COLDWATER RIVER WATERSHED IMPLEMENTATION PLAN

DRAFT

April 11, 2013

COLDWATER RIVER WATERSHED IMPLEMENTATION PLAN

Prepared for:

Mississippi Department of Environmental Quality

Prepared by:

Delta F.A.R.M.
P.O. Box 257
Stoneville, MS 38776

With additional technical assistance from:

Coldwater River Watershed Implementation Team
P.O. Box 276
Stoneville, MS 38776

Mississippi Department of Environmental Quality
Office of Pollution Control
P.O. Box 20385
Jackson, MS 39289

Table of Contents

List of Tables 4
List of Figures 5
1.0 Introduction 6
1.1 Mission and Goals 6
1.2 Watershed Implementation Team 6
2.0 Watershed Description 9
2.1 Geography 9
2.2 Hydrology 9
2.3 Land use 10
2.4 Socioeconomics 11
2.5 Demographics 11
3.0 Interests and Concerns 12
3.1 Identifying Interests and Concerns 12
3.2 Sediment 13
3.2.1 Locations Where Sediment is an Issue 13
3.2.2 Cause 13
3.2.3 Sources 13
3.3 Nutrients 14
3.3.1 Cause 14
3.3.2 Sources 14
3.3.3 Nonpoint Sources 14
3.3.4 Point Sources 15
3.4 Alluvial Aquifer Declines 16
3.4.1 Cause 16
3.4.2 Source 16
4.0 Coldwater River MRBI Watershed Resources 17
4.1 Water Quality Standards 17
4.2 Surface Water Quality 18
4.3 TMDLs 21
4.4 Groundwater Resources 23
4.5 Fisheries, Plant, and Wildlife Resources 23
5.0 Conservation Practice Implementation 24
5.1 Goal 24
5.2 Participants 24
5.3 Implementation 24
5.4 Implementation Budget 28
6.0 Education Strategy 29
6.1 Goal 29
6.2 Participants 29
6.3 Activities 29
7.0 Evaluation 31
7.1 Monitoring 31
7.2 Plan Evaluation & Revision Procedure 33
8.0 References 35

List of Tables

Table 1. Priority Interests and Concerns in Coldwater River MRBI Watersheds 12

Table 2. Permitted point sources in the project area 15

Table 3. Water quality criteria for the Coldwater River Watershed 16

Table 4. Reported impairments from the EPA for the Coldwater Watershed 17

Table 5. 2002 303(d) listings for the Coldwater River Watershed 19

Table 6. Water Quality Standard 19

Table 7. Total Maximum Daily Load 19

Table 8. TMDL targets and land use calculations 21

Table 9. Projected Costs for Practice Implementation by Funding Source 27

List of Figures

Figure 1. Location of Coldwater River MRBI Watersheds within the State of MS 7

Figure 2. Impaired Segments of MRBI Coldwater River Watersheds 8

Figure 3. Coldwater River MRBI Watershed Land Use Map 10

Figure 4. Coldwater River Watershed Sample Sites (USDA NRCS 2012) 18

Figure 5. Coldwater River MRBI Watershed Project – Allen Site Map 24

Figure 6. Coldwater River MRBI Watershed Project – Shannon Site Map 25

Figure 7. Coldwater River MRBI Watershed Project – Boyd Site Map 26

1.0 Introduction

1.1 Mission and Goals

The mission of this Coldwater River Watershed Implementation Plan (WIP) is to develop a more sustainable future for the resources, residences, and businesses located within selected HUC 12 watersheds by advancing on-the-ground conservation measures that address resource concerns and ultimately achieve or exceed water quality parameters set forth by TMDLs.

The goal of this plan is to provide guidance for implementing and evaluating conservation practices on select sites within the watershed in support of the Delta Nutrient Reduction Strategy (DNRS), the Mississippi River Basin Initiative (MRBI), and Delta Sustainable Water Resources Task Force (WRTF).

1.2 Watershed Implementation Team

Members of the Coldwater River Watershed Implementation Team are listed below. They represent various professional resource agencies and stakeholders that have been involved with project activities in the MRBI watersheds.

Agency/Organization Members - Delta F.A.R.M., Delta Wildlife, FTN Associates, MS Department of Environmental Quality, MS Department of Wildlife, Fisheries, and Parks, MS Farm Bureau Federation, MS Soil and Water Conservation Commission, Mississippi State University, The Nature Conservancy, Tunica County Soil and Water Conservation District, USDA- NRCS, USDA-ARS National Sedimentation Laboratory, U.S. Army Corp of Engineers, U.S. Environmental Protection Agency, U.S. Geological Survey, and the Yazoo-Mississippi Delta Joint Water Management District

Stakeholder Members – Mike Boyd, Buddy Allen, Daniel Shannon

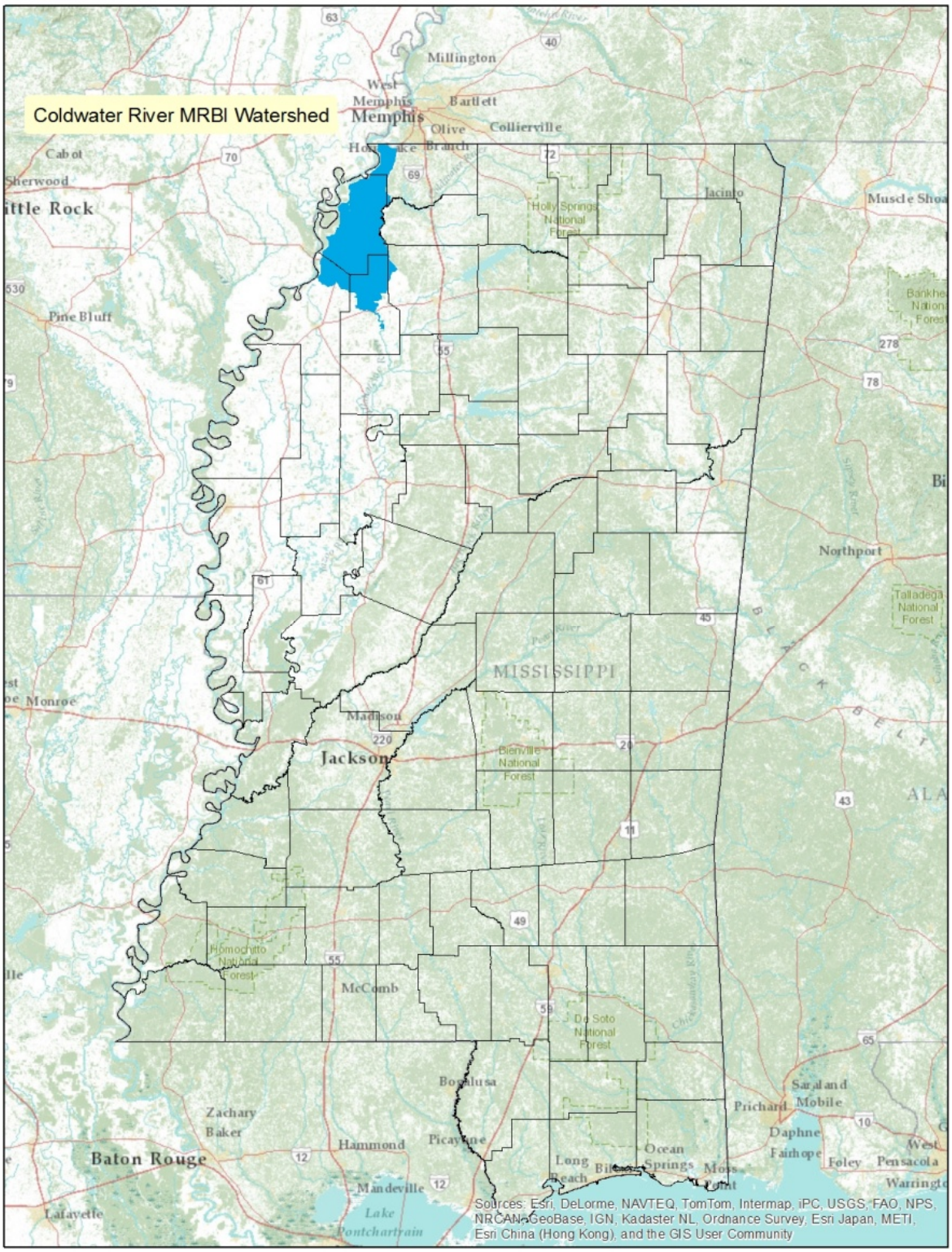


Figure 1. Location of Coldwater River MRBI Watersheds within the State of Mississippi

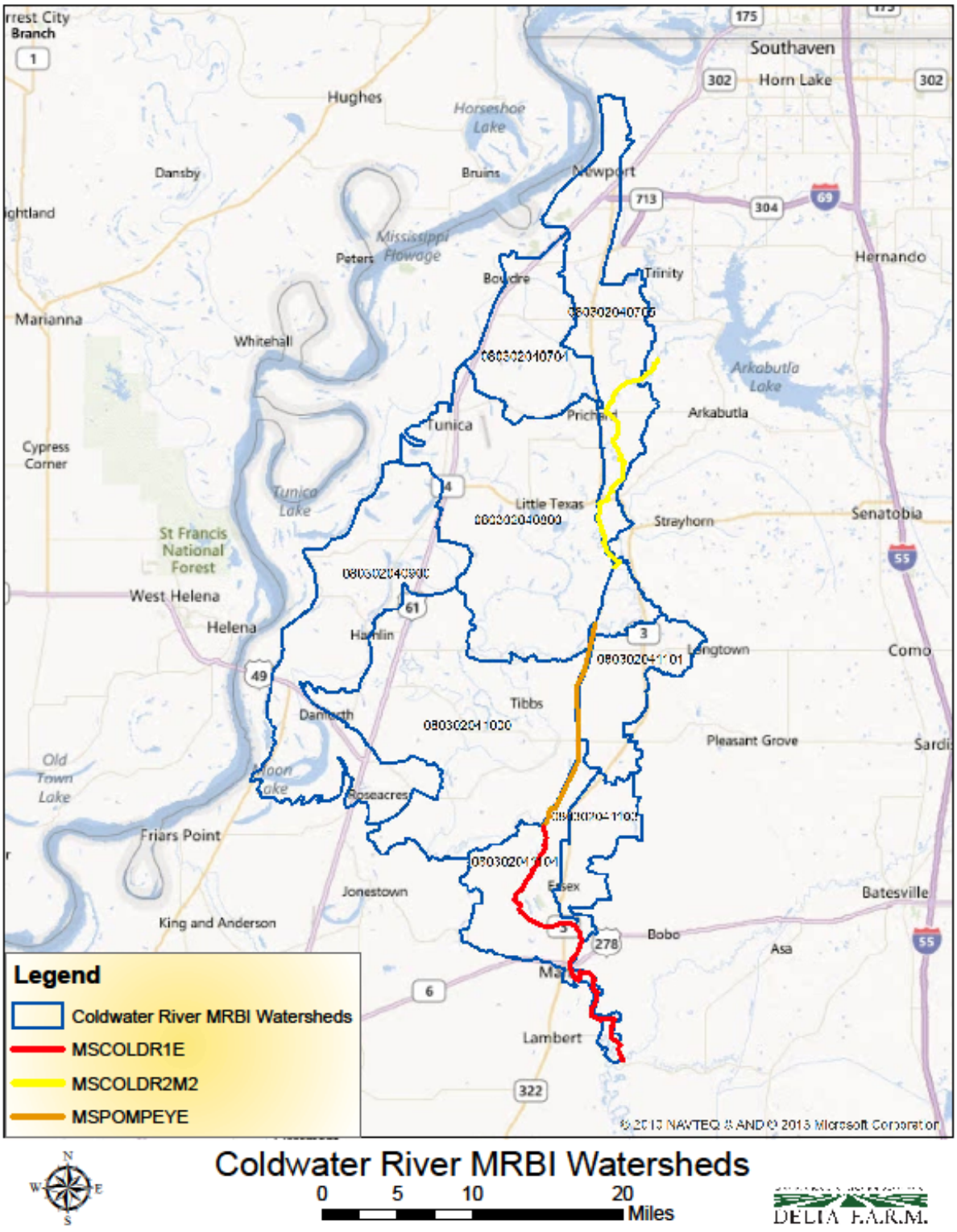


Figure 2. Impaired Segments of MRBI Coldwater River Watersheds

2.0 Watershed Description

2.1 Geography

The Coldwater River MRBI watersheds drain approximately 415,000 acres of the Yazoo River basin in portions of Desoto, Tunica, Coahoma, Panola and Quitman counties in North West Mississippi. Located in the northern most part of Mississippi the watershed is just minute's from Southaven, one of that fastest growing communities in Mississippi. Several smaller communities in the watershed include; Walls, Robinsonville, Tunica, Jonestown, and Sledge.

The watershed is underlain by Mississippi River alluvium. The topography of the watershed is primarily flat, with some ridge and swell topography provided by river terraces (MDEQ 2000). 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. Soils in the watershed (headwaters) are of Dundee (moderately to somewhat poorly drained fine sandy loam to silty clay loam) and Forestdale (somewhat poorly to poorly drained silty clay loam) series. There are also heavier soils, predominately of Alligator and Sharkey series. These are poorly drained clay soils. The watershed is located in the Mississippi Alluvial Plain ecoregion. Native vegetation would consist of bottomland hardwood forests.

2.2 Hydrology

The Coldwater River flows for about 220 miles through Northwestern Mississippi. It flows in a Southward direction from its headwaters near Hudsonville, Mississippi into Arkabutla Lake. The River then flows from Arkabutla Lake to the Little Tallahatchie River.

The MRBI Coldwater River Watersheds consist of the following 12 digit HUCs:

- Phillips Bayou (HUC#080302040900)
- Buck Island Bayou (HUC#080302040704)
- Lower Lake Cormorant Bayou (HUC#080302040705)
- Muddy Bayou (HUC# 080302041000)
- White Oak Bayou (HUC#080302040800)

- David Bayou (HUC#080302041101)
- Burrell Bayou (HUC#080302041103)
- Lower Coldwater River (HUC#080302041104)

Surface water levels in the watershed are maintained by rainwater, the Mississippi River alluvial aquifer, and the Coldwater River and Arkabutla Lake. The advent of irrigation in the 1970's has lowered the water levels in the Mississippi River Alluvial Aquifer to the point that it does not maintain base flows even in the largest area rivers. Ground water withdrawals for agricultural use, primarily irrigation, are made from the alluvial aquifer and surface water, with a majority coming from the alluvial aquifer. (USDA NRCS 2012).

2.3 Land use

Historically, the area consisted largely of ridge and swale topography. However many of the agriculture fields in the area have been developed and improved by land forming and installing drainage infrastructure. According to 2011 NAIP data, the pre-dominate land use is agriculture and crops include corn (7,000 ac), soybeans (21,475 ac), cotton (6,348 ac), milo (11,792 ac), catfish (240 ac), and rice (9,060 ac). Other land uses in the watershed are characterized by wetlands, small urban areas, water, and forest land.

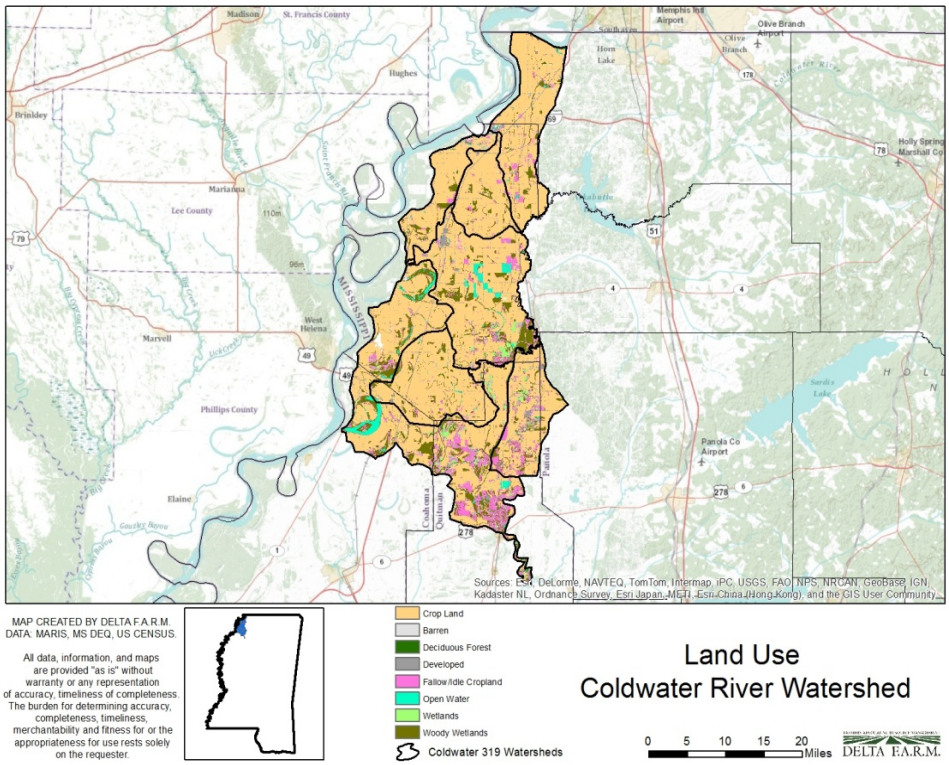


Figure 3. Coldwater River MRBI Watershed Land Use map.

2.4 Socioeconomics

Many of the landowners and farmers of this watershed have demonstrated a progressive mindset. Producers in the watershed have a history of recognizing environmental concerns and voluntarily addressing them through assistance programs such as EQIP, CRP, and WRP. Stakeholders are informed and receptive of innovative conservation practices, such as those required to successfully reduce sediment and nutrient loading as well as those used for water quantity stewardship.

2.5 Demographics

Based on 2010 Census data for Desoto, Coahoma, Panola and Quitman Counties, it is estimated that 24,000 people live in the watershed. Desoto County has seen population growth while the other counties have remained steady or declined in population.

3.0 Interests and Concerns

3.1 Identifying Interests and Concerns

For the purposes of this project and the guiding WIP, interests and concerns were formulated through development of the Delta Nutrient Reduction Strategy. Implementation of DNRS watershed projects (such as this Coldwater MRBI Watershed Project) identified four questions to address:

1. What levels of nutrient reductions are achievable?
2. What will they cost?
3. What is the value to each stakeholder from these nutrient reductions?
4. What levels of nutrient reductions will protect Delta water bodies and benefit the Gulf of Mexico?

Given this, reducing nutrient and sediment runoff from agricultural sources are the primary concerns to be addressed. These concerns are directly reflected in the MS Soil and Water Conservation Commissions proposed MRBI work plan for the watershed area. Realizing the connectivity between water quality and water quantity and the overlapping solutions, the Delta Sustainable Water Resources Task Force was developed to address water resource concerns using an integrated approach. Therefore, declines in the alluvial aquifer are considered of interest and in the scope of this WIP.

Table 1. Priority Interests and Concerns in Coldwater River MRBI Watersheds

Status	*Description*
Concern: Cause: Location: Extent:	Sediment Nonpoint source agricultural runoff due to erosion Impairment occurs in streams and lakes Entire watershed
Concern: Cause: Location: Extent:	Nutrients Nonpoint source agricultural runoff Impairment occurs in streams and lakes Entire Watershed
Concern: Cause: Location: Extent:	Alluvial Aquifer Declining alluvial aquifer Impairment occurs in alluvial aquifer Entire Watershed

3.2 Sediment

Stakeholders noted that sedimentation in ditches and streams helps contribute to flooding. They also expressed concern that the presence of glyphosate resistant weeds in the watershed my result in increased cultivation, which could increase erosion and sediment loads. The sediment TMDLs for these water bodies recommend that sediment loads to these water bodies be reduced to the range of 8.8E-02 to 2.4E-01 tons per acre per day at the effective discharge. The reduction of sediment load in the Coldwater River watershed to equal that of a relatively stable stream will allow the river to approach stable conditions (MDEQ. 2003a).This reduction will provide improved habitat for the support of aquatic life in the river and will result in the attainment of the applicable water quality standards.

3.2.1 Locations Where Sediment is an Issue

Stakeholders identified drainage ditches and streams as places where sedimentation is an issue. MDEQ identified the segment that flows from the confluence of Cub Lake Bayou to the split with Pompey Ditch as areas where sediment was expected to be a water quality issue.

3.2.2 Cause

Sediment is the pollutant causing sedimentation and turbidity in these water bodies. Sedimentation is created by erosion of soil particles in the watershed. Soils in the area tend to be fine grained which makes them more susceptible to erosion.

3.2.3 Sources

There are National Pollutant Discharge Elimination System (NPDES) permits for Total Suspended Solids for the Coldwater River watershed. These sources however provide negligible loadings of sediment when compared to wet weather sources such as, Municipal Separate Storm Sewer Systems and nonpoint sources. The TSS component of the permitted discharges is generally composed more of organic material, and therefore, provides less direct impact on the biologic integrity of a stream than would stream sedimentation due to soil erosion during wet weather events. Nonpoint loading of sediment in a water body results from the transport of the material into receiving waters by the process of mass wasting, head cutting, gullying, and sheet and rill erosion (MDEQ. 2003a).

3.3 Nutrients

The WIT identified nutrients in runoff as a priority concern. MDEQ has determined that the stream section from Yazoo Pass to Pompey Ditch has a high probability of containing nutrients levels detrimental to fish and other wildlife. High nutrient concentrations can support high growth of algae or other aquatic plants. When the algae die, their decomposition uses oxygen in the water, which can result in low oxygen levels that are harmful to fish and other aquatic life. The TMDLs for this stream section has been recommended for reductions of 95.0% phosphorous loads entering these water bodies to meet the preliminary target of 0.16mg/l. Based on the estimated existing and target total nitrogen concentrations, this TMDL recommends a 83.5% reduction of the nitrogen loads entering these water bodies to meet the preliminary target of 1.05 mg/l. (MDEQ 2008)

3.3.1 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 2008)

3.3.2 Sources

Nutrient loads are primarily contributed by nonpoint sources in the watershed. However, there are also 22 NPDES sources permitted to discharge into Coldwater River.

3.3.3 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 stereos as a result of dry fallout and rainfall. 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 water body. 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 ground water.

3.3.4 Point Sources

These point sources provide negligible impacts to the watershed and no changes are required in their permits due to the current TMDL (MDEQ 2008).

Table 2. Permitted point sources in the project area.

Name	NPDES Permit	Permitted Discharge (cfs)	Actual Average Discharge (cfs)	Actual Average BOD mg/L	Permitted BOD mg/L	**Actual NH3-N mg/L**	Permitted NH3-N mg/L
Buck Island Bayou MGP	MS0049123	0.063	0.29	5.33	30	NA	NR
USACOE Arkabutla N Abutment	MS0020656	0.021	0.002	2	30	NA	NR
Austin Trailer Park	MS0051934	0.009	0.009	2.8	30	NA	NR
Lake Forest S/D	MS0034188	1.547	0.147	6.07	30	NA	NR
Skylane Trailer Park	MS0037925	0.034	0.027	17.3	30	NA	NR
Twin Lakes #1	MS0022543	0.232	0.151	7.07	30	NA	NR
Twin Lakes #2	MS0029467	0.201	0.169	5.61	30	NA	NR
Wilson Mill Subdivision	MS0053830	0.019	0.002	5	30	NA	NR
Como POTW	MS0030104	0.387	0.165	2.4	10	0.15	NR
Sam Minor Headstart	MS0045055	0.002	0.003	34.5	30		NR
Strayhorn Elementary	MS0035181	0.012	0.005	8	30	NA	NR
Pride of the Pond, 001	MS0039802	1.076	0.185	34.14	75	NA	NR
Pride of the Pond, 002	MS0039802	1.076	0.63	9.81	30	NA	NR
Tunica Inudstrial Park	MS0032786	0.093	0.211	11.7	30	2.3	2
Tunica POTW	MS0042323	0.68	0.33	26.4	30	NA	NR
Westgate Utilities	MS0024261	0.081	0.074	33.56	30	NA	NR
Dundee School	MS0054798	0.015	0.211	8.06	10	NA	NR
Crenshaw POTW	MS0026930	0.32	0.131	26.4	30	NA	NR
Sledge POTW	MS0021016	0.34	0.4	22	30	NA	NR
Marks POTW	MS0024660	1.02	0.297	27.2	30	NA	NR
Lula POTW	MS0025151	0.068	0.046	23.3	30	2.54	2
Falcon POTW	MS0036731	0.35	0.012	11.7	30	NA	NR

3.4 Alluvial Aquifer Declines

Groundwater levels in the Coldwater River watershed have declined causing producers to drill deeper wells to reach water. Deeper wells are less efficient to operate and thereby more expensive. More efficient use of ground water supplies has become an important topic among stakeholders, along with water holding capacity and level Coldwater River and associated waters.

3.4.1 Cause

Water is being withdrawn from the aquifer faster than it is being recharged.

3.4.2 Source

Irrigation accounts for the majority of the ground water withdrawals.

4.0 Coldwater River MRBI Watershed Resources

4.1 Water Quality Standards

The water use classification for all perennial surface waters of this watershed stated in the Mississippi water quality regulations is Fish and Wildlife Support. The designated beneficial uses for these waters are Aquatic Life Support (MDEQ 2003a). Table 2 lists the numeric water quality criteria applicable to the Coldwater River watershed perennial surface waters (MDEQ 2002).

Table 3. Water quality criteria for Coldwater River watershed.

Parameter	Criteria
Dissolved Oxygen	5.0 mg/L daily average, 4.0 mg/L instantaneous
PH	Between 6.0 and 9.0 su
Temperature	32.2 deg C
Fecal coliform	May – October: geometric mean of 200 per 100 mL, 400 per 100 mL less than ten percent (10%) of the time during a 30 day period. November – April: geometric mean of 2000 per 100 mL, 4000 per 100 mL less than ten percent of the time during a 30 day period.
Specific conductance	1000 uohms/cm
Dissolved Solids	750 mg/L monthly average, 1500 mg/L instantaneous

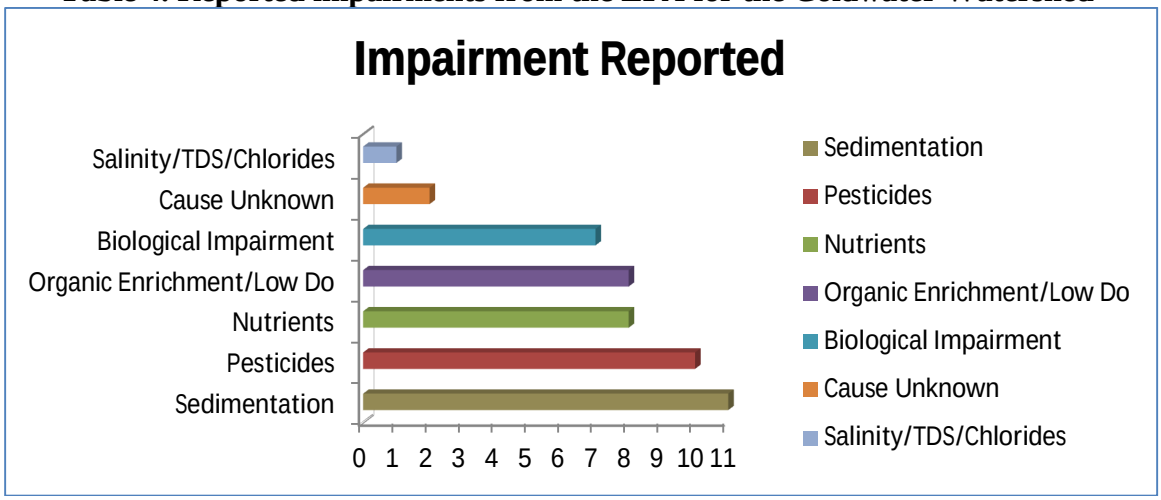
Mississippi's water quality standard for sediment is a narrative and reads as follows: "Waters shall be free from materials attributed to municipal, industrial, agricultural or other discharges producing color, odor, taste, total suspended or dissolved solids, sediment, turbidity, or other conditions 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 2002).

4.2 Surface Water Quality

Surface waters in the Coldwater watershed are generally, high in turbidity December through April from the high sediment runoff leaving agricultural fields. It is common practice to work land in the fall and in dry Februaries in anticipation of a wet spring. Turbidity usually declines in the summer and fall due to decreased erosion as crops cover the fields and due to lower fall rainfall (USDA NRCS 2012).

Pesticides are found in surface waters during the agricultural season. There are no current use pesticides that are at levels of concern. However; DDT was used extensively in this area both on crops and for mosquito control and can be found in sediments and in large, older fish, especially gar, buffalo, and carp.(USDA NRCS 2012) As stated before All surface waters in the Coldwater Watershed are under fish consumption advisories due to the continued presence of DDT and Toxaphene in fish tissues.

Table 4. Reported impairments from the EPA for the Coldwater Watershed



(USDA NRCS 2012)

Total Number of Impairments Reported: 48

Water quality monitoring has been going on since the early 2000's. Sites were first chosen by the Tunica County Soil and Water Conservation District at locations they felt would be most influenced by their implementation of conservation and water quality

BMPs (YMD 2008). Sites were located on Buck Island Bayou, Walnut Lake, Phillip's Bayou, McKinney Bayou, Six Mile Lake, and Yazoo Pass. Later, data were taken at the same locations as Jack Kilgor and Jan Hoover's ERDC Fish IBI sampling sites to help better characterize seasonal water quality (Hoover & Kilgore 2003). These samples included laboratory and insitu measurements.

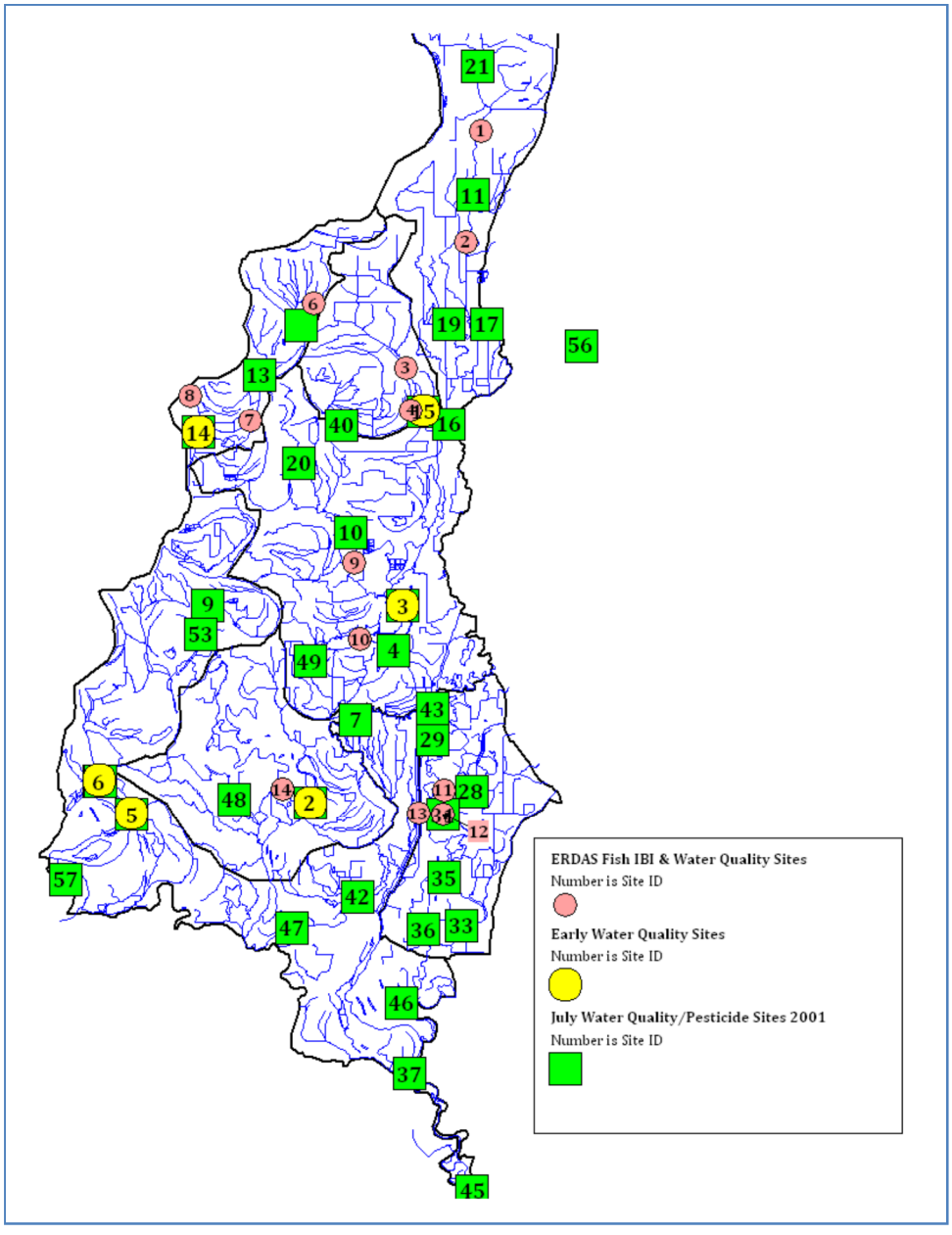


Figure 4. Coldwater River Watershed Sample Sites (USDA NRCS 2012)

The Coldwater River watershed has been evaluated as impaired and is included on the Mississippi 303 (d) List (MDEQ 2004a). Table 4-6 summarizes the listings from the 2002 303(d) List.

Table 5. 2002 303(d) listings for the Coldwater River Watershed

Name	ID	County	HUC	Cause	Mon/Eval
Coldwater River	MSCOLDR2M2	Desoto, Tate, Tunica	8030210	Sediment/Siltation	Monitored
At Pritchard: From confluence with Cub Lake Bayou to split with Pompey Ditch above Sara					
Coldwater River	MSCOLDR2E	Desoto, Tate, Tunica	8030204	Sediment/Siltation	Evaluated
At Coldwater River: From Spillway Arkabutla Reservoir to confluence with Pompey Ditch					

Table 6. Water Quality Standard

Parameter	Beneficial Use	Narrative Water Quality Criteria
Sediment/Siltation	Aquatic Life Support	Waters shall be free from materials attributable to municipal, industrial, agricultural, or other dischargers producing color, odor, taste, TSS, or other conditions in such a 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 uses.

Table 7. Total Maximum Daily Load

Segment	WLA	LA	MOS	TMDL
MSCOLDR2M2	8.8E-02 to 2.4E-01*	8.8-02 to 2.4E-01*	implicit	8.8E-02 to 2.4E-01
MSCOLDR2E	8.8E-02 to 2.4E-02*	8.8-02 to 2.4E-02*	implicit	8.8E-02 to 2.4E-02
*tons per acre per day at the effective discharge				

4.3 TMDLs

Nonpoint sources of sediment (due to erosion) are the primary sources of concern. Sources identified in the TMDL include agriculture, aquaculture, and the natural landscape of which ridge and swell topography is common. Wet weather conditions are critical for sediment loading to the water bodies. The target measure of sediment retention would reduce sediment yields to a range of 8.8E-02 to 2.4E-01 tons per acre per day.

The TMDL also addresses organic enrichment and low dissolved oxygen listings for The Coldwater River on the Mississippi 2006 Section 303(d) List of Impaired Water Bodies. There are currently no numerical criteria for nutrient concentrations in Mississippi surface waters. MDEQ currently has a Nutrient Task Force working on the development of nutrient criteria. An annual concentration of 1.05mg/l is an applicable targe for TN and 0.16mg/l for TP for water bodies located on the west side of the Delta (TMDL for Yazoo River Basin Tunica and Coahoma Counties 2008). These numbers may be revised after the development of nutrient criteria by the NTF. Nonpoint organic sources are considered to be the primary source of oxygen demand in the Coldwater system. The TMDL calls for a 95.0% reduction of the phosphorus loads entering these waterbodies to meet the preliminary target of 0.16mg/l. Based on the estimated existing and target total nitrogen concentrations, this TMDL recommends an 83.5% reduction of the nitrogen loads entering these water bodies to meet the preliminary target of 1.05mg/l

Table 8. TMDL targets and land use calculations.

Water Body	Coldwater River			Water	Urban	Barren	Forest	Pasture/Grass	Cropland	Wetland	Total
			Acres	260.9	641.8	0	45.1	0	14618.5	3787.6	19353.9
Landuse	TN KG/Mile²		Percent	1.30%	3.30%	0.00%	2.00%	0.00%	75.50%	5.90%	100.00%
Forest	111.3		Miles² in watershed	0.41	1	0	0.07	0	22.8	5.9	30.2
Pasture	777		Flow cfs based on area	44.2	cfs						
Cropland	10956.2										
Urban	287.8		TN Load kg/mi² annual avg	259.0	287.8	111.3	777.0	10956.2	259.0		
Water	259		TP Load kg/mi² annual avg	259.0	4.3	61.3	61.3	1295.0	5490.9	259.0	
Weltand	259										
Aquaculture	2590		TN Load kg/day	29.00	0.79	0.00	0.02	0.00	684.39	4.19	689.70
			TP Load kg/day	0.29	0.01	0.00	0.01	0.00	342.99	4.19	347.50
Landuse	TP kg/Mile²										
Forest	60.3		TN target concentration	1.05	mg/l						
Pasture	1295		TP target concentration	0.16	mg/l						
Cropland	5490.9										
Urban	4.3		TN target load	250.3	lbs/day						
Water	259		TP target load	38.2	lbs/day						
Wetland	259										
Aquaculture	2590		TN estimated load per day	1517.3	lbs/day						
			TP estimated load per day	764.5	lbs/day						
			TN estimated concenteration	6.36	mg/l						
			TP estimated concenteration	3.21	mg/l						
			TN reduction needed	83.50%			The land use calculations are based on 2004 data.				
			TP reduction needed	95.00%			The nutrient estimates are based USDA ARS. The TMDL				
							targets are based on EPA guidance for calculations				
							of targets when considering all available data.				

4.4 Groundwater Resources

The majority of drinking water use in this watershed is supplied by groundwater from the deep aquifer. The majority of agricultural water use in this watershed is supplied by groundwater from the shallow alluvial aquifer. No issues have yet been raised with regard to the quality of groundwater in this watershed. Declining groundwater levels in the alluvial aquifer are an issue in the watershed (MDEQ 2000).

4.5 Fisheries, Plant, and Wildlife Resources

A few federally threatened species may occur within the watershed. These are Least tern (*Sterna antillarum)*, Pallid sturgeon (*Scaphirhynchus albus*), Fat pocketbook (*Potamilus capax*), and although not federally the state of Mississippi has listed the Bald Eagle (*Haliaeetus leucocphalus*). All water bodies in the Delta, including those in the Coldwater River watershed, were placed under fish consumption advisory in 2001 for the legacy pesticides DDT and Toxaphene. As previously listed the fish covered by the advisory were carp, buffalo, gar, and non-farm raised catfish over 22 inches (MDEQ 2001).

Since 1985, bottomland wetland and forest habitats have been restored in the watershed through USDA Farm Bill Programs such as CRP and WRP. A small percentage of the watershed has been restored to bottomland hardwood forests in the past 25 years using these federal cost-share programs. Because of increased forest lands and a moderate amount of natural wetlands, the Coldwater River watershed has fair populations of numerous consumptive wildlife species such as white-tailed deer, migratory waterfowl, and small game.

Fishing and hunting both take place in the watershed. Hunting primarily takes place on private land and includes deer, waterfowl and small game hunting. Moon Lake is a popular recreational lake within the watershed. The lake has experience reduced fishing opportunity due to its impairment from sedimentation. Several projects have been proposed or completed adjacent to Moon Lake in order to stabilize and improve the fisheries and overall health and recreational value of the lake.

5.0 Conservation Practice Implementation

5.1 Goal

The goals of the following implementation actions are to:

1. Improve water quality in local water bodies
2. Improve water quality in downstream receiving waters
3. Through monitoring and evaluation, provide answers to questions outlined in the Delta Nutrient Reduction Strategy.

5.2 Participants

Agencies/Organizations - Delta F.A.R.M., Delta Wildlife, FTN Associates, MS Department of Environmental Quality, MS Department of Wildlife, Fisheries, and Parks, MS Farm Bureau Federation, MS Soil and Water Conservation Commission, Mississippi State University, The Nature Conservancy, Tunica County Soil and Water Conservation District, USDA- NRCS, USDA-ARS National Sedimentation Laboratory, U.S. Army Corp of Engineers, U.S. Environmental Protection Agency, U.S. Geological Survey, and the Yazoo-Mississippi Delta Joint Water Management District

Producers – Buddy Allen, Mike Boyd, Daniel Shannon

5.3 Implementation

Conservation practices are to be implemented on three project sites as identified in Figures 7-9. Practices to be implemented include:

- tail-water recovery systems (two systems)
- land leveling (905 acres)
- water control structures (30)
- low grade weirs (2)
- two-stage ditch (3,850 linear feet)

These practices address the three primary resource concerns of sediment/nutrient runoff and the declining alluvial aquifer.

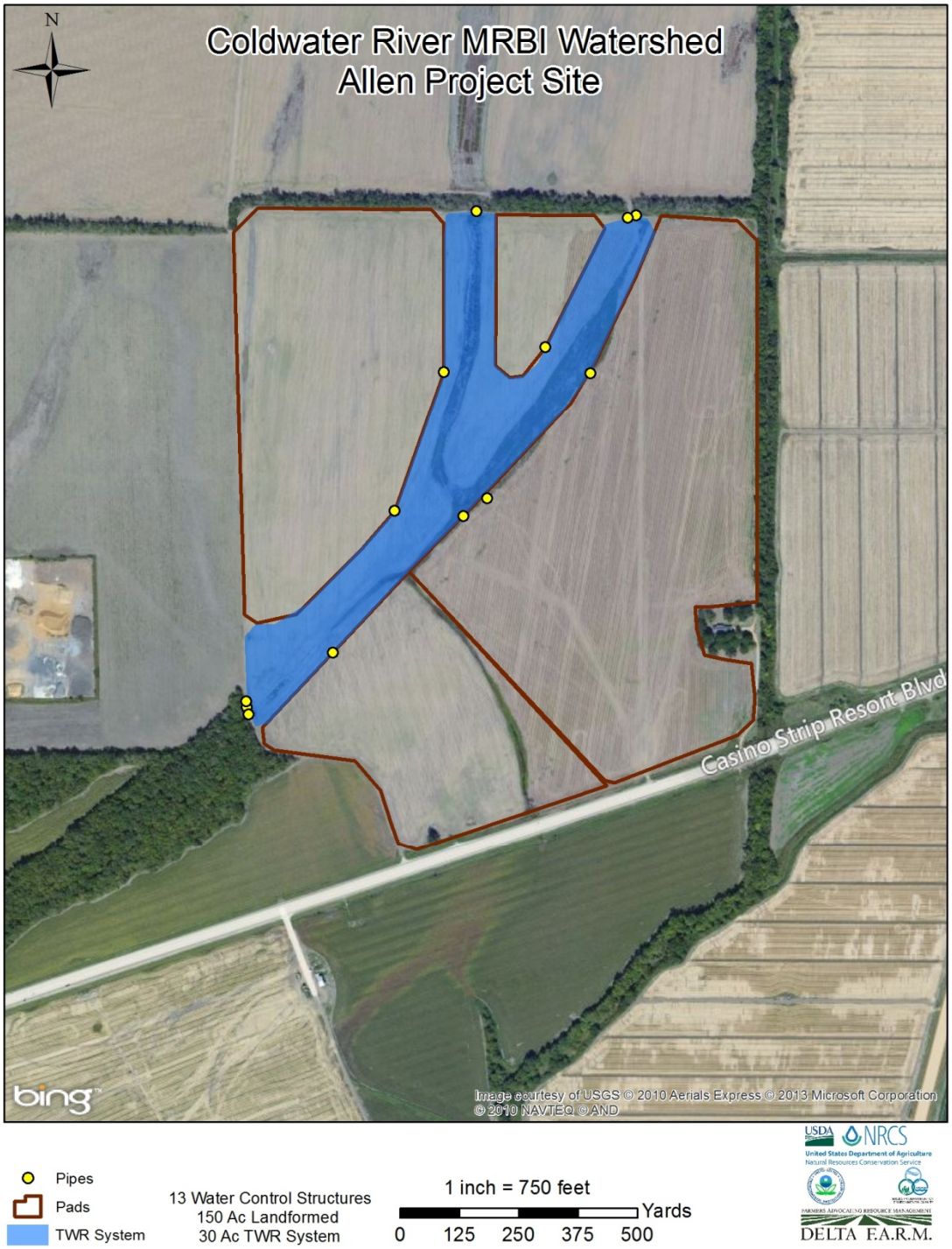


Figure 5. Coldwater River MRBI Watershed Project - Allen Site Map

Figure 6. Coldwater River MRBI Watershed Project – Shannon Site Map

Figure 7. Coldwater River MRBI Watershed Project – Boyd Site Map

5.4 Implementation Budget

Funding for implementation of these conservation practices is provided by:

- Producers – Buddy Allen, Mike Boyd, Daniel Shannon
- USDA Natural Resource Conservation Service – Mississippi River Basin Initiative, Cooperative Conservation Partnership Initiative, Agricultural Watershed Enhancement Program, and the Environmental Quality Incentives Program
- Mississippi Department of Environmental Quality – U.S. Environmental Protection Agency 319 program.

Table 9. Projected Costs for Practice Implementation by Funding Source

Practice	Producer	NRCS	EPA-MDEQ	Total
Tail-water Recovery Systems	$ 112,500	$ 501,090	$ 110,850	
Land Leveling with Pads	$ 262,500	$ 378,750	$ -	
Water Control Structures	$ 117,300	$ 67,300	$ 55,000	
Low Grade Weirs	$ 26,250	$ -	$ 10,000	
Two-Stage Ditch	$ 11,400	$ -	$ 39,150	
Totals	**$ 529,950**	**$ 947,140**	**$ 215,000**	**$ 1,692,090**

6.0 Education Strategy

6.1 Goal

The overall objective of the education strategy in the Coldwater River MRBI watersheds is to develop an atmosphere that promotes sustained, long-term protection and improvement of natural resources in the watershed. Specific objectives of education efforts in the watershed include the following:

- Increase farmer and landowner awareness of the value of clean water and their responsibility to insure others downstream have clean water.
- Increase farmer and landowner knowledge of programs that offer financial and/or technical assistance to plan, design, and/or install BMPs to improve water quality.
- Increase producer awareness of how BMPs can be used to reduce negative water quality and habitat affects.
- Increase producer awareness of the long term environmental and economic advantages of protecting and improving water quality and habitat.

6.2 Participants

Agencies/Organizations - Delta F.A.R.M., Delta Wildlife, FTN Associates, MS Department of Environmental Quality, MS Department of Wildlife, Fisheries, and Parks, MS Farm Bureau Federation, MS Soil and Water Conservation Commission, Mississippi State University, The Nature Conservancy, Tunica County Soil and Water Conservation District, USDA- NRCS, USDA-ARS National Sedimentation Laboratory, U.S. Army Corp of Engineers, U.S. Environmental Protection Agency, U.S. Geological Survey, and the Yazoo-Mississippi Delta Joint Water Management District

Producers – Buddy Allen, Mike Boyd, Daniel Shannon

6.3 Activities

Education and outreach activities have been outlined through ongoing efforts with the Delta Nutrient Reduction Strategy and the Delta Sustainable Water Resources Task Force. In 2012, multiple surveys were conducted of regional stakeholders and the general public. These results

are currently guiding the development of an Education and Outreach Strategy for the WRTF. Once the strategy is complete, recommended activities will be incorporated into this WIP.

7.0 Evaluation

7.1 Monitoring

The monitoring design will be implemented by Mississippi State University and MDEQ at two tiers within the Coldwater Watershed: Tier 1 is edge of field monitoring, and Tier 2 is small sub-watershed scale monitoring. The monitoring design will address:

- Nutrient reductions within primary, channelized headwater streams in identified watersheds (<200ac)
- Reduction efficiency estimates for individual BMPs based on above and below BMP sampling (i.e., tailwater recovery, water storage systems)
- Load reductions, and hydrological modifications as a result of BMP implementation

This data collection and evaluation effort is focused at evaluating BMP structures within the Coldwater watershed that have the ability to reduce nutrient concentrations, as well as document the conservation benefits of water management. These structures include edge of field structures (pads and pipes – slotted, flashboard), improved drainage channels fitted with 2-stages design, low grade weirs, and surface water conservation management strategies including tailwater recovery systems and/ or reservoirs. Depending on the structure and placement within the landscape evaluation will take occur for: sediments, nutrients and hydrology. The project will begin October/November 2012 and extend to September 30, 2015. Thereafter, evaluation and continuous data collection will be based on additional, as yet un-determined funding sources. Listed below are the monitoring protocols for the specific parameters being evaluated within the project.

Monitoring Design: Parameters, treatments, assumptions, and protocols

Parameters:

1. Nutrients (inorganic and total)
2. Sediments (tied to turbidity/TSS in water)
3. Water HRT / volume and water levels

Sampling Protocol for all parameters:

1. Non-stormflow / Grab – every 3 weeks during a 8 month growing season (March-October); every 6 weeks over 3 months (November – February)
    a. Sediment accumulation
    b. Water level
    c. Physicochemical parameters (*In Situ* parameters – DO, pH, ORP, specific conductivity, temperature)
    d. Water samples

2. Stormflow – storm event driven (typically between 8-17 per year)
    a. Water samples
    b. Physicochemical parameters (deployed data-sondes)

Water Sample Preservation:

Preservation techniques for nutrient analysis will be commensurate with QAQC procedures outlined in QAPP with MDEQ and USGS. Water samples will be collected with 24-48 hours of storm events and all samples will be analyzed within the MDEQ lab in 48 hours. If preservation is required field crews will have the ability to acid preserve. Add ratio of 2ml:1L of concentrated H_2SO_4 to water sample to preserve, and keep at 4°C.

Additional Data Collection Efforts

1. **Sediments**
    a. Interested to identify sediment deposition and accumulation in behind slotted pipes, low-grade weirs and tailwater recovery systems.
    b. Interested to evaluate phosphorus load accumulated with sediment accumulation.

Assumptions:

- Sediment accumulating within the system is sediment that is not accumulating in downstream ecosystems
- Improved sedimentation will result in a decrease in turbidity and total suspended solids in downstream aquatic systems

- Controlled drainage structures reduce the velocity and flow rate of non-storm and storm flow thus increasing sedimentation and reducing scour.

2. Water Volumes, HRT, water levels

a. Interested in determining the effects of slotted pipes and low-grade weirs on water volumes, levels and flow rates
b. Important information for NRCS – how much water is being captured throughout the year within tailwater recovery and on-farm storage reservoirs
c. Water levels = real time data loggers, as well as level loggers
d. HRT and Volumes = survey and geometry

Assumptions:

- Control structures will reduce outflow volumes by increasing the volume of water that is retained within the ditch at any one time
- Control structures will increase non-storm flow HRT, and improve first flush capture of contaminants for storm events that are intense and short in duration
- Improved HRT will facilitate improved sedimentation
- Weir structures will hold water according to height and volume characteristics
- Tailwater recovery units and on-farm storage reservoirs increase the amount of surface runoff capture

7.2 Plan Evaluation & Revision Procedure

Through the evaluation process, MDEQ will prepare a revised watershed implementation plan incorporating the changes requested by the reviewers. At this point it may be necessary to call a meeting to reconcile any conflicting comments or requests for change.

If the evaluation criteria are all being met in Coldwater River surface waters, the watershed implementation plan will be revised to address a different restoration issue or issues, or to protect the quality of the watershed. If the evaluation criteria are not being met, the approach for water

quality improvements in the Coldwater River watershed will be revised based on knowledge that has been gained since 2013.

The draft watershed implementation plan will be submitted to the Implementation Team, and all others who submitted comments. Within two weeks of receiving the draft watershed implementation plan, the Implementation Team will notify their stakeholders of the availability of the revised watershed implementation plan for stakeholder review. One month will be allowed for review of the draft. Comments will be due at the end of this review period.

Within a month after the comments on the draft watershed implementation plan are received, MDEQ will prepare a final watershed implementation plan. The final watershed implementation plan will be submitted to the Implementation Team for review and approval. After the final watershed implementation plan has been approved, the Implementation Team will notify their stakeholders of the completion and availability of the final plan for use as a guide to improvement activities.

8.0 References

Kilgor, Jack., Hoover, Jan., 2003. ERDC, Vicksburg, MS

MDEQ. 2000. Yazoo Basin Status Report. Mississippi Department of Environmental Quality. Jackson, Mississippi.

MDEQ. 2001. Mississippi's Fish Tissue Advisories and Commercial Fishing Bans, August 2002.

MDEQ. 2002. State of Mississippi Water Quality Criteria for Intrastate, Interstate and Coastal Waters. Mississippi Department of Environmental Quality. Jackson, Mississippi.

MDEQ. 2003a. Sediment TMDL for the Coldwater River, Yazoo River Basin. Mississippi Department of Environmental Quality. Jackson, Mississippi.

MDEQ 2008 Total Maximum Daily Loads for Total Nitrogen, Total Phosphorus, and Organic Enrichment/Low Dissolved Oxygen for a Segment of the Coldwater River.

MDEQ. 2003b. Total Maximum Daily Loads for the Legacy Pesticides DDT and Toxaphene in the Yazoo River Basin. Mississippi Department of Environmental Quality. Jackson, Mississippi.

MDEQ 2004a. Mississippi 2002 Section 303(d) List of Water Bodies. Mississippi Department of Environmental Quality. Jackson, Mississippi.

Thomann, R.V. and J.A. Mueller. 1987. Principles of Surface Water Quality Modeling and Control. Row, New York.

USDA Natural Resources Conservation Service. 2012. Water Quality Supplement to the Coldwater Watershed Feasibility Study. Jackson, MS.

Yazoo Mississippi Joint Water Management District. 2008. Coldwater River Watershed Project History and Status: February 2008. Stoneville, MS.