen:

- Richies Bayou from the headwaters near Sherard, MS to the confluence with Overcup Slough;
- Overcup Slough from the headwaters at Richies Bayou near Beverly, MS to the confluence with the Sunflower River.

4.5.2 Cause

The TMDLs assumed that nutrient enrichment was the cause of the organic enrichment and low dissolved oxygen conditions (MDEQ 2008a,b,c). As described in Section 4.2, high nutrient concentrations in a water body can encourage the growth of aquatic plants, which

becomes organic material when it dies, and removes oxygen from the water as it decomposes. High levels of organic material decomposing in a water body deplete oxygen from the water and suffocate aquatic life.

4.5.3 Sources

While nutrient enrichment is believed to be the primary cause of organic enrichment and low dissolved oxygen conditions cited for the listed water bodies, there are potential sources of organic matter in the watershed that may also contribute to these conditions. They are discussed below. See Section 4.4.3 for a discussion of nutrient sources in the Overcup Slough watershed.

4.5.3.1 **Point Sources**

Two NPDES permitted point sources discharge to Overcup Slough or its tributaries. They are Farrell POTW (MS0045187), and Mascot Planting Company (MS0022225) (enSearch accessed). Both permits are for the discharge of treated domestic wastewater (i.e.,treated sewage). The NPDES permit for the Farrell POTW includes limits for oxygen demand and dissolved oxygen. The NPDES permit for the Mascot Planting Company also includes limits for oxygen demand (Table 4.1). While these types of discharges can deplete oxygen downstream of the discharge point, the effect is usually fairly localized.

Table 4.1. NPDES Permit Limits for Point Sources of Organic Enrichment

Discharge	Phase	BODs Limits		DO Limits
		Avg	Max	Min
Farrell POTW	I	45 mg/L	65 mg/L	Report
	II	6 mg/L	9 mg/L	6 mg/L
Mascot Planting Company	NA	30 mg/L	40 mg/L	NA

4.5.3.2 **Nonpoint Sources**

Organic material, such as crop residue, leaves, and chaff, can be washed into the water body from the surrounding land, and exert an oxygen demand as they decompose. Sources can also include plants along the stream banks.

4.6 Pesticides

Stakeholders identified the potential for runoff to carry pesticides to ditches and streams as a concern. They also expressed concern that the presence of Herbicide-resistant weeds in the watershed may lead to increased herbicide application. A fish consumption advisory is in effect for long-lived pesticides in selected fish species that covers all Delta streams and lakes, including those in the Overcup Slough watershed (see Section 2.6.2.4). Pesticide concentrations in soils, surface water and groundwater have not been identified as a health concern.

4.6.1 Locations Where Pesticides are an Issue

Legacy pesticides in fish are an issue for all Delta water bodies, including Overcup Slough, its tributaries, and all other water bodies in the watershed. Stakeholders are concerned about the effects of current-use pesticides on wildlife that live in and use local ditches and streams. Herbicide-resistant weeds can occur in fields and lands around fields, including ditches.

4.6.2 Causes

DDT and Toxaphene are the pesticides named in the Delta-wide fish consumption advisory. These pesticides degrade very slowly in the environment and are bioaccumulative, meaning they accumulate in living tissue and can be passed on to other organisms, including humans, through the food chain. Eventually, these pesticides can accumulate in certain fish species to the point that eating those fish can cause health problems in people. DDT and Toxaphene have been measured in fish tissue throughout the Delta at levels that may harm human health.

4.6.3 Sources

Stakeholders expressed concern about the potential for field applications of herbicides to contribute pesticides to surface waters. As weeds become resistant to commonly-used herbicides, application rates and frequency of herbicide applications can increase, which increases the potential for herbicides to enter surface waters.

DDT and Toxaphene are no longer used in the US. The use of DDT was banned in the US in 1973, and use of Toxaphene was banned in 1982. Historically, however, DDT and Toxaphene were commonly used on croplands in the Delta, including the 17,877 acres of cropland in the Overcup Slough watershed. Because it takes decades for these chemicals to degrade, they are still found in soils, sediments, and living organisms in the Delta. Recent measurements of concentrations of DDT and Toxaphene in fish tissue collected from the Delta indicate that concentrations of these pesticides are decreasing (MDEQ 2001). This suggests that the residual DDT and Toxaphene is finally degrading.

5.0 RESTORATION AND PROTECTION GOALS

5.1 Water Quality

The restoration and protection goals for the Overcup Slough watershed are based, in part, on the goal of the Delta Nutrient Reduction Strategy; which is answering the following questions:

1. What percent reduction of sediment, nitrogen, and phosphorus loading is possible?
2. What do the sediment, nitrogen and phosphorus load reductions cost?
3. What are the benefits of these load reductions for stakeholders?
4. What nutrient load reductions will protect Delta water quality and the Gulf of Mexico?

5.2 Water Quantity

The restoration and protection goals for the Middle Porter Bayou Watershed are also based partly on the goals of the Mississippi Delta Sustainable Water Resources Imitative, some of which include the following questions:

1. How much groundwater recharge is possible in the watershed?
2. How much groundwater savings can be achieved with voluntary conservation measures?
3. How much groundwater savings can be achieved through the development and use of surface water resources in the watershed?

6.0 TARGETING AND PRIORITIZATION

BMPs are being planned for implementation in the Overcup Slough watershed through several projects. The prioritization and targeting approaches used for these projects are described below.

6.1 Delta Nutrient Reduction Strategy

Nutrient loading in agricultural runoff varies by region, watershed, and individual field. The nutrient cycle in an agricultural watershed is extremely complex with many inputs and variables. To fully address the issue, a comprehensive approach must be used to ensure that all factors are considered. As part of the Delta Nutrient Reduction Strategy, the Site Characterization Work Group was tasked with developing a strategy to prioritize agricultural systems for nutrient reduction.

Using this strategy, systems within the Overcup Slough watershed were classified based on soil type, cropping practices, and existing drainage infrastructure. Soils were classified as ***heavy*** (clays), ***medium*** (loams) ***light*** (sandy loams), and ***mixed*** (clay, loam, and sandy loams found in close proximity due to ridge and swale topography). Cropping practices were initially classified as ***irrigated*** or ***dry land***, and then by crop type - ***soybeans***, ***rice/soybean rotation***, ***cotton,*** or ***corn***. Drainage infrastructure was classified as ***developed*** or ***undeveloped***. Developed land typically consists of leveled or precision graded fields with pipes, pads, and tailwater ditches, or ridge and swale land that has been shaped to facilitate furrow irrigation. Undeveloped land includes areas with significant ridge and swale and/or that are subject to frequent flooding. These areas are not developed because the development cost exceeds potential benefits.

Project sites within the Overcup Slough watershed will be selected for implementation of nutrient reduction BMP's (figure 6.1) These proposed sites are characteristic of systems that are representative of the agricultural landscape throughout the Overcup Slough watershed. .

6.2 Mississippi River Basin Initiative - Cooperative Conservation Partnership Initiative

Catchments with active or planned water quality monitoring will be given priority to receive funds under the Mississippi River Basin Initiative – Cooperative Conservation Partnership Initiative (MRBI-CCPI) program. Producers must submit applications for funding to the Coahoma County NRCS office.

6.3 Mississippi River Basin Initiative- Wetland Reserve Enhanced Program

Areas within the Overcup Slough watershed will be prioritized for wetland restoration based on gaps in waterfowl and wildlife habitat, existence of Wetland Reserve Program (WRP) contracts and producer willingness to participate in WRP. Ranking criteria for high priority restoration and enhancement projects, developed by DW and MDWFP, include factors such as location, riparian buffers, water availability, proximity to other waterfowl habitat, and connectivity with surrounding habitat. The Forest Breeding-Bird Decision Support Model results will also be considered as part of the prioritization process. In consultation with local NRCS staff, these ranking criteria will be used to help prioritize sites for WRP contracts.

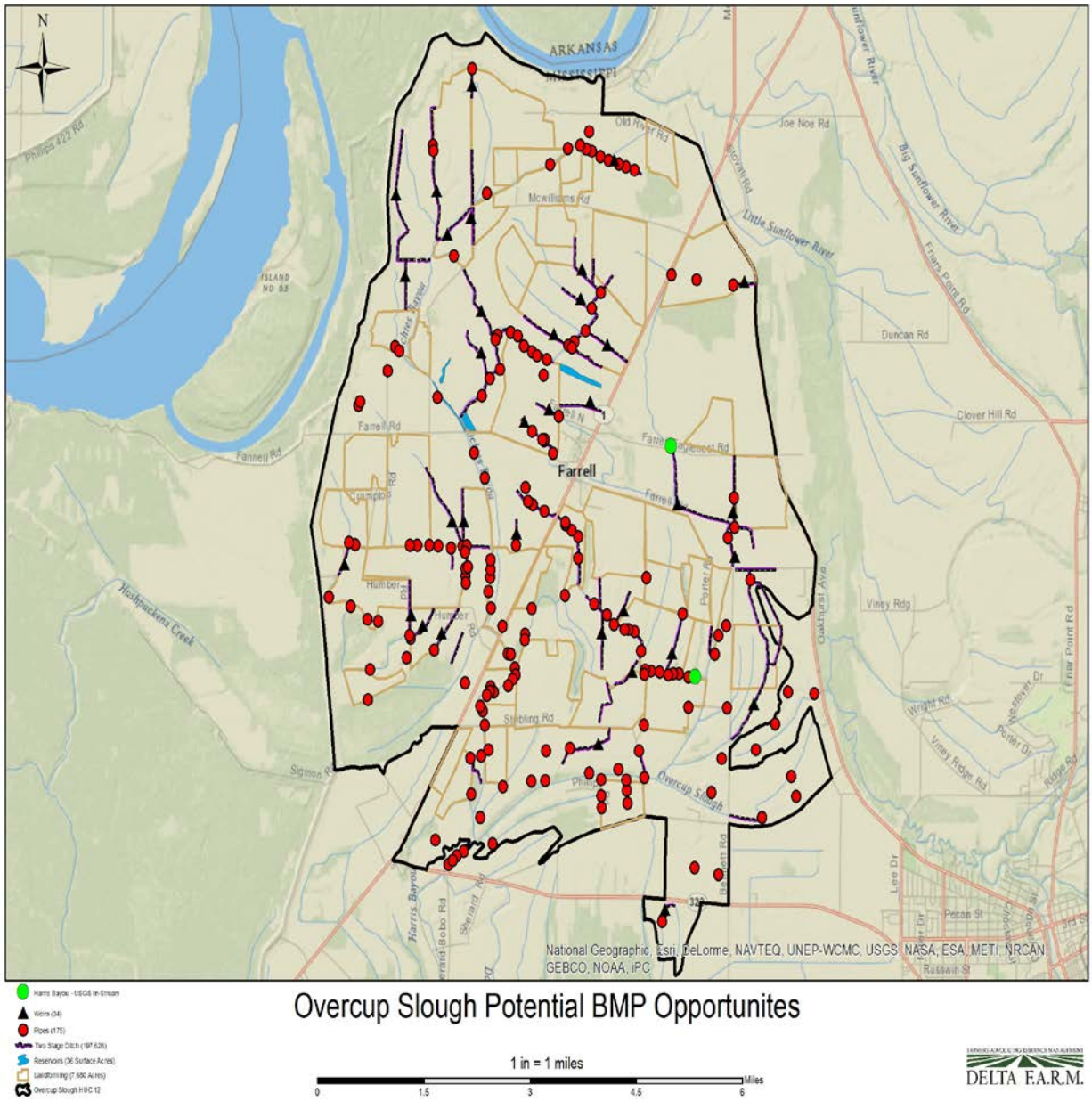

Figure 6.1 Overcup Slough Potential BMP Opportunities

6.4 Harris Bayou Drainage District Projects

The Harris Bayou Drainage District (HBDD) conducts annual maintenance primarily in the waterway and floodway of Overcup Slough. Sediment and trash accumulation are the primary problems within the drainage district ditches. These problems lead to poor drainage and flooding in portions of the watershed. HBDD has ongoing projects to address these concerns but lack the financial means to continually address trouble spots.

7.0 MANAGEMENT

There are two underlying management principles of this WIP: ecosystem-based management and adaptive management. The goals and objectives of this plan reflect these principles. Each of these management principles is briefly described below, followed by watershed management actions that are planned for the near future to work toward the vision for Overcup Slough. Goals related to other existing or potential concerns in this watershed will be addressed in future implementation plans.

7.1 Ecosystem-Based Management

An ecosystem-based approach is being used for watershed management in the Overcup Slough watershed. Overcup Slough and its watershed represent the ecosystem management unit. Although bayous and lakes are typically considered the ecosystem, water bodies and their watershed are inexorably coupled. Land use and land cover activities in the watershed directly or indirectly affect the water body. Sediment and nutrient loadings from the watershed drive many aquatic ecosystem processes, including both desirable and undesirable changes in the water body. The ecosystem, however, is characterized not only by its environmental attributes, but also by its socioeconomic attributes. Humans are part of, not apart from, aquatic ecosystems. Watershed management is fundamentally a social activity (Thornton and Creager 2001).

The benefits that accrue from reduced sediment and nutrient loadings to water bodies in the Overcup Slough watershed are not just in terms of increased water clarity, reduced sedimentation, increased water quantity, reduced flooding, reduced algal blooms, a more productive sport fishery, and greater recreational and aesthetic values. The agricultural community also benefits from reduced sediment and nutrient loadings. For example, Pimentel et al. (1995) estimated that each ton of soil lost to erosion was worth about $6.75 per year to the farmer ($5.00 per ton for lost nutrients, and $1.75 per ton for lost soil and water capacity). The Delta sediment TMDL estimates that at least 0.007 tons per acre per day of sediment is lost from Delta watersheds. Based on this loss rate, just over approximately 44,000 tons of soil are lost from the Overcup Slough watershed each year (17,378 acres x 0.007 x 365), and the minimum estimate of dollars lost from the watershed is about $297,000 per year (44,000 x $6.75).

These estimates are very conservative because they are based on yield from the watershed, not loss from the fields (field losses are higher than delivery to the waterbody).

7.2 Adaptive Management Process

In addition to ecosystem-based management, an adaptive management process is being used for watershed management in the Overcup Slough watershed. Adaptive management is "learning by doing" and has become the recommended approach for ecosystem and natural resources management, including watershed management (Christensen et al. 1996; Holling 1978; Jackson et al. 2001). Adaptive management has helped shift management from the concept that there is a "balance of nature" to a more realistic concept that ecosystems are dynamic, non-equilibrium systems. The environment is continually changing – climate, development, agricultural practices, demographics, and societal values. Adaptive management is the only feasible approach for moving toward sustainable water resources (Coleman 1998).

Adaptive management, or learning by doing, means that periodic assessments must be made to determine if results-based criteria are being attained and if the water bodies and watershed are moving toward the desired vision for Overcup Slough and its watershed. The schedule for these periodic assessments and revision of the watershed management plan is discussed in Chapters 9 and 10. The rotating basin approach used by MDEQ is part of this periodic assessment process.

7.3 Planned activities

There are two key factors in this watershed that dictate which BMPs will be successful, *irrigation* and *development*. With development comes an increased financial investment by the landowner. As land cost increases, landowner willingness to take land out of production to implement BMPs decreases. This scenario calls for larger BMPs to be implemented in undeveloped areas that will treat runoff from upstream, developed areas. The less developed areas of the watershed are characterized by ridge and swale topography and there are more

opportunities for BMP implementation. Low-lying swales are suitable for treatment wetlands, while unimproved drainage ditches are prime candidates for low grade weirs, tail water recovery systems, and other BMPs.

Irrigation, particularly of rice, introduces an additional factor into the nutrient equation. Non-storm flows in most Delta streams naturally decrease during the summer months due to less rainfall. Irrigation water supplements these non-storm flows and often provides a constant source of runoff throughout the growing season. Although increased non-storm flows benefit many aspects of stream health and water quality, it also reduces the ability of some BMPs to trap nutrients. For example, multiple low grade weirs are designed to trap and pool runoff, allowing biological transformations to occur. With a steady non-storm flow the utility of these in-stream BMPs can be diminished. To effectively treat this type of runoff, BMPs should be capable of treating or reusing large volumes of water. Therefore, for areas of the watershed characterized by both development and irrigation, the primary BMPs will be tail water recovery systems, on farm water storage reservoirs, and treatment wetlands.

Given these considerations, the management practices currently targeted for the Overcup Slough watershed include:

- Nutrient and sediment BMPs,
- Enroll marginal agricultural lands in wetland restoration programs,
- Water management projects
- Water quantity projects

7.3.1 Nutrient and Sediment BMPs

Overcup Slough has been targeted for monitoring and installation of BMPs to reduce nutrient and sediment loads in cropland runoff. Specific nutrient and sediment BMPs that will be installed include:

- Low-grade weirs,
- Irrigation tailwater recovery systems,
- Irrigation land leveling,
- Underground irrigation pipeline,
- Grade stabilization structures,
- Two stage ditches,
- Grassed waterways,
- Dropped inlet structures,
- Input management, and
- Conservation easements.

These BMPs are discussed below.

7.3.1.1 **Low-grade Weirs**

Installation of low-grade weirs in agricultural drainage ditches can improve water quality through removal of sediment and nutrients. The weirs slow flow during storm events and allow sediment to be deposited. In addition, holding water in the ditches behind the weirs creates environments that encourage biogeochemical transformation of nutrients, as well as contribute to groundwater recharge (Kroger et al 2008a). One study in the Delta determined that low-grade weirs reduced annual phosphorus loads from cropland runoff by over 40% (Kroger et al. 2008). Low-grade weirs will be installed in ditches throughout the watershed as funding allows through various cost share programs. (Figure 7.1). Table 7.1 provides additional information about installation of low-grade weirs in the Overcup Slough watershed.

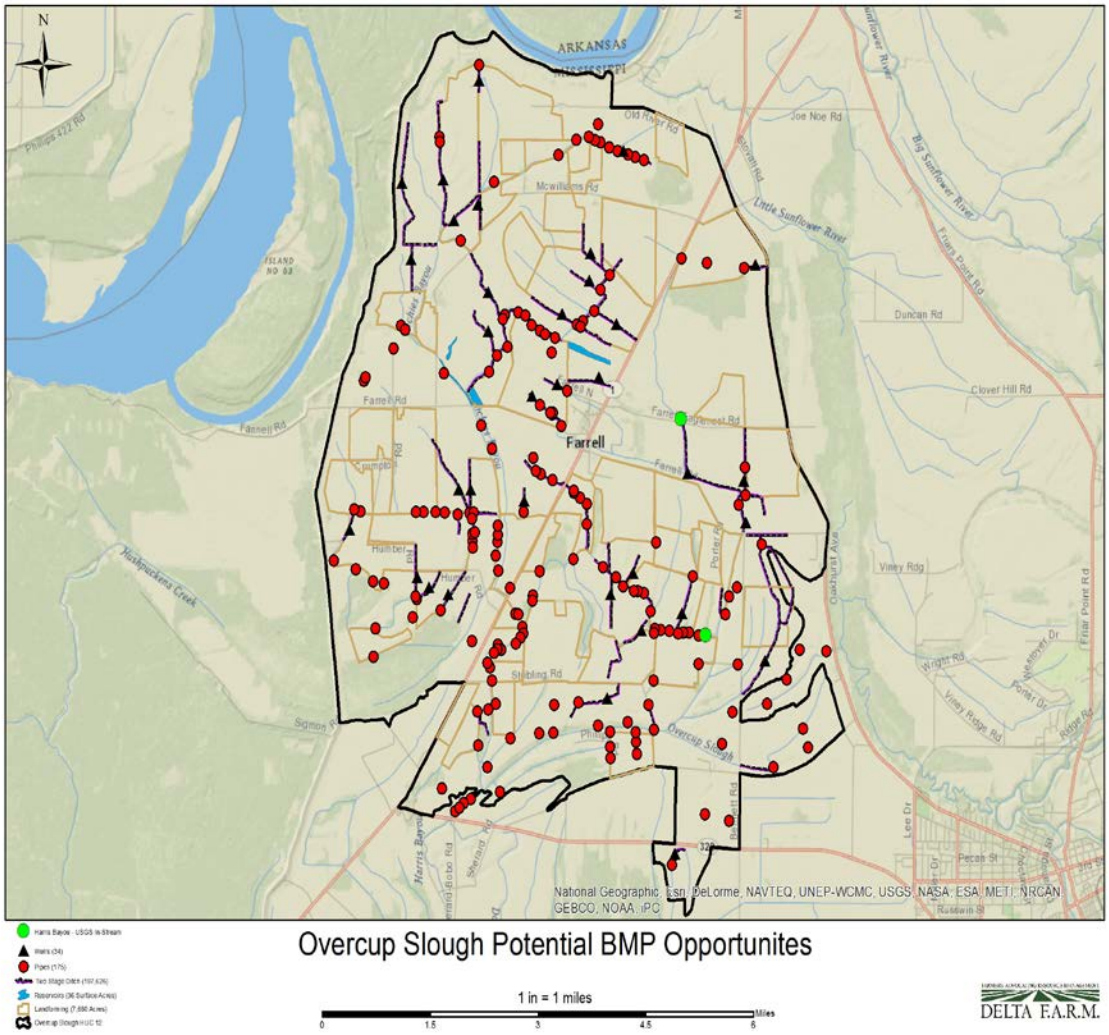

Figure 7.1. Proposed Locations for Low-Grade Weirs (black) in Overcup Slough Catchments

Table 7.1. Implement Low Grade Weirs

Management Action	•Implement low grade weirs	
Objective	• Reduce sediment and nutrient loads into Overcup Slough	
Performance Measure	•Reduce sediment loading to Overcup Slough by 30% •Reduce nitrogen loading to Overcup Slough by 40% • Reduce phosphorous loading to Overcup Slough by 50%	
Benefits	• Increase groundwater recharge •Decreased sediment loading to downstream receiving systems • Decreased downstream nitrogen loading through denitrification and nitrogen uptake by aquatic vegetation • Decreased downstream phosphorous loading through sedimentation and uptake by aquatic vegetation	
Participant	Activity	Schedule
Private Landowner	Private landowner voluntarily participating and contributing cost-share portion of low grade weir expenses	2014-2017 Installation of low grade rip rap or concrete weirs.
EPA NPS Section 319	Provide funding assistance for cost-sharing of low grade weirs through Section 319 funding in the NPS program	
MS Department of Environmental Quality	Contract with Delta F.A.R.M. to administer 319 funds with individual farmers	2014 though 2029 – Landowner maintenance of low-grade weirs.
USDA NRCS	Provide technical and financial assistance to producers for implementation of low grade weirs through NRCS programs (i.e. EQIP and MRBI).	Budget
Delta F.A.R.M.	Technical design and installation of low grade weirs. Provide technical services and outreach to producers on the implementation, maintenance, and benefits of this management practice.	34 Low grade weirs @$5,000 = $170,000 Weir maintenance @ $875/year for 15 year contract = $446,250 **Total = $616,250**
USGS	Matching funds through cooperative partnership with MDEQ to monitor base and storm flow water quantity and quality associated with implementation of the low grade weirs.	

7.3.1.2 **Pads and Pipes**

Pad and pipe systems control field runoff to reduce erosion and sediment delivery to downstream waters. The pad (a dike) routes flow through the pipe to provide an non-erodible route for runoff as an alternative to unlined ditches or gullies. This practice has been classified by the Mississippi NRCS as having the potential to decrease sediment loads slightly to significantly.[6] This practice is not expected to significantly affect nutrient loads, except for phosphorus associated with sediment loads.[7] Pad and pipe systems have already been installed in Overcup Slough by some producers in the watershed. However, there is potential for installation in additional locations throughout the Overcup Slough watershed (Figure 7.1). These systems could be designed and installed by the landowner, with assistance from Delta F.A.R.M or NRCS. Financial assistance for installation and maintenance of these systems may be provided by through the EPA Section 319 grant funds, NRCS cost share programs, or privately funded by the landowner or producer. See Table 7.2 for details of the plans for installing these systems in the Overcup Slough catchment.

7.3.1.3 **Irrigation Tailwater Recovery Systems**

Tailwater recovery systems collect irrigation runoff water for reuse. This makes for more efficient use of irrigation water. Holding runoff water, such as in a collection pond, allows sediment to settle out, and creates environments that encourage biogeochemical transformation of nutrients, as well as contribute to groundwater recharge. In addition to water use management and water quality improvement, tailwater recovery ponds can benefit several of the species of concern identified in Section 3.3. Tailwater recovery systems are planned for the watershed and will be installed where suitable. (Figure 7.2). The systems will be designed to recover drainage from cropland in the watershed. Systems may be designed and installed by the landowner with assistance from NRCS and Delta F.A.R.M. Financial assistance for installation of systems may be available from NRCS programs and/or EPA 319 grant funds. See Table 7.3 for details of the plans for installation of tailwater recovery systems in Overcup Slough watershed.

[6] http://efotg.sc.egov.usda.gov/references/public/MS/ms-cppe-soil_706.PDF accessed
[7] http://www.nrcs.usda.gov/technical/standards/nhcp.html accessed

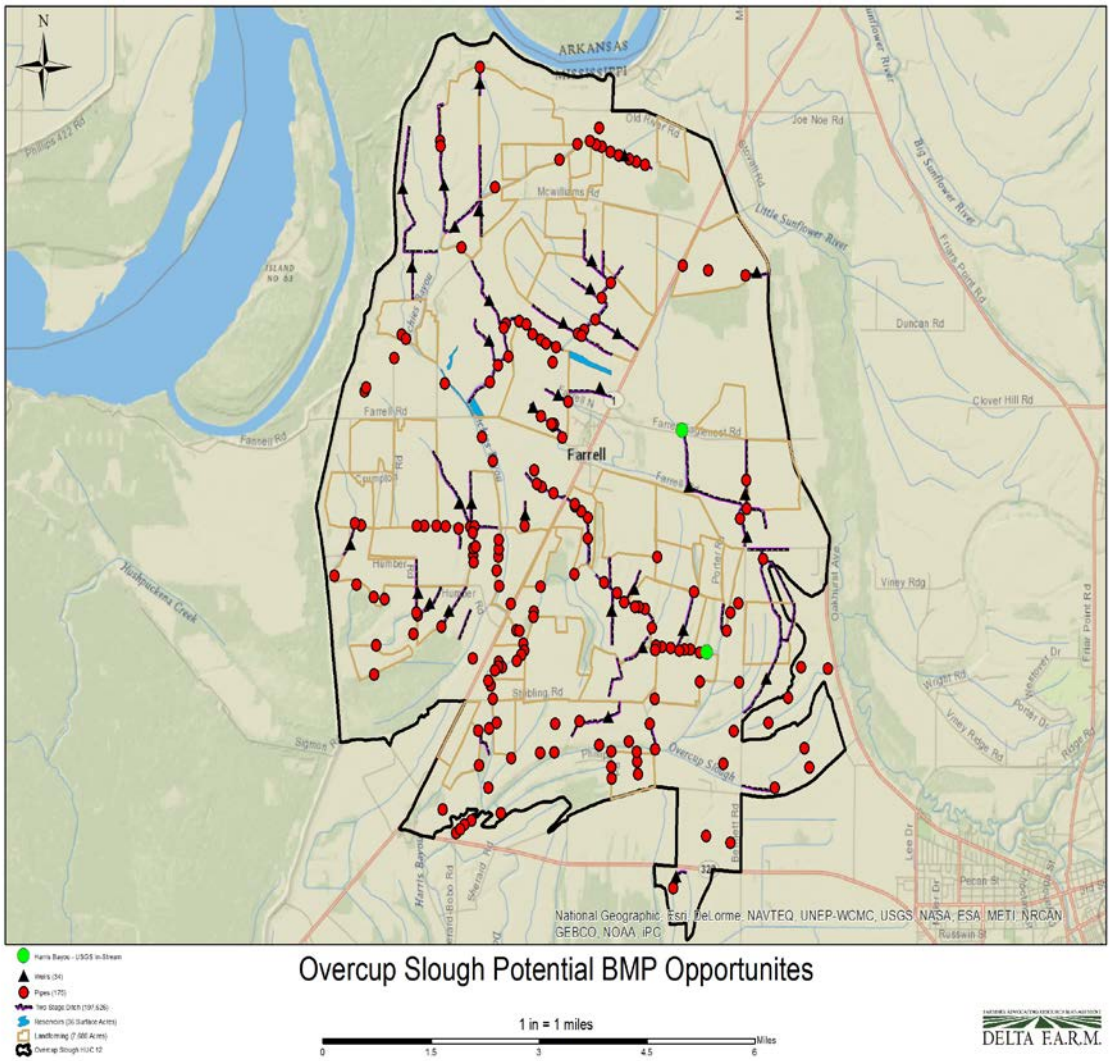

Figure 7.2. Irrigation Tailwater Recovery System Possible Locations (Blue)

Table 7.2. Implement Pads and Pipes

Management Action	Implement pads and pipes	
Objective	• Reduce sediment and nutrient loads to Overcup slough	
Performance Measure	•Reduce sediment loading to Overcup Slough by 30% •Reduce nitrogen loading to Overcup Slough by 40% • Reduce phosphorous loading to Overcup Slough by 50%	
Participant	Activity	Schedule
Private Landowner	Private landowner's voluntarily participating and contributing cost-share portion of pad and pipe expenses.	2014-2017 installing pads and pipes 2014 through 2029 – Landowner maintenance of pads and pipes.
EPA NPS Section 319	Provide funding assistance for cost-sharing of pads and pipes through Section 319 funding in the NPS program.	
MS Department of Environmental Quality	Contract with Delta F.A.R.M. to administer 319 funds with individual farmers.	Budget
USDA NRCS	Provide technical and financial assistance to producers for implementation of pads and pipes through NRCS programs (i.e. EQIP and MRBI).	560,394 Ft/Pad @$2.50 = $1,400,985 175 Pipes @ $2,500 = $437,500 Pipe maintenance @ $200/year for 15 year contract = $525,000 **Total = $2,363,485**
Delta F.A.R.M.	Technical design and installation of pads and pipes. Provide technical services and outreach to producers on the implementation, maintenance, and benefits of this management practice.	
USGS	Matching funds through cooperative partnership with MDEQ to monitor vase and storm flow water quantity and quality associated with implementation of that pads and pipes.	

Table 7.3. Implement Irrigation Tailwater Recovery Systems

Management Action	•Implement tailwater recover (TWR) systems	
Objective	• Reduce groundwater depletion in the Delta and reduce sediment and nutrient loads to Overcup Slough	
Performance Measure	•Reduce groundwater withdrawal by 36 ac-ft per year per system •Reduce sediment loading to Overcup Slough by 30% •Reduce nitrogen loading to Overcup Slough by 40% • Reduce phosphorous loading to Overcup Slough by 50%	
Benefits	• Decreased electricity/ diesel cost of pumping irrigation water •Decreased nitrogen fertilizer costs by recirculation of irrigation return water • Decreased thermal shock to plants by using surface water vs. groundwater for irrigation • Decreased sediment and nutrient loading to downstream receiving systems	
Participant	Activity	Schedule
Private Landowner	Private landowner voluntarily participating and contributing cost-share portion of TWR expenses as set forth in NRCS EQIP, MRBI or other programs.	2014-2017 Installation of TWR systems
EPA NPS Section 319	Provide funding assistance for cost-sharing of TWR systems though Section 319 funding	
MS Department of Environmental Quality	Contract with Delta F.A.R.M. to administer 319 funds with individual farmers	2014 though 2029 – Landowner operation and maintenance of TWR Systems.
USDA NRCS	Provide technical and financial assistance to producers for implementation of TWR systems through NRCS programs (i.e. EQIP and MRBI).	Budget
Delta F.A.R.M.	Technical design and installation TWR systems. Provide technical services and outreach to producers on the implementation, maintenance, and benefits of this management practice.	$2,716 per ac/ft storage $30,000 equipment per system 3 systems – 20 ac/ft each
USGS	Matching funds through cooperative partnership with MDEQ to monitor base and storm flow water quantity and quality associated with implementation of the TWR systems.	60 ac/ft @ $2716 = $162,960 3 equipment sets @ $30,000 = $90,000 **Total = $252,960**

7.3.1.4 **Irrigation Land Leveling**

This practice involves modifying the shape of the land to planned grades that permit uniform and efficient application of irrigation water, reduce erosion and water logging, and provide for adequate drainage and is often implemented in conjunction with pads and pipes. Land leveling is an eligible practice for the NRCS, MRBI-CCPI and EQIP programs. See Table 7.4 for details of the plans for implementing this practice in the Overcup Slough watershed.

7.3.1.5 **Underground Irrigation Pipeline**

This practice involves installing low pressure, underground plastic pipeline for the conveyance of water for irrigation. Use of underground pipe can reduce erosion and water loss, and is a necessary component of other practices such as land leveling and tailwater recovery. Installation of underground irrigation pipe is an eligible practice for the NRCS, MRBI-CCPI and EQIP programs. Based on historical averages, it is estimated that approximately 20,000 feet of low pressure, underground, plastic pipe will be installed for irrigation water in the Overcup Slough watershed. See Table 7.5 for details of the plans for installing underground irrigation pipe in the Overcup Slough watershed.

Table 7.4 Implement Irrigation Land Leveling

Management Action	•Implement land leveling	
Objective	• Reduce groundwater depletion in the Delta and reduce sediment loads to Overcup Slough	
Performance Measure	•Reduce sediment loading to Overcup Slough by 30% •Reduce nitrogen loading to Overcup Slough by 40% • Reduce phosphorous loading to Overcup Slough by 50%	
Benefits	• Decreased sediment loading to downstream receiving systems •Reduce groundwater withdrawals by increasing efficiency of irrigation use	
Participant	Activity	Schedule
Private Landowner	Private landowner voluntarily participating and contributing cost-share portion of land leveling expenses	2014 – 2017 Installation
USDA NRCS	Provide funding assistance for cost-sharing of land leveling through MRBI program.	
EPA NPS Section 319	Provide funding assistance for cost-sharing of land leveling through Section 319 funding in the NPS program	
MS Department of Environmental Quality	Contract with Delta F.A.R.M. to administer 319 funds with individual farmers.	Budget
Delta F.A.R.M.	Technical design and installation of land leveling. Provide technical services and outreach to producers on the implementation, maintenance, and benefits of this management practice.	7,680acres@$650/Acre = $4,992,000 **Total = $4,992,000**
USGS	Matching funds through cooperative partnerships and MDEQ to monitor base and storm flow water quantity and quality associated with implementation of the management practice.	

Table 7.5 Underground Irrigation Pipe

Management Action	•Install underground irrigation pipe	
Objective	• Reduce groundwater withdrawals and reduce sediment load to Overcup slough	
Performance Measure	•Reduce groundwater withdrawal by 36 ac-ft per year per system •Reduce sediment loading to Overcup Slough by 30% •Reduce nitrogen loading to Overcup Slough by 40% • Reduce phosphorous loading to Overcup Slough by 50%	
Benefits	• Decreased groundwater withdrawals by reducing water losses •Decreased sediment loading to downstream receiving systems	
Participant	Activity	Schedule
Private Landowner	Private landowner voluntarily participating and contributing cost-share portion installation expenses.	2014-2017 Installation
USDA NRCS	Provide technical and financial assistance through EQIP, MRBI, AWEP and similar programs.	
MS Department of Environmental Quality	Contract with Delta F.A.R.M. to administer 319 funds with individual farmers.	
Delta F.A.R.M.	Provide technical services and outreach to producers on the implementation, maintenance, and benefits of this management practice.	
Budget		
Installation of 60,000 ft of underground pipe @ $8.00/ft **Total = $480,000**		

7.3.1.7 **Grassed Waterways**

Grassed waterways convey runoff with minimal erosion, and can trap both sediment and nutrients. Grassed waterways are eligible practices for the MRBI-CCPI and EQIP program, and may beinstalled at potential locations in the watershed. See Table 7.6 for additional information on the plans for installation of grassed waterways in the Overcup Slough watershed.

7.3.1.8 **Two-stage Ditches**

Constructing or modifying agricultural drainage ditches to include a small channel to carry effective discharge and benches to act as floodplains during higher flows. This type of construction can increase the stability of the ditch, reduce maintenance, and improve ecological function (NEH, 2007). See Table 7.7 for additional information on the plans for installation of two-stage ditches in the Overcup Slough watershed.

7.3.1.9 **Conservation Easements**

Enrolling land in conservation programs can reduce erosion and runoff of sediment and nutrients. These lands can reduce erosion through stabilizing soil. Conservation lands can also act as filters to remove sediment and nutrients in runoff. Conservation programs generally provide some kind of financial incentive or compensation in return for removing the land from cultivation, such as rental payments, cost-share for restoration work, or tax credits. The USDA manages several programs for land conservation in Mississippi, including the Conservation Reserve Program, Conservation Stewardship Program, and Wildlife Habitat Enhancement Program. The Mississippi Fish and Wildlife Foundation also manage a conservation easement program, as does the Mississippi Land Trust and Ducks Unlimited and Delta Wildlife

Table 7.6 Implement In-field Sediment Management Practices

Management Action	•Implement In-field sediment management practices	
Objective	• Reduce sediment and nutrient loads to Overcup Slough by installing grassed waterways	
Performance Measure	•Reduce sediment loading to Overcup Slough by 30% •Reduce nitrogen loading to Overcup Slough by 40% • Reduce phosphorous loading to Overcup Slough by 50%	
Benefits	• Field grade stabilization •Decreased soil erosion and increased agricultural production • Decreased loads to receiving streams of organic material and nutrients sorbed to soil particles • Increased soil organic and nutrient content	
Participant	Activity	Schedule
Private Landowner	Private landowner voluntarily participating and contributing cost-share portion of management practices	2014 - 2017 Installation of grassed water ways and filter strips.
USDA NRCS	Provide funding assistance for cost-sharing through, EQIP, MRBI and similar programs.	
EPA NPS Section 319	Provide funding assistance for cost-sharing of land leveling through Section 319 funding in the NPS program	
MS Department of Environmental Quality	Contract with Delta F.A.R.M. to administer 319 funds with individual farmers.	Budget
Delta F.A.R.M.	Technical design and installation of sediment management practices. Provide technical services and outreach to producers on the implementation, maintenance, and benefits of this management practice.	Grass Waterway 3,500ft @20.00/ft = $21,000 Filter Strips 10 acres @ $400/ac = $4,000 Cost of taking land out of production 10 acres @ $5,000/acre = $50,000 **Total = $75,000**

Table 7.7 Design, Construct, and Maintain Two-Stage Ditches

Management Action	•Design, construct, and maintain two-stage ditches	
Objective	• Reduce sediment and nutrient loads to Overcup Slough	
Performance Measure	•Reduce sediment loading to Overcup Slough by 30% •Reduce nitrogen loading to Overcup Slough by 40% • Reduce phosphorous loading to Overcup Slough by 50%	
Benefits	• Increase groundwater recharge •Decreased sediment loading to downstream receiving systems • Decreased downstream nitrogen loading through denitrification and nitrogen uptake by aquatic vegetation • Decreased downstream phosphorous loading through sedimentation and uptake by aquatic vegetation	
Participant	Activity	Schedule
Private Landowner	Private landowner voluntarily participating and contributing cost-share portion of two stage ditch expenses	2014 - 2017 Installation of two stage ditches
USDA NRCS	Provide technical assistance for design.	
EPA NPS Section 319	Provide funding assistance for cost-sharing of land leveling through Section 319 funding in the NPS program	
MS Department of Environmental Quality	Contract with Delta F.A.R.M. to administer 319 funds with individual farmers.	Budget
Delta F.A.R.M.	Technical design and installation of two stage ditches. Provide technical services and outreach to producers on the implementation, maintenance, and benefits of this management practice.	Two State Ditch Construction $15/ft 197,626Lnft = $2,964,390
USGS	Matching funds through cooperative partnerships and MDEQ to monitor base and storm flow water quantity and quality associated with implementation of the management practice.	**Total = $2,964,390**

7.3.1.10 **Input Management**

Precision agriculture refers to one technique for managing crop inputs and yields using spatially referenced monitoring of field nutrient content, soil quality, and crop yield to more precisely apply fertilizers and pesticides using computer controlled equipment (Hudson and Hite 2001). Precision agriculture is expected to reduce the amount of inputs producers use, reducing their production costs, and runoff and infiltration of fertilizer nutrients and pesticide chemicals.

There is currently concern among Delta producers about the high start-up costs of precision agriculture, and the uncertainty about whether the technique actually increases producer profits. There is also uncertainty among producers about how to implement the techniques, and if it is even needed in the Delta. This technique was developed in the upper Midwest, which has very different soils and nutrient cycling than the Delta. Table 7.8 contains additional information.

7.3.2 Enroll Lands in Wetland Reserve Program

Natural and constructed wetlands have been shown to improve water quality through removal of sediment and nutrients. Slower flow through the wetlands allows sediments to be deposited. Nutrients are used by wetland plants, and sorbed by wetland soils. The wet environment encourages biogeochemical transformation of nutrients. In addition, wetlands contribute to groundwater recharge .

Overcup Slough watershed is a target watershed under the MRBI Wetland Reserve Enhancement Program (WREP). Approximately 7,905 acres of wetlands currently exist in the Overcup Slough watershed (Figure 2.3). There are already a few wetland easements in the watershed. Financial assistance for design, installation, and maintenance of restored wetlands will be available from the NRCS through the WREP. See Table 7.9 for additional information about wetland restoration activities planned for Overcup Slough watershed.

7.3.3 Wildlife Management

Projects may be implemented in the Overcup Slough watershed with the purpose of improving and extending habitat for wildlife, primarily birds. These include restoration and management of wetlands through the Wetland Reserve Program, and shallow water development and management. Restored wetlands can provide wintering habitat, migratory stop-over sites, late summer/fall foraging sites, and breeding/nesting habitat for a number of waterfowl, forest, and migratory bird species. Shallow water development and management involves inundating fields during the winter to provide habitat for wildlife, including native and migrating waterfowl, migrating shorebirds, amphibians, and fish. As noted in Section 7.3.2, wetland restoration and management activities in Overcup Slough are eligible for assistance under the MRBI WREP. Shallow water development in Overcup Slough watershed is eligible for assistance under the NRCS EQIP and MRBI-CCPI programs. See Table 7.10 for additional information about shallow water development planned for Overcup Slough watershed.

Other management practices also have the potential to improve or extend habitat for wildlife. Tailwater recovery ponds (Section 7.3.1.3) and on-farm storage ponds (Section 7.3.4.2) can provide habitat for waterfowl and amphibians.

7.3.4 Water Management Projects

Water management activities anticipated for Overcup Slough include in-channel storage, tailwater recovery systems, on-farm storage, and irrigation water management. Tailwater recovery systems are described in Section 7.3.1.3. The remaining activities are described below.

Table 7.8 Precision Agriculture and Input Management

Management Action	•Implement input management through precision agriculture	
Objective	• Reduce nutrient loading to Overcup Slough	
Performance Measure	•Reduce sediment loading to Overcup Slough by 30% •Reduce nitrogen loading to Overcup Slough by 40% • Reduce phosphorous loading to Overcup Slough by 50%	
Benefits	• More efficient use of fertilizer •Potential for yield increases through better placement • Less fertilizer loss downstream	
Participant	Activity	Schedule
Private Landowner	Private landowner voluntarily participating and contributing cost-share portion of precision agriculture and input management.	2014 - 2017 implement precision agriculture and input management practices
USDA NRCS	Provide funding assistance for cost-sharing of precision agriculture and input management t through EQIP, MRBI or other programs.	
Delta F.A.R.M.	Provide technical services and outreach to producers on the implementation, maintenance, and benefits of this management practice.	Budget 9,000 acres @ $8.75/acre/year **Total = $263,250**

Table 7.9. Restore and Manage Wetlands

Management Action	•Restore and manage wetlands	
Objective	• Increase groundwater recharge and reduce sediment and nutrient loads to Overcup Slough	
Performance Measure	•Reduce sediment loading to Overcup Slough by 30% •Reduce nitrogen loading to Overcup Slough by 40% • Reduce phosphorous loading to Overcup Slough by 50%	
Benefits	• Increased groundwater table elevations •Increased groundwater recharge •Increased and enhanced shorebird, amphibian, waterfowl, fisheries, and wildlife habitat • Improved downstream water quality through decreased sediment and nutrient loading	
Participant	Activity	Schedule
Private Landowner	Private landowner voluntarily participating and contributing cost-share portion of wetland restoration expenses as set forth in CRP, WRP, EQIP, AWEP or other program requirements.	2014-2017
USDA NRCS	Provide funding assistance for cost-sharing of wetland restoration through, CRP, WRP, EQIP and similar programs. Provide technical assistance for restoration and management of wetlands.	
Delta F.A.R.M.	Technical design and installation of wetland management practices. Provide technical services and outreach to producers on the implementation, maintenance, and benefits of this management practice.	Budget 200 acres @ $4,000/Acre **Total = $800,000**

Table 7.10. Construct and Manage Shallow Water Areas

Management Action	•Construct and manage shallow water areas	
Objective	• Reduce sediment and nutrient loads to Overcup Slough	
Performance Measure	•Reduce sediment loading to Overcup Slough by 30% •Reduce nitrogen loading to Overcup Slough by 40% • Reduce phosphorous loading to Overcup Slough by 50%	
Benefits	•Increased and enhanced shorebird, amphibian, waterfowl, fisheries, and wildlife habitat • Improved downstream water quality through decreased sediment and nutrient loading	
Participant	Activity	Schedule
Private Landowner	Private landowner voluntarily participating and contributing cost-share portion of shallow water management expenses as set forth in NRCS EQIP or other program requirements.	2014-2017
USDA NRCS	Provide funding assistance for cost-sharing of shallow water management through EQIP and similar programs. Provide technical assistance for shallow water areas.	
Delta F.A.R.M.	Increase awareness of producers about cost share programs and deadlines, facilitate the enrollment of private land owners, and provide technical services and outreach to producers on the implementation management and benefits of shallow water management practices.	Budget 2,000 acres per year for 3 years @$28/ac/year **Total = $168,000**

7.3.4.1 **On-Farm Storage**

Off-channel water storage in addition to tailwater recovery impoundments (see Section 7.3.1.2), shallow water development (see Section 7.3.3), and restoration of wetlands (see Section 7.3.2) may be installed in the Overcup Slough watershed. Development of off-channel water storage is an eligible practice under the MRBI-CCPI, AWEP and EQIP programs. Landowners will design and install off-channel water storage with assistance from NRCS and Delta F.A.R.M. Priority locations for off-channel water storage will be determined based on program prioritization criteria (Section 6.2). See Table 7.11 for additional information on installation of off-channel storage in the Overcup Slough watershed.

7.3.4.2 **Irrigation Water Management**

Irrigation water management consists of practices to track and control the volume, frequency, and application rate of irrigation water in a planned and efficient manner. Irrigation water management may be implemented in the Overcup Slough watershed through the MRBI CCPI, EQIP program. This may include implementation of the NRCS PHAUCET Irrigation Control Program. This program helps producers design flat poly pipe furrow irrigation systems by identifying the appropriate hole sizes to punch in the pipe based on variables such as the well pump rate, field slope, row lengths, and size of poly pipe (YMD 2009). This design assistance is expected to reduce water usage. Feedback from producers who have used PHAUCET has all been positive (YMD 2009). See Table 7.12 for additional information on planned implementation of irrigation water management in Overcup Slough watershed.

Table 7.11. Design, Construct, and Operate on-Farm Storage for Irrigation

Management Action	•Design, construct, and operate on-farm storage for irrigation	
Objective	• Reduce groundwater depletion in the Delta and reduce sediment and nutrient loads to Overcup Slough	
Performance Measure	• Reduce groundwater withdrawal by 160ac-ft per year per system •Reduce sediment loading to Overcup Slough by 30% •Reduce nitrogen loading to Overcup Slough by 40% • Reduce phosphorous loading to Overcup Slough by 50%	
Benefits	• Decreased groundwater withdrawal and increased groundwater recharge •Decreased electricity/diesel cost of pumping irrigation water • Decreased nitrogen fertilizer costs by recirculation of irrigation return water • Decreased thermal shock to plants by using surface water vs. groundwater for irrigation • Decreased sediment and nutrient loading to downstream receiving systems	
Participant	Activity	Schedule
Private Landowner	Private landowner voluntarily participating and contributing cost-share portion of on-farm storage expenses as set forth in NRCS EQIP, MRBI, or other program requirements.	2013-2014 Install On-farm storage reservoirs
USDA NRCS	Provide funding assistance for cost-sharing of off channel storage through EQIP, MRBI or other programs. Provide technical assistance for design, construction, and operation of on-farm storage.	
EPA NPS Section 319	Provide funding assistance for cost-sharing of land leveling through Section 319 funding in the NPS program	
MS Department of Environmental Quality	Contract with Delta F.A.R.M. to administer 319 funds with individual farmers.	Budget
Delta F.A.R.M.	Technical design and installation of on-farm storage reservoirs. Provide technical services and outreach to producers on the implementation, maintenance, and benefits of this management practice.	Construction $1,500 per ac/ft Equipment $50,000 per System Operation and Maintenance for 15 year contract period $120,000 per system 3 systems 96 ac/ft each Construction 288 ac/ft @ $1,500 = $432,000 3 equipment sets @ $50,000 = $150,000 3 maintenance @ $120,000 = $360,000 **Total = $942,000**

Table 7.12. Irrigation Water Management.

Management Action	•Implement irrigation water management practices	
Objective	• Reduce groundwater withdrawals	
Performance Measure	• 20% increase in irrigation efficiency where applied	
Benefits	• Decreased groundwater decline • Increased water levels in surrounding water bodies • Reduced production costs	
Participant	Activity	Schedule
Private Landowner	Private landowner voluntarily participating and contributing cost-share portion of irrigation management expenses.	2014 - 2017 Implement irrigation water management on multiple project sites
USDA NRCS	Provide funding assistance for cost-sharing of irrigation water management through EQIP, MRBI or other programs.	
Delta F.A.R.M.	Technical design and installation of irrigation management practices. Provide technical services and outreach to producers on the implementation, maintenance, and benefits of this management practice.	Budget
Yazoo Mississippi Delta Water Management District	Provide technical and financial assistance to producers for implementation of irrigation management practices.	3,000 acres @ $9/acre **Total = $27,000**

7.3.5 Point Source Management

The Farrell POTW will be required to achieve NPDES permit limits for ammonia in its effluent by October 2012. As a condition of its NPDES permit, the Farrell POTW was required to submit an engineering report to MDEQ describing how the facility will come into compliance with the upcoming ammonia limit, by May 2010. As of August 2010, MDEQ had not received an engineering report (personal communication, P. Bhowal, August 3, 2010). Compliance with nutrient permit limits by small POTWs is expected to be a wide-spread issue in the Delta.

7.4 Schedule

A schedule management practice implementation will be developed as funding sources are secured for plan implementation.

7.5 Budget

Table 7.13 below, summarizes the budget information for the management actions discussed above. The total estimated budget for these activities is approximately $1.6 million.

Table 7.13 Management Budget

Management Actions	Activities	Costs	Funding Sources
Nutrient and Sediment BMPs	Low Grade Weirs	$616,250	NRCS/EPA/Producer
	Tailwater Recovery	$252,960	NRCS/EPA/Producer
	Pads and Pipe	$2,363,485	NRCS/EPA/Producer
	Two Stage Ditch	$2,964,390	NRCS/EPA/Producer
	Grassed waterway & riparian buffers	$75,000	NRCS/FSA/EPA/Producer
	Underground Irrigation Pipe	$480,000	NRCS/EPA/Producer
	Land leveling	$4,992,000	NRCS/EPA/Producer
	Restore Wetlands	$800,000	NRCS/Producer
	Shallow Water Areas	$168,000	NRCS/EPA/Producer
	Input Management	$263,250	NRCS/EPA/Producer
Water management	Install 4 off-channel storage reservoirs	$942,000	NRCS/EPA/Producer
	PHAUCET	$27,000	NRCS/EPA/Producer

8.0 AWARENESS, EDUCATION AND OUTREACH

8.1 Goals

The goals of the awareness, outreach, and education activities outlined in this plan are:

- Get stakeholder input on issues to address;
- Make residents and landowners aware of issues in the watershed;
- Increase producer use of BMPs;
- Increase producer use of assistance programs;
- Make producers aware that BMPs personally benefit them, as well as the environment and community; and
- Foster pride in the watershed.

8.2 Activities

8.2.1 Stakeholder Meetings

The producers in Overcup Slough were contacted by Delta F.A.R.M. to identify the issues they perceive as concerns and would like addressed in the management plan. These stakeholders were also apprised of the Delta Nutrient Reduction Strategy, and the associated planning in the Overcup Slough watershed.

8.2.2 Nutrient and Sediment BMPs

The data gathered from the monitoring associated with BMP installations in the Overcup Slough watershed will be used to inform producers in the area, and the BMP sites will be included on informative tours. Stovall Farms lies in the Overcup Slough watershed and currently serves as a demonstration farm where BMPs are showcased during the numerous farm tours that are held each year.

8.2.3 PHAUCET

Mississippi State University, Delta F.A.R.M., NRCS and the YMD Water Management District work to inform producers in the watershed about the PHAUCET program, its benefits and success, and how to implement
it.

8.2.4 WRP Enrollment

The most effective outreach efforts are those that work one on one with individual landowners, which is the process that will be used by both DW and NRCS in implementing the WRP. NRCS will work with individual landowners first, to enroll land in WRP and draw up contracts for wetland easements. Once the contracts are signed, DW and NRCS will include the landowners in designing and constructing the WRP project, to ensure compatibility with farming practices, and provide insight and information on how wetland functions benefit the landowner. Ancillary benefits the landowner receives by having the WRP project on their property will be described and documented for use in future DW outreach and education.

Sustaining both the wetland functions and management activities over time will be significantly enhanced with three years of individual landowner outreach on wetland management. After three years, the wetlands will be established and close to being self-sustaining. Further, after 3 years of individual consultation and encouragement, landowner management activities are expected to become part of their routine farming practices.

8.3 Delta Nutrient Reduction Strategy

Ongoing activities associated with Delta Nutrient Reduction Strategy are expected to contribute to the awareness, education, and outreach goals of this plan. DNRS work groups routinely meet to discuss monitoring, best management practices, water management, input management, etc. Outcomes from these meetings are incorporated into education/outreach materials which are disseminated to producers and the general public through multiple outlets.

8.4 Schedule

Activities geared toward increasing awareness, outreach, and education will occur throughout the process of contracting, designing, installing, maintaining, and documenting management practices in the Overcup Slough watershed. A schedule for awareness, outreach, and education activities described above will be developed as funding sources are secured for plan implementation.

8.5 Budget

Awareness, outreach, and education activities planned in Overcup Slough watershed will be funded through grants and agency operations budgets. Budget information for awareness, outreach, and education activities for Overcup Slough watershed is summarized in Table 8.1. The total budget for these activities is $105,000.00.

Table 8.1. Budget for Overcup Slough Awareness, Outreach, and Education Activities

Education, Outreach Activity	Budget	Funding Sources
BMP outreach	$60,000	EPA/NRCS
PHAUCET outreach	$15,000	YMD/MSU/Delta F.A.R.M.
Nutrient Reduction strategy outreach	$30,000	EPA/MDEQ/Delta F.A.R.M.

9.0 EVALUATION

9.1 Monitoring

9.1.1 Water Quality

A water quality monitoring plan will be developed to evaluate water quality improvements in the Overcup Slough watershed as funding is made available for future efforts. Current efforts by MDEQ, USGS, and MSU are monitoring flow, sediment, N, and P, and other constituents during both base flow and storm flow, prior to, and after, construction and implementation of conservation management practices to determine the resulting percent reduction in sediment, N, and P at the multiple spatial tiers. However, funding for these efforts is set to expire in 2014. See *Figure 7.1 for monitoring locations*.

9.1.2 Habitat

WRP Easement properties in the watershed are monitored on an annual basis by NRCS or a technical service provider such as Delta Wildlife. Site conditions are documented and reported to NRCS who maintains the records for each easement property.

9.1.3 Water Levels

Ground water levels in Overcup Slough watershed are routinely monitored at selected wells by YMD. YMD surveys water levels in 550 wells throughout the Delta every year in the spring and fall (YMD 2008). There are no USGS continuous ground water monitoring wells located in the Overcup Slough watershed, although there are two wells located near Clarksdale.[8]

Surface water levels do not appear to be routinely monitored at any water body in the Overcup Slough watershed. Water levels in the Sunflower River are monitored by a USGS gage downstream of Overcup Slough at Sunflower.[9]

9.1.4 Water Use Survey

YMD conducts an annual water use survey for the five major crop types in the Delta – corn, cotton, soybeans, rice, and catfish. Between 100 and 150 sites are surveyed each year. Irrigation water volumes are estimated based on pump flow rate and monthly electricity usage.

9.1.5 Schedule

The schedule for monitoring activities well be developed as funding sources are made available.

[8] http://waterdata.usgs.gov/ms/nwis/gw
[9] http://waterdata.usgs.gov/ms/nwis/dv/?site_no=07288500&referred_module=sw

9.1.6 Budget

Budget information for monitoring activities is summarized in Table 9.1.

Table 9.1. Monitoring Budget Summary

Monitoring Activity	Budget	Funding Source
Water quality	$180,000 (3 years)	EPA/MDEQ/USGS
Wetland habitat	Agency Budgets	NRCS
Ground water levels	Agency Budget	YMD
Water use	Agency Budget	YMD

9.2 Criteria

Water quality, groundwater use, and groundwater level measures will be used to evaluate whether implementing this plan has resulted in improvement in the Overcup Slough watershed. These measurements will be compared to the performance measures for each management activity shown in Tables 7.1 through 7.11, and summarized below.

9.2.1 Nutrient targets

The nutrient TMDLs completed for Overcup Slough water bodies used preliminary annual average concentration targets of 1.05 mg/L for TN, and 0.16 mg/L for TP (MDEQ 2008a,b,c). The management targets for this plan are 30% reduction of TN load to Overcup Slough, and 30% reduction of the TP load to Overcup Slough.

9.2.2 Sediment

The target sediment yield range developed for Delta streams is 0.0014 to 0.0045 tons per acre per day at the effective discharge (MDEQ 2008d).

9.2.3 Groundwater

For activities focused on reducing groundwater use, the management target is to reduce groundwater use by 40 acre-feet per year at the site of implementation. Restoration of wetlands also has a target of increasing the area available for groundwater recharge in the Overcup Slough watershed by 3 acres.

9.3 Assessment

Implementation milestones and schedules have been developed for the management actions and education and outreach activities described in this plan. For implementation to be considered successful, all activity milestones must be met on time. The Team will meet quarterly to review progress on achieving the milestones and make needed adjustments to the schedule. Each Team member serves as the chair for one of the major management categories, such as sewerage, sediment and nutrient loading, etc. There is a subcommittee associated with each of these categories to ensure that the management actions are implemented.

In addition, the success of the implementation of this plan in achieving the management targets specified in Section 9.2, will be evaluated no later than 2016. This will be accomplished by the Watershed Implementation Team, or its designee(s), compiling and renewing available monitoring data (Section 9.1) and comparing results to the targets. A short report will be prepared by the evaluators, summarizing the results of their review. This information will be provided to all interested stakeholders and implementation participants in preparation for revising the Overcup Slough Watershed Implementation Plan (WIP).

9.3.1 Plan

Specific management action schedules toward achieving the vision for the Overcup Slough watershed are described in Chapter 7.0 and summarized in Table 7.12. If the schedules are not being met, the causes behind the failure to meet the goals will be determined, and actions will be taken. Specific management action goals and/or expectations are described in Chapter 7.0.

9.3.2 Education and Outreach

Specific goals and/or expectations for education and outreach activities are described in Chapter 8.0. If the activity goals were not met, the causes behind the failure to meet the goals will be determined. In addition, the plan activities will be evaluated with regard to information and knowledge about the watershed and its waterbodies that has been gained since the existing plan was developed, as well as any relevant physical changes in the watershed or changes in policy affecting the watershed. Implementation of the activities will be reevaluated in light of all of this information on a quarterly basis, as discussed above.

10.1 Overall WIP Budget

Table 10.1 Watershed Implementation Plan Budget Summary

Activity	NRCS	EPA 319	Producer	Other	Total
BMPs	$ 6,479,218	$ 3,649,870	$ 3,737,746	$ -	**$ 13,866,834**
Monitoring	$ -	$ 90,000	$ -	$ 90,000	**$ 180,000**
Outreach	$ 30,000	$ 45,000	$ -	$ 30,000	**$ 105,000**

11.0 PLAN REVISION

Dependent on approval and funding, the Watershed Implementation Team will prepare a revised WIP, incorporating the changes requested by the reviewers and reconciling any conflicting comments or requests for change.

The WIP will be submitted to the Watershed Implementation Team and all others who submitted comments. Within two weeks of receiving the WIP, the team will notify their stakeholders of the availability of the revised WIP for stakeholder review. One month will be allowed for review of the . Comments will be due at the end of this review period. Within a month after the comments on the WIP are received, the Watershed Implementation Team will prepare a final updated WIP. The updated WIP will be submitted to the Watershed Implementation Team for review and approval. After the updated WIP has been approved, the team will notify their stakeholders of the completion and availability of the updated WIP for use as a guide for watershed restoration and protection activities.

Funding for revision of the WIP will come from the agencies included on the Watershed Implementation Team, and/or the Section 319 program.

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