

BELL CREEK-WEST PRONG MUDDY CREEK WATERSHED IMPLEMENTATION PLAN



Bell Creek-West Prong Muddy Creek Watershed Implementation Plan

Prepared for:

**Tennessee-Tombigbee River Basin Team
Mississippi Department of Environmental Quality**

Developed by:

Bell Creek-West Prong Muddy Creek Watershed Implementation Team

Prepared by:

**Mississippi Soil and Water Conservation Commission
P.O. Box 23005
Jackson, MS 39225**

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I. EXECUTIVE SUMMARY

Bell Creek-West Prong Muddy Creek Watershed was identified as a priority watershed by the Mississippi Department of Environmental Quality. Muddy Creek has 2 Total Maximum Daily Load (TMDL) documents written to address reductions needed to meet water quality standards, one for biological impairment due to Nutrients, and Low Dissolved Oxygen (DO)/Organic Enrichment and one for Fecal Coliform. West Prong Muddy Creek is on the 2012 303(d) List of Impaired Waters for Biological Impairment. The Mississippi Soil and Water Conservation Commission, Tippah County Soil and Water Conservation District and USDA Natural Resources Conservation Service felt a great impact on water quality could be made in this watershed. MSWCC submitted a proposal to apply best management practices to address the nutrient loading and sedimentation issue on agricultural lands because of nutrients attaching to sediment particles. That proposal was selected for funding by MDEQ and a contract was awarded to MSWCC. Under that contract, MSWCC is required to assemble a Watershed Implementation Team to address other issues and concerns within the watershed and write a Watershed Implementation Plan.

The key natural resource problems in this watershed are nutrient loading and sedimentation. The Watershed Implementation Plan has the goals of reducing the nutrients and sediment entering the streams and creeks in the watershed, and meeting TMDL load allocations in the Bell Creek-West Prong Muddy Creek Watershed. To help solve this problem, one of the management actions is to implement a 319 water quality project on the agricultural lands within the watershed. The targeted area for this project is the cropland and pastureland in Tippah County that lie within the watershed boundaries. This is a three year project that began in 2011 and will end in September 2014. The groups that will be implementing the management action of reducing the nutrient and sediment loading are the Tippah County Soil and Water Conservation District, Natural Resources Conservation Service, and the Mississippi Soil and Water Conservation Commission. The Tippah County Soil and Water Conservation District and the Natural Resources Conservation Service can be contacted at 662-837-4464 ext. 3 for information and assistance about this management action.

Table 1.1 Bell Creek-West Prong Muddy Creek Watershed Canal Management Action Plan

Goal	Who	What	Where	When	Contacts
Reduce nutrient and sediment loading, achieve standards for Low DO/Organic enrichment and narrative standards for nutrient loading, and Fish and Wildlife Support designated use	MSWCC, USDA NRCS, Tippah County Soil and Water Conservation District	Continue existing programs and projects related to farmer education, BMP implementation, and habitat conservation	Entire watershed	2012-2014	Mark Gilbert, MSWCC 601-354-7645 NRCS 662-837-4464 ext. 3 Tippah Co. SWCD 662-837-4464 ext. 3
	Local Landowners and operators	Grade Stabilization Structures Pasture and Hay Land Planting Water and Sediment Control Basins Streambank and Shoreline Protection Critical Area Planting Heavy Use Area Protection Nutrient Management Stream Crossings Tank/Trough Diversions Fencing	Entire Watershed	2012-2014	Local landowners

II. VISION STATEMENT

The vision of the Bell Creek-West Prong Muddy Creek Watershed Implementation Team is to improve and/or protect the quality of water in streams and creeks.

III. MISSION STATEMENT

The mission of the Bell Creek-West Prong Muddy Creek Watershed Implementation Team is to educate landowners on new and innovative best management practices, land use planning methods and implementing the appropriate Best Management Practices that will result in the enhancement and conservation of all the natural resources in the watershed.

IV. WATERSHED IMPLEMENTATION TEAM

Members of the Watershed Implementation Team for the Bell Creek-West Prong Muddy Creek Watershed include as follows:

Joe Cross- Landowner

Tony McBride- Landowner

Dale Robertson- Muddy Creek Drainage District Commissioner/Landowner

Larry Wilbanks- Tippah Co Soil and Water District Commissioner/Landowner

Troy Shaw- Tippah Co Soil and Water Conservation District Commissioner

Nick Simmons- Tippah County Cooperative Extension Service (Extension)

Danny Braddock- Tippah County Soil and Water Conservation District (SWCD)

Liz Cockrell- Tippah County Soil and Water Conservation District (SWCD)

Mark Gilbert- Mississippi Soil & Water Conservation Commission (MSWCC)

Patrick Vowell- Mississippi Soil & Water Conservation Commission (MSWCC)

Gail Spears- Mississippi Soil & Water Conservation Commission (MSWCC)

Andy Whittington- Mississippi Farm Bureau Federation (MFBF)

Daniel Stuart- Mississippi Department of Environmental Quality (MDEQ)

Paul Lowry- Natural Resources Conservation Service (NRCS)

Shane Stocks- United States Geological Survey (USGS)

Dr. John Ramirez-Avila- Mississippi State University (MSU)

Janet Chapman- Mississippi Department of Environmental Quality (MDEQ)

V. WATERSHED DESCRIPTION

The Muddy Creek watershed is approximately 63,682 acres. The land uses for the Muddy Creek Watershed include 12,692 acres of pastureland (19.9%), 24,982 acres of forestlands (39.2%), 7,724 acres of cropland (12.1%), and 18,284 acres of urban, wetlands and other (all together 28.7%). Figure 5.1 shows the land uses in the Muddy Creek watershed. The targeted area of this watershed is the Bell Creek-West Prong Muddy Creek Subwatershed (Figure 5.2).

Bell Creek-West Prong Muddy Creek is located in the northwestern portion of Tippah County, Mississippi (Figure 5.3). There are 19,277 acres located within the watershed boundaries. This watershed is located in a rural area with a population of about 2,380. Therefore, people live throughout the watershed. The town of Falkner is located in this watershed. Economic conditions that influence this watershed include the loss of jobs due to industry closings and low timber prices. There have been no significant changes in land use in this watershed in the last 20 years.

The soils associations in the watershed include Wilcox-Dulac-Falkner, Ruston-Cutbert-Ora and Falaya-Urbo-Waverly soils. The geology of the watershed is Ackerman Formation of the Eocene Epoch in the Cenozoic era. Bell Creek-West Prong Muddy Creek watershed is located in the Northern Hilly Gulf Coastal Plains and Flatwoods/Blackland Prairie Margins ecoregions. The wetland areas in the watershed are typically the areas that have backwater from the watershed structures.

Named water bodies in the watershed include Fourmile Branch, Bell Creek, West Prong and North Prong creeks. The Holly Springs National Forest and Tippah Lake are the environmental management areas located within this watershed.

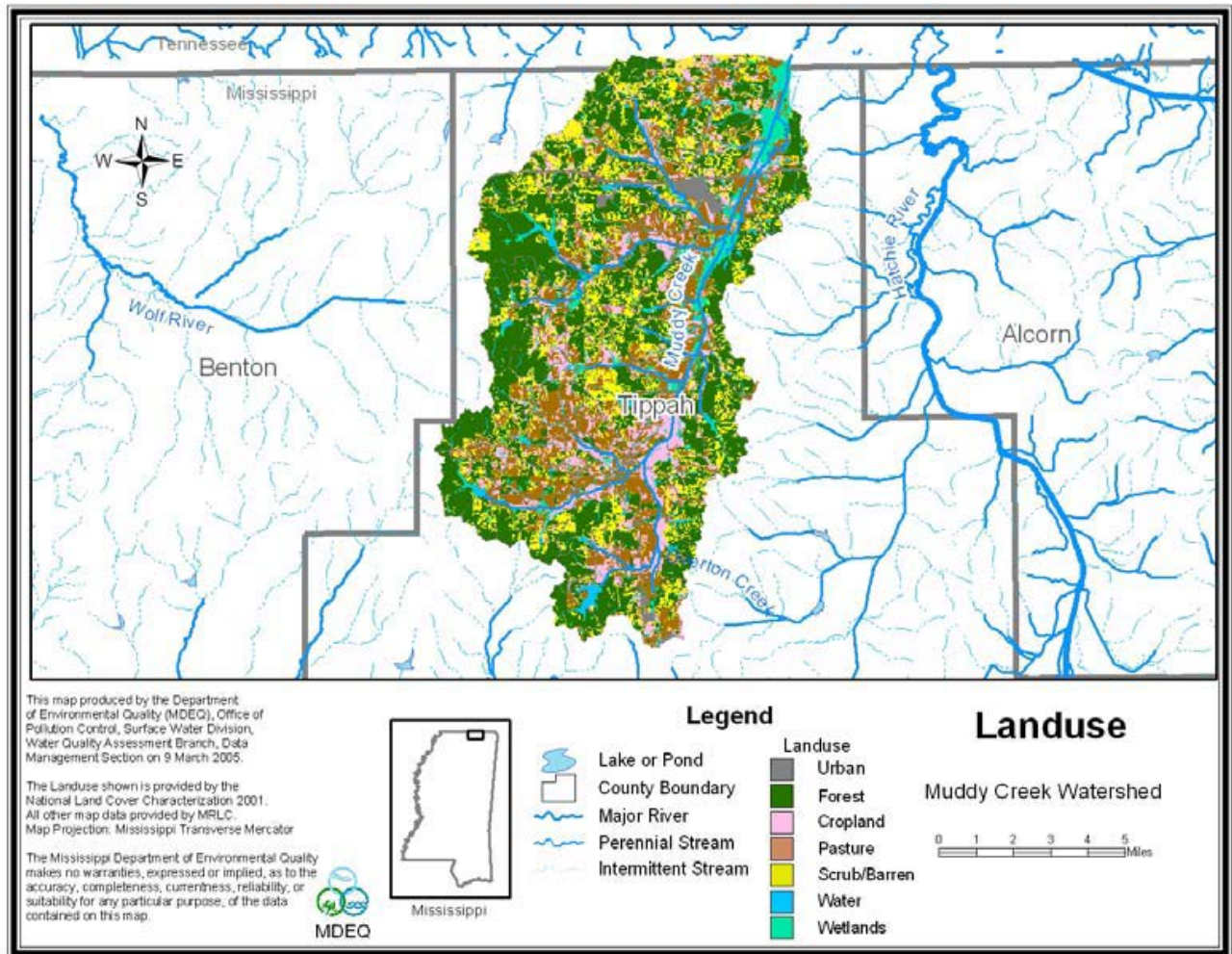


Figure 5.1 Land Use in Muddy Creek Watershed.

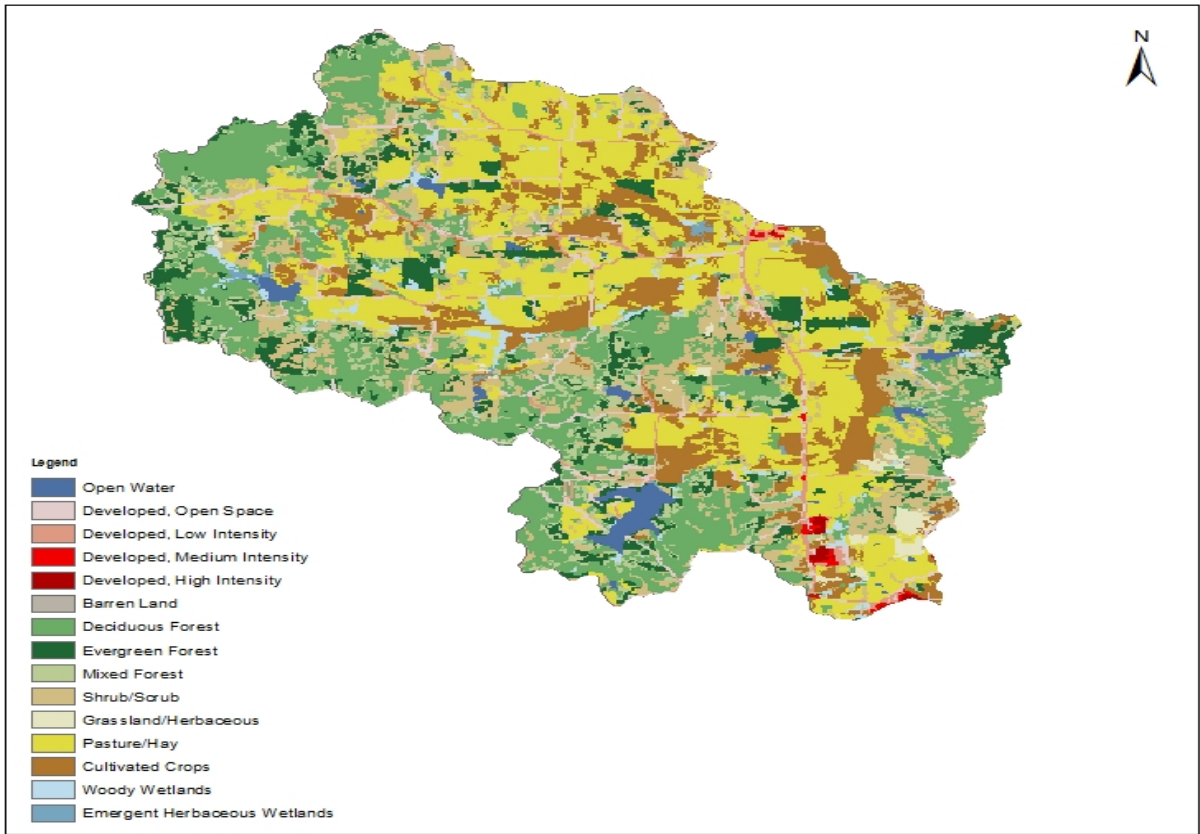


Figure 5.2 Land Use in Bell Creek-West Prong Muddy Watershed

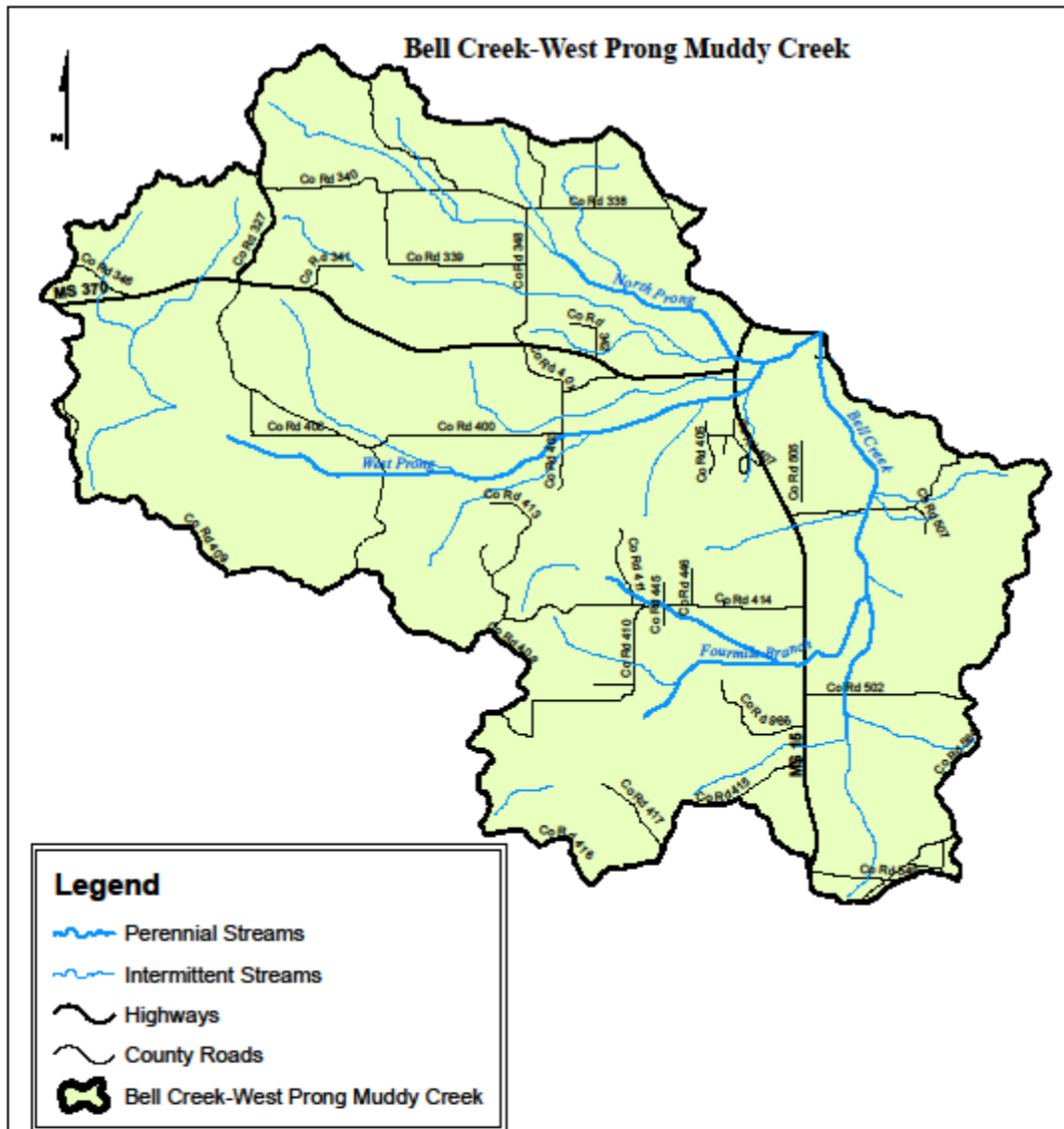


Figure 5.3 Bell Creek-West Prong Muddy Creek Watershed.

VI. STAKEHOLDER INTERESTS

The stakeholders in this watershed want to conserve and preserve the soil, water, and wildlife habitat. Stakeholders in the watershed want to restore the watershed creeks and streams to a state of good water quality. This can be done by reducing runoff (stopping erosion and loss of topsoil) and improving habitat for fish and wildlife. Stakeholders desire to use the natural resources wisely, eliminate snags and debris, stop people from littering, and provide beaver control. Also, there are issues where people target practice from bridges endangering cattle and other livestock nearby. The stakeholders believe all the interests are tied together. The snags and debris are coming from two different issues. Storm damage to woody areas cause log and brush debris to get into the streams. Also, people toss household trash and old appliances from bridges into the streams and creeks. This debris causes large snags that retard the flow causing flooding. Once the flood waters recede the topsoil is washed away taking nutrients and chemicals with it. This helps increase the potential of starting head cuts and gullies while leaving debris in pastures and on cropland. Therefore, the stakeholders think stopping the littering would help resolve a lot of the snag and debris issues in the streams and creeks. This would, in turn, help reduce the sediment and nutrients entering the streams. A concern that has recently become a major concern is the landfill in the headwaters of the watershed. It is the concern of the landowners that sediment and other contaminants will affect the water quality in the watershed. The concern for beaver control has always been an issue, but recently the beaver dams have started causing flooding of croplands. Due to this flooding, some of the farmers will lose parts of some fields that they farm. Landowners want to make sure Best Management Practices are used to maintain and/or improve water quality while the Mississippi Department of Transportation four lanes Highway 15 through the watershed.

VII. Water Resources

A. History of Activity in the Watershed

The primary players in restoration and /or conservation efforts in the Bell Creek-West Prong Muddy Creek Watershed are the Natural Resources Conservation Service, Tippah County Soil and Water Conservation District and the Mississippi Soil and Water Conservation Commission. Local landowners and operators will play a major role in the restoration and conservation of the natural resources in this watershed by installing best management practices on their land. There have been several programs that have been utilized by landowners in the watershed in past years. These programs include Environmental Quality Incentive Program (EQIP), Conservation Reserve Program (CRP), Emergency Watershed Program (EWP), Hold Our Topsoil (HOT), a 319 demonstration project (1996-1998) and the Agricultural Conservation Program (ACP). These programs have helped many landowners apply conservation on the ground while reducing soil loss, enhancing wildlife habitat, enhancing water quality, increasing water quantity, increasing tree production and promoting conservation education.

The Bell Creek-West Prong Muddy Creek Watershed was selected as a priority watershed by the Mississippi Department of Environmental Quality. As the management agency for Agricultural Nonpoint Source Pollution in Mississippi, the Mississippi Soil and Water Conservation Commission (MSWCC) determined that the Bell Creek-West Prong Muddy Creek Watershed would be a good candidate for restoration. After meetings with local landowners, Tippah County Soil and Water Conservation District (SWCD) commissioners and staff and Natural Resources Conservation Service (NRCS) employees that work in this area, MSWCC felt there was enough interest in the watershed that a measurable difference could be shown, and submitted a proposal to the Mississippi Department of Environmental Quality (MDEQ). Through a collaborative effort between Tippah County SWCD, NRCS, MDEQ and MSWCC, the team members for the Watershed Implementation Team were assembled. At this point in time, there has been no process discussed to modify this team.

B. Wildlife and Fisheries

There are important recreational species located throughout the watershed. These species include deer, turkey, bass, catfish, bream, rabbits, squirrel, and raccoon. The list of plants and animals

of special concern are included as Appendix A. There are no animals and plants that are threatened or endangered in this watershed.

C. Designated Use Classifications and Water Quality Standards

The designated beneficial uses for the Bell Creek and West Prong Muddy Creek and the waterbodies included in the watershed are aquatic life support and secondary contact. The water use classification for the listed segments of Bell Creek and West Prong Muddy Creek is fish and wildlife support according to the 2002 Water Quality Criteria for Intrastate, Interstate and Coastal Waters.

Table 7.1 Water Quality Standards.

Parameter	Beneficial Use	Water Quality Standards
Fecal Coliform	Secondary Contact	<p>May-October: Fecal coliform colony counts not to exceed a geometric mean of 200 per 100ml based on a minimum of 5 samples taken over a 30-day period with no less than 12 hours between individual samples, nor shall the samples examined during a 30-day period exceed 400 per 100 ml more than 10% of the time.</p> <p>November-April: Fecal coliform colony counts not to exceed a geometric mean of 2,000 per 100ml based on a minimum of 5 samples taken over a 30-day period with no less than 12 hours between individual samples, nor shall the samples examined during a 30-day period exceed 4,000 per 100 ml more than 10% of the time.</p>

Parameter	Beneficial Use	Water Quality Standards
Dissolve Oxygen	Aquatic Life Support	<p>DO concentrations shall be maintained at a daily average of not less than 5.0mg/l with an instantaneous minimum of not less than 4.0mg/l. 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.</p>

Parameter	Beneficial Use	Narrative Water Quality Standards
Nutrients	Aquatic Life Support	<p>Waters shall be free from materials attributable to municipal, industrial, agricultural, or other dischargers producing color, odor, taste, total suspended solids, 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 uses.</p>

D. Current Status of Water Bodies in the Watershed

Waterbodies in the Muddy Creek watershed that have TMDLs written for them and require reductions to meet Water Quality Standards are as follows:

Muddy Creek- Low DO/Organic Enrichment, and Nutrients,
Muddy Creek-Fecal Coliform.

E. TMDLs

There have been two TMDLs developed for Muddy Creek, one for Fecal Coliform and the second for biological impairment due to Nutrients and Low DO/Organic Enrichment. The Bell Creek-West Prong Muddy Creek Watershed is located within the Muddy Creek Watershed and is located in Tippah County, Mississippi. The watershed ID number is 0601, and the Hydrologic Unit Code (HUC) code for the watershed is 08010207.

A fecal coliform TMDL has been developed for an evaluated water body segment of Muddy Creek, MS206E, on the Mississippi 2002 Section 303(d) List of Impaired Water Bodies. The segment was originally listed for pathogens on anecdotal information. No data were collected for this water body. MDEQ selected fecal coliform as an indicator organism for pathogenic bacteria for TMDL development.

Muddy Creek flows in a northern direction from its headwaters in central Tippah county across the Tennessee state line to the confluence with the Hatchie River. Although fecal coliform loadings from point and nonpoint sources in the watershed were not explicitly represented with a model, a source assessment was conducted for the Muddy Creek Watershed. Nonpoint sources of fecal coliform include wildlife, livestock and urban development. Also considered were the nonpoint sources such as failing septic systems and other direct inputs to Muddy Creek. The recommendation of the TMDL was an educational project that teaches best management practices for reducing nonpoint source pollution be implemented.

The recommended load reduction from the nutrients, low DO and organic enrichment TMDL includes a 45 to 70% reduction of the nutrient loads entering Muddy Creek from nonpoint sources.

VIII. WATERSHED MANAGEMENT ACTIONS

Agricultural Best Management Practices

Nutrient and Sediment BMPs

1. Stakeholder Interests

The major interests of the stakeholders are the nutrient and sediment loadings to Bell Creek and Muddy Creek in the watershed. Sediment is an issue because nutrients attach to sediment particles. Nutrients are one of the reasons a TMDL was developed for this watershed.

2. Goals/Objectives

The goal and objective is to reduce the nutrient and sediment loading coming from agricultural lands and bring the creeks back from unstable stream levels to stable stream levels. By accomplishing this task, the above named creeks could meet Water Quality Standards.

3. Management Actions

The management action that will be taken to address nutrient and sediment loading is the installation of agricultural BMPs that pertain to nutrients and sediment. These BMPs include but are not limited to:

- Streambank and Shoreline Protection,
- Grade Stabilization Structures,
- Pasture and Hay Land Planting,
- Nutrient Management,
- Water and Sediment Control Basins,
- Fencing,
- Critical Area Planting,
- Diversions,
- Heavy Use Area Protection, and
- Tank/Troughs.

These BMPs will be installed by cooperating landowners in the watershed. The program that these BMPs will be installed under is the MSWCC cost-share program. The Natural Resources Conservation Service (NRCS) will provide the technical/planning assistance for this project. Most of the BMPs that will be installed are permanent structures and must be maintained by the landowner for a period of 10 years. NRCS and Tippah County Soil and Water District employees identified landowners in the watershed that had agricultural land using maps provided by the Mississippi Department of Environmental Quality.

4. Project Tracking/Assessment of Progress

The Bell Creek- West Prong Muddy Creek 319 project began in 2011 and is scheduled to end September 2014. The milestones for the Bell Creek-West Prong Muddy Creek Watershed 319 project are listed below:

1. Assist Natural Resources Conservation Service (NRCS), United States Geological Survey (USGS), and the Tippah County Soil and Water Conservation District (SWCD), with assistance from Mississippi Department of Environmental Quality (MDEQ), in the development of a Watershed Implementation Team (WIT).
2. Develop a Watershed Implementation Plan (WIP) consistent with MDEQ guidance and assistance from the WIT.
3. Assist in the development and implementation of a watershed monitoring plan for the project.
4. Present a draft WIP to MDEQ and the Muddy Creek Watershed Implementation Team for review and comments.
5. Determine through intensive surveys, priority areas that are contributing significant pollutant loads in the watershed.
6. Inform the public, landowners, and other stakeholders within the project area about the project and secure commitments from priority landowners and others willing to participate in the project.
7. Notify MDEQ project officer, in a timely manner, of all project visits/ inspections/ field days/ and any other public meetings so that the project officer may have an opportunity to attend.
8. Develop plans for Best Management Practices (BMPs) in accordance with approved WIP.

9. Assist landowners and operators in the installation of appropriate BMPs and collect before and after soil loss and GPS coordinates each installed BMP and incorporate into a GIS format.
10. Establish at least two (2) demonstration farms to inform the public about BMPs.
11. Provide a least two (2) informational field days/tours to inform the public about the benefits of the project.
12. Develop and distribute no fewer than 1,000 informational fact sheets highlighting the benefits derived from the project.
13. Publish no fewer than 4 articles about the project in newsletters and local newspapers.
14. Erect no fewer than 20 project roadside signs where water quality practices are installed in the project.
15. Document pre-existing site conditions and improvements by conducting before and after photo documentation.
16. Assist the MDEQ project officer in conducting inspections during construction.
17. Make project presentations as requested by MDEQ.
18. Secure maintenance agreements from cooperators/landowners in accordance with MSWCC state cost-share guidelines.
19. Submit bi-annual reports by every September 25th and March 25th of each year showing status of tasks and start/completion dates of each task.
20. Submit a final report to MDEQ.

5. Desired Results/Benefits

The desired benefit of this project will be the reduction of nutrient loading to levels that are considered to be acceptable and remove the impaired segments of Muddy Creek from Mississippi's 303(d) list.

6. Roles/Responsibilities

There are several different groups with responsibilities in this watershed. MSWCC has the responsibility and role of administering the 319 project. The Tippah County Soil and Water Conservation District and the local NRCS staff have the role of technical assistance. The landowners have the responsibility of implementation of BMPs in the project area. The Muddy Creek Watershed Implementation Team has the role of helping gather all the information needed to write the Watershed Implementation Plan. MSWCC also has the responsibility of compiling all the information and writing the initial plan for the watershed. Other programs that are available to landowners in the watershed include EQIP, CRP, and WHIP. Under these three programs, there has been \$375,506.20 spent over the last three years with another \$150,000 projected to be spent over the next three years in Tippah County.

7. Budget

The table below shows a list of potential Best Management Practices to be installed with the 319 grant.

Table 8.1 Funded 319 Project Budget for BMPs.

Practice	Area Affected	BMP Cost	BMP Total
Streambank and Shoreline Protection	2,500 feet	\$69.17/ft	\$172,904
Grade Stabilization Structure	12 structures	\$6,500 /ea	\$78,000
Pasture and Hay Land Planting	100 acres	\$200/ac	\$20,000
Water and Sediment Control Basin	4 structures	\$10,000/ ea	\$40,000
Nutrient Management	700 acres	\$103.80/ac	\$72,156
Tank/Trough	5 each	\$2,500/ea	\$12,500
Diversions	1,200 feet	\$1.20/ft	\$1,440
Heavy Use Area Protection	4 each	\$2,500/ea	\$10,000
Fencing	10,000 feet	\$1.30/ft	\$13,000
Critical Area Planting	100 acres	\$300/ac	\$30,000
Total			\$450,000

Table 8.2 Technical Assistance

Item	Cost
Technical Assistance	\$41,667
Total	\$41,667

IX. EDUCATION/OUTREACH ACTIVITIES

A. Educational Activities to be Implemented

The overall objective of community education in the Bell Creek-West Prong Muddy Creek watershed is to develop an atmosphere that promotes sustained, long-term protection and improvement of aquatic resources in the watershed. Specific objectives of education efforts in the watershed include the following:

- Increase public awareness of the value of clean water.
- Increase public awareness of agricultural runoff and encourage behaviors that will reduce levels of nutrients and sediments in the watershed by education, watershed characterization and stewardship opportunities.
- Increase public awareness of how BMPs can be used to reduce negative water quality and habitat effects.
- Increase public awareness of the long term environmental and economic advantages of protecting and improving water quality and habitat in the Bell Creek-West Prong Muddy Creek watershed.

1. Signage

Signs identifying the BMPs that have been installed will be erected throughout the watershed upon permission of landowners.

Primary partners- Mississippi Soil and Water Conservation Commission, Mississippi Department of Environmental Quality, Tippah County Soil and Water Conservation District, Natural Resources Conservation Service, and Environmental Protection Agency.

a. Indicators

There will be field days held to show other landowners and the interested public the BMPs installed. Participants will be counted at these field days. Traffic through the watershed cannot be documented, but some areas are along a heavily traveled state highway.

b. Schedule

The BMP signs will be erected as practices are completed and/or requested by the landowners throughout the life of the project.

c. Budget

Table 9.1 Projected Costs for Signage.

Item	Unit	Cost	Total Cost
Signs	20	\$100.00	\$2,000.00
Total			\$2,000.00

2. Landowner Meeting and Field Days

There will be a landowner meeting held to inform landowners in the watershed about the project and what BMPs will be available for implementation on their land. Also, there will be at least two field days held to highlight the BMPs that have been installed during the project period. This will allow other landowners and the interested public to view some of the practices that are being installed to benefit water quality in the watershed.

Primary partners- Mississippi Soil and Water Conservation Commission, Mississippi Department of Environmental Quality, Tippah County Soil and Water Conservation District, Natural Resources Conservation Service, and Environmental Protection Agency

a. Indicators

Attendance at these field days will be documented and reported to MDEQ. The number of individuals who install BMPs as a result of the field days will also be documented.

b. Schedule

Field days in the watershed will take place in 2012-2014.

c. Budget

Table 9.2 Projected Costs for Landowner Meeting and Field Days.

Item	Units	Cost	Total Cost
Event Flyers	300	.60/each	\$180.00
Mailing/Delivery	300	.44/each	\$135.00
Miscellaneous (Landowner Meetings, Field Days, supplies)	3	\$2,240.67/each	\$6,722.01
Total			\$7,037.01

3. Fact Sheets

A fact sheet will be developed at the end of the project. This fact sheet will contain information about the watershed, the number and type of BMPs that were installed, the number of tons of soil being saved, and the number of acres impacted by the BMPs.

Primary Partners- Mississippi Soil and Water Conservation Commission, Tippah County Soil and Water Conservation District, and Natural Resources Conservation Service.

a. Indicators

1,000 fact sheets will be designed and distributed. These fact sheets will be handed out at the final field day and will also be available in the district offices.

b. Schedule

The fact sheet will be developed once all BMPs are in place to get a total tons of soil saved and the correct number of BMPs installed.

c. Budget

Table 9.3 Projected Costs for Fact Sheets.

Item	Unit	Cost	Total Cost
Printing	1,000	1.00/each	\$1,000.00
Total			\$1,000.00

4. Watershed Harmony Puppet Show

Watershed Harmony is a musical puppet performance aligning with the fourth and fifth grade Mississippi Framework and National Science Standards. Audiences of all ages will delight in environmental stewardship through this toe tapping musical. Performances are not only enjoyed by school groups, but also by adults attending teacher workshops, civic clubs, and conferences. This program serves to inform, excite, and enlist the help of citizens in an ongoing effort to promote water quality in their communities.

Primary Partners- Mississippi Department of Environmental Quality and Bayou Town Productions.

a. Indicators

The number of participants will be documented and submitted to MDEQ.

b. Schedule

Watershed Harmony will be presented before August 2014.

c. Budget

Table 9.4 Projected Costs for Watershed Harmony Puppet Show

Item	Unit	Cost	Total Cost
Watershed Harmony Puppet Show	1 show	\$1,000.00	\$1,000.00
Total			\$1,000.00

5. Tippah County Fair

A booth will be set up at the fair with information about the project with pictures of BMPs within the watershed and other educational materials about nonpoint source pollution and the Bell/Muddy 319 project. The booth will be set up for the entire fair with information available to the patrons of the fair. Coloring books and crayons will be given to the children on family night. Also, Sam E Soil will be making special appearances throughout the night on family night.

Primary partners- Mississippi Soil and Water Conservation Commission, Mississippi Department of Environmental Quality, and Tippah County Soil and Water Conservation District.

a. Indicators

The number of brochures that are handed out to adults will be documented. The number of children who receive Sam E. Soil coloring books on family night will be documented.

b. Schedule

The exhibit will be at the fair for 3 consecutive years.

c. Budget

Table 9.5 Projected Costs for Fair Exhibit.

Item	Units	Cost	Total Cost
Brochures	3,000	.65/each	\$1,950.00
Coloring Books	6,000	.38/each	\$2,280.00
Litter Bags	2,500	.42/each	\$1,050.00
Total			\$5,280.00

6. Water Bill Mailers

A flyer will be designed and mailed out to the homes in the Bell/Muddy watershed. This flyer will inform homeowners of ways they can help improve water quality in the watershed. This will be mailed with their monthly water bill.

Primary partners- Mississippi Soil and Water Conservation Commission, Mississippi Department of Environmental Quality, and Tippah County Soil and Water Conservation District.

a. Indicators

The number of flyers sent out will be documented.

b. Schedule

The flyers will be mailed before August 2014.

c. Budget

Table 9.6 Projected Costs for Water Bill Mailers.

Item	Units	Cost	Total Cost
Mailing	500	.44/each	\$225.00
Envelopes	500	.10/each	\$50.00
Flyer	500	.65/each	\$325.00
Total			\$600.00

7. Presentations

Presentations relating to water quality will be made to civic organizations. These presentations will inform individuals about ways they can improve water quality and nonpoint source pollution.

Primary partners- Mississippi Soil and Water Conservation Commission, Mississippi Department of Environmental Quality, and Tippah County Soil and Water Conservation District.

a. Indicators

The number of people in attendance will be documented.

b. Schedule

These presentations will be made before August 2014.

c. Budget

Table 9.7 Projected Budget for Presentations.

Item	Units	Cost	Total Cost
Miscellaneous	3	\$50.00/each	\$150.00
Total			\$150.00

8. Radio Advertisements

Radio advertisements will be run on the local radio station to inform people about water quality and nonpoint source pollution. Each spot will run 5 times a days for 2 weeks.

Primary partners- Mississippi Soil and Water Conservation Commission, Mississippi Department of Environmental Quality, and Tippah County Soil and Water Conservation District.

a. Indicators

The number of radio ads run and produced will be recorded.

b. Schedule

The ads will run before August 2014.

c. Budget

Table 9.8 Projected Costs for Radio Advertisements.

Item	Units	Cost	Total Cost
Ads	3	\$200.00/each	\$600.00
Total			\$600.00

9. Adopt-A-Stream

Adopt-A-Stream is a program that promotes environmental stewardship through training workshops, outdoor field activities, and by introducing participants to watershed action projects. One and two-day workshops inform participants about watershed topics such as stream health, stream ecology, aquatic life and water chemistry.

Primary Partners- Mississippi Department of Environmental Quality and Mississippi Wildlife Federation.

a. Indicators

The number of participants and the number of participants that carry on the adoption activities will be documented.

b. Schedule

At least one event will take place before September 30, 2014.

c. Budget

Table 9.9 Projected Costs for Adopt-A-Stream Workshop.

Item	Unit	Cost	Total Cost
Adopt A Stream Workshop	1 day workshop	\$1,000.00	\$1,000.00
Total			\$1,000.00

10. Total Projected Cost of Education/Outreach Activities

Table 9.10 Total Projected Education Budget

Item	Unit	Cost	Total Cost
Signage	20	\$100.00	\$2,000.00
Landowner Meeting and Field Days	3	\$2,435.67	\$7,037.01
Fact Sheets	1,000	\$1.00	\$1,000.00
Watershed Harmony Puppet Show	1	\$1000.00	\$1,000.00
Tippah County Fair	3	\$1,760.00	\$5,280.00
Water Bill Mailers	1	\$600.00	\$600.00
Presentations	3	\$50.00	\$150.00
Radio Ads	3	\$200.00	\$600.00
Adopt-A-Stream	1	\$1,000.00	\$1,000.00
Total			\$18,667.01

11. Total Budget for Bell Creek-West Prong Muddy Creek Watershed Implementation Plan

Table 9.11 Bell Creek-West Prong Muddy Creek Watershed Implementation Plan Total Budget

Item	Cost
BMPs	\$450,000
Technical Assistance	\$41,667
Education/Outreach	\$18,667.01
Total	\$510,334.01

X. EVALUATION

A. Plan Evaluation Procedure

This watershed implementation plan will be evaluated and revised every three to five years or on an as needed basis. The evaluation of this plan will be organized by the Muddy Creek Watershed Implementation Team. At that time, the WIT will develop a detailed schedule for review and revision of this watershed implementation plan. The WIT members will be responsible for notifying their stakeholders of the opportunity to propose changes to the watershed implementation plan. One month will be allowed for notification of stakeholders.

The plan will be evaluated by the team, or their designee, and any interested stakeholders. One month will be allowed for evaluation and submittal of comments. Therefore, comments will be due two months after the evaluation procedure is initiated. The plan will be evaluated in two ways. First, to determine if the plan goals have been achieved, and second, to determine if it reflects the current condition of the watershed, state of science, and issues in the watershed.

B. Implementation Evaluation Strategy

- 1.** The following measures and indicators of progress will be utilized to track the success of this plan by MSWCC:
 - Before and after photo documentation on a representative sample of the BMPs installed,
 - Before and after soil loss collection on each BMP installed, and
 - An R5 Load estimation Model Field Data Entry Sheet completed on each BMP installed,
 - Establishment of two demonstration farms that will be used to inform the public about best management practice systems, and
 - Informational fact sheets will be distributed that highlight the benefits derived through the installation of Best Management Practices.

2. MDEQ will be responsible for any monitoring at the conclusion of the project to determine the pollutant reductions achieved by the application of Best Management Practices in the watershed.

XI. PLAN REVISION

A. Plan Revision Procedure

After evaluation, 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 Bell Creek-West Prong Muddy surface waters, the watershed implementation plan will be revised to address a different restoration issue or issues, or to protect the water quality of the watershed. If the evaluation criteria for the watershed are not being met, the approach for restoring Bell Creek-West Prong Muddy watershed will be revised based on the knowledge that has been gained since 2011.

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, the DRAFT watershed implementation plan will be submitted to the Implementation Team for review and approval. After the DRAFT watershed implementation plan has been approved, the Implementation Team will notify their stakeholders of the completion and availability of the plan for use as a guide to watershed restoration and protection activities.

XII. RESOURCES

MDEQ 2005. Phase One Fecal Coliform TMDL for Muddy Creek. North Independent Streams Basin Tippah County, Mississippi. Mississippi Department of Environmental Quality. Jackson, Mississippi.

MDEQ 2006. Total Maximum Daily Load Biological Impairment Due to Organic Enrichment/Low DO and Nutrients Muddy Creek, North Independent Basin Mississippi Department of Environmental Quality. Jackson, Mississippi.

"Natural Heritage Inventory: Search Animal Database." *Mississippi Museum of Natural Science*. <http://www.mdwfp.com/museum/html/Research/query_animals.asp>

"Natural Heritage Inventory: Search Plant Database." *Mississippi Museum of Natural Science*. <http://www.mdwfp.com/museum/html/Research/query_plants.asp>

USDA. SCS. 1966. Soil Survey of Tippah County, Mississippi.

Appendix A

Plant and Animal Species of Special Concern

Animals of Special Concern in Tippah County

Scientific Name	Common Name
CYPRINELLA WHIPPLEI	STEELCOLOR SHINER
NOTURUS STIGMOSUS	NORTHERN MADTOM
PROCAMBARUS ABLUSUS	A CRAYFISH

Plant Species of Special Concern in Tippah County

Scientific Name	Common Name
CHELONE GLABRA	WHITE TURTLEHEAD
ADIANTUM CAPILLUSVENERIS	SOUTHERN MAIDENHAIR-FERN
PLATANThERA PERAMOENA	PURPLE FRINGELESS ORCHID
AGALINIS PSEUDAPHYLIA	SHINERS' FALSE-FOXGLOVE
SILENE OVATA	OVATE CATCHFLY
ASARUM CANADENSE	CANADA WILD-GINGER
ASPELENIUM RHIZOPHYLLUM	WALKING-FERN SPLEENWORT
ATHYRIUM PYCNOCARPON	GLADE FERN
CAREX PICTA	PAINTED SEDGE
CYPRIPEDIUM PUBESCENS	YELLOW LADY'S-SLIPPER
GOODYERA PUBESCENS	DOWNY RATTLESNAKE-PLANTAIN
HYBANTHUS CONCOLOR	GREEN VIOLET
JUGLANS CINEREA	WHITE WALNUT
LIGUSTICUM CANADENSE	NONDO LOVAGE
ORCHIS SPECTABILIS	SHOWY ORCHID

PANAX QUINQUEFOLIUS	AMERICAN GINSENG
PHILADELPHUS INODORUS	ODORLESS MOCK-ORANGE
TRIOSTEUM ANGUSTIFOLIUM	NARROW-LEAF FEVER ROOT

Appendix B

Funded 319 Project Proposal

PROJECT TITLE:

Bell Creek- West Prong Muddy Creek Watershed Nonpoint Source Pollution Project

PROJECT ABSTRACT:

This project will be located in the north central portion of Tippah County in Mississippi.

The objectives of this project will be:

To improve water quality and protect high quality waters through the implementation of selected BMPs in targeted areas.

To apply Best Management Practices (BMPs) to agricultural lands in the project area so as to reach the desired outcome of reduced nutrient loads entering streams in the watershed.

To inform and educate the public about Best Management Practices that benefit water quality.

The project cost is \$508,333. Of this amount, \$305,000 in 319 funds are requested with the balance of \$203,333 to be supplied as match.

LEAD ORGANIZATION:

Mississippi Soil and Water Conservation Commission
Mark Gilbert, Project Manager
P.O. Box 23005
Jackson, MS 39225-3005

Phone: (601) 354-7645

Fax: (601) 354-6628

e-mail: mgilbert@mswcc.state.ms.us

COOPERATING AGENCIES AND ORGANIZATIONS:

Tippah County Soil and Water Conservation District; USDA Natural Resources Conservation Service; Mississippi Department of Environmental Quality

GRANT ADMINISTRATOR:

Mark E. Gilbert, Environmental Administrator
MS Soil & Water Conservation Commission
P.O. Box 23005
Jackson, MS 39225-3005

Phone: (601) 354-7645
(601) 540-4210 (cell)
Fax: (601) 354-6628
e-mail: mgilbert@mswcc.state.ms.us

PROJECT LOCATION:

Muddy Creek Watershed (08010207-0601)
(see attachment 1 for a maps depicting the location and land use for the watershed)

PROJECT OBJECTIVE:

The water quality impairment to be addressed by this project is nutrient loading. A Stressor Identification Report was developed due to Muddy Creeks failure to meet minimum water quality criteria for biological use support based on biological sampling conducted in 2001. The Stressor Identification report indicated the biological impairment most likely being due to organic enrichment/low dissolved oxygen and nutrients. The designated beneficial use for Muddy Creek is fish and wildlife support. Therefore, due to Muddy Creek not meeting the water quality standards, a TMDL has been developed. The TMDL recommends a 45 to 70% reduction in the amount of nutrients from nonpoint sources entering Muddy Creek to attain the preliminary target range of 0.6mg/l to 0.11mg/l. (a copy of the TMDL is attached)

Another objective of this project will be to reduce soil loss on pasture land in the watershed. BMPs listed on the following page will not only reduce nutrients and pathogens but will also reduce the amount of sediment entering Muddy Creek from pasture land in the watershed.

PROJECT DESCRIPTION:

This project will implement selected Best Management Practices (BMPs) on targeted areas in the Muddy Creek Watershed that will result in reduced pollutant loadings from agricultural nonpoint sources. The targeted area within this watershed will be an area in the Bell Creek-West Prong Muddy Creek Watershed. The main water quality problem to be addressed by this project is nutrients from agricultural nonpoint sources. Of primary concern are animal waste runoff and the animal access to streams from cattle operations in the watershed. Also, soils in the watershed are very erosive, with sheet and gully erosion occurring on sloping hay land and pastureland. Erosion is occurring from pasture and hay land in the project area at the rate of 8-10 tons per acre per year. Nutrients and pathogens from animal waste as well as sediment contained in runoff is entering Muddy Creek and its tributaries causing degradation of the resource base.

The erosion of the soil resource base removes nutrients, reduces water holding capacity, undermines plant rooting systems, reduces the soil's organic matter content, reduces soil tilth and degrades water quality within the project area.

The Muddy Creek Watershed is approximately 63,682 acres. The watershed is predominately rural. The current land uses in the Muddy Creek Watershed include 7,724 acres of cropland, 12,692 acres of pasture land, 24,982 acres of timber land, 3,974 acres of urban land, 10,097 acres of barren land, 3,362 acres of wetlands and 851 acres of water. This project will target an area in the Bell Creek-West Prong Muddy Creek Subwatershed which is approximately 3,940 acres within the watershed that contains about 2,167 acres of pasture land. The Bell Creek-West Prong Muddy Creek Subwatershed is an 19,277 acre subwatershed.

This project will be implemented in three phases. Phase 1 will consist of analyzing existing assessment data, determining target areas within the watershed where the stressors are causing the greatest damage and if the application of needed Best Management Practices will yield a beneficial reduction in pollutant loadings. Education and outreach activities will also be conducted during this phase to inform landowners in the watershed about the objectives of the project. The Mississippi Soil and Water Conservation Commission (MSWCC) will cooperate with the Tippah County Soil and Water Conservation Districts in identifying the appropriate Best Management Practices for targeted areas in the watershed and educating landowners as to the need for their participation.

Phase 2 will consist of (based upon the finding of phase 1) the application of best management practices on targeted areas in the watershed that will result in desired pollutant load reductions. The Mississippi Soil and Water Conservation Commission will accomplish this through its water quality cost share program. In this project, records will be kept at both the state level and local level so as to determine the progress being made in carrying the project out and the benefits that are being received as related to the improvement of water quality within the project. During the planning process with participants, the amount of soil loss from the area to be treated with a particular BMP will be determined and recorded. The amount of soil saved as a result of applying the BMP will also be determined and recorded. Additional information will be collected on each BMP installed in the project that will be provided to MDEQ and used to calculate the pollutant load reduction for each BMP installed. This information will indicate the project effectiveness in reducing pollutant loadings. Participants in the project will be required to maintain BMPs for a period of up to ten years after installation.

Additional education and outreach efforts will be conducting during this phase to inform and educate the public about Best Management Practices that benefit water quality. This will be accomplished by the following:

Establish at least 2 demonstration farms to inform the public about best management systems.

Conduct at least 2 field day/tours during the life of the project.

Prepare and distribute at least 1,000 fact sheets highlighting the benefits derived from the project.

Publish at least 4 articles about the project in newsletters and local newspapers.

Erect at least 20 project roadside signs that designate where water quality practices are in progress or have been completed.

To address the above stated water quality problems, Best Management Practices (BMPs) will be installed on agricultural lands in the project area. Potential BMPs to be installed include but are not limited to:

- 12 grade stabilization structures
- 100 acres of Pasture & Hay land Planting
- 4 Water and Sediment Control Basins
- 700 acres of Nutrient Management
- 5 Tank/Troughs
- 2,500 feet Streambank and Shoreline protection
- 4 Heavy Use Area Protection
- 100 acres Critical Area Planting
- 1,200 feet of Diversions
- 10,000 feet of Fencing

Phase 3 will consist of post BMP monitoring to determine the pollutant load reductions achieved by the application of Best Management Practices. The MSWCC will coordinate with the MDEQ in conducting these activities.

MILESTONES:

1. Sign grant contract with MS Department of Environmental Quality. (Month 0)
2. Determine priority areas that are contributing significant loads in the watershed. (Month 1)
3. Issue policies and procedures for implementing the project to the SWCD office. (Month 1)
4. Meet with the board of SWCD commissioners to get their understanding of their responsibilities and participation. (Month 2)
5. Provide training to district staff. (Month 2-3)
6. Assist in establishing an evaluation system in conjunction with the MS Department of Environmental Quality to indicate the benefits of the project. (Month 2-3)
7. Conduct a landowner meeting to inform potential participants about the project. (Month 3)
8. Secure commitments from several landowners and operators who are willing to participate in the project. (Month 3-4)
9. Assist participants in developing a conservation plan and applying best management practices (Month 4-12)
10. Establish at least demonstration farm (Month 4-12)
11. Document pre-existing site conditions. (Month 2-12) (Before and after photo documentation will be conducted).
12. Accelerate conservation planning and application assistance. Special effort will be made to complete conservation plans during this time frame. (Month 13-24)
13. Conduct at least 1 informational field day/tour to inform the public about the project. (Month 13-24)
14. Establish at least 1 demonstration farm. (Month 13-24)
15. As requested, assist DEQ with evaluations. (Month 0-36)
16. Collect GPS coordinates and other data required by MDEQ on all BMPs installed in the project. (Month 0-36)
17. Assemble data on the amount of soil saved. (Month 0-36)
18. Erect project roadside signs which designate where water quality practices are in progress or have been completed. (Month 4-36)
19. Provide continued conservation planning and application assistance to participants. (Month 25-36)
20. Review the status of applying best management practices to reach the objectives of the project. (Month 25)
21. Based upon the needs and finding of milestone 18, assistance in planning and/or application will be redirected and/or accelerated. (Month 25-36)
22. Publish at least 4 articles about the project. (Month 0-36)
23. Publicity of the project will be increased; at least 1 field day/tour will be conducted and at least 1,000 fact sheets will be developed and distributed. (Month 25-36)
24. Bi-annual reports will be made to MSDEQ. (Month 0-36)
25. Make Final report to MSDEQ. (Month 36)

CRITERIA FOR EVALUATION

(also see Phase 1 and 3 information under Project Description)

The following measures and indicators of progress will be utilized to track the success of this project:

NPS Pollutant Load Reduction – the amount of soil saved as a result of the installation of best management practices (BMPs) in this project will be a direct indicator of sediment load reduction to Muddy Creek along with its tributaries. Since nutrients and animal waste are transported to the waters by over land flow along with sediment, any reduction in sediment loadings will result in a reduction of nutrient loadings thereby enhancing the effectiveness and success of the project. Other data collected for MDEQ will be used to calculate pollutant load reductions for each BMP installed in the project.

Implementation of NPS Controls – this project will involve the installation of Best Management Systems. Best Management Systems are defined as a combination of BMPs, both structural and vegetative, which are the most practical, effective and economical means of preventing or reducing pollution from nonpoint sources to a level compatible with water quality goals. **The estimated types and numbers of BMPs to be installed as part of Best Management Systems are listed in the project description of this proposal.** The application of best management systems in the project will be the responsibility of the landowners and operators participating in the project as cooperators of the local soil and water conservation district.

Public Education, Awareness, and Action - this project will include the establishment of at least 2 demonstration farms that will be used to inform the public about best management systems. These will be utilized during the 2 field day/tours that will be conducted in the project. Also, at least 1,000 informational fact sheets highlighting the benefits derived from the project will be developed and distributed as well as the publishing of at least 4 articles about the project in newsletters and local newspapers. At least 20 project roadside sign will be erected where water quality practices are installed in the project. Other educational actions will be conducted to measure the success of the project. These include such things as increased public awareness; before and after photo documentation; increased cooperation among agencies, associations, public bodies and educational institutions; and the economic benefits of applying best management practices. The Mississippi Soil and Water Conservation Commission will request information through the local soil and water conservation district that will assist in measuring the success of the project in the demonstration area.

MONITORING

At a selected site or sites on the main tributaries of the watershed, water samples will be taken and analyzed for organic enrichment/low dissolved oxygen and nutrient content. After BMPs are installed at the site or sites, additional samples will be taken and analyzed to determine the actual load reduction resulting from the implementation of the BMPs. A plan for the monitoring will be developed by the USGS to determine the exact procedures and details of the monitoring regime. Funding for this portion of the project is included in the project budget.

PROJECT PERIOD

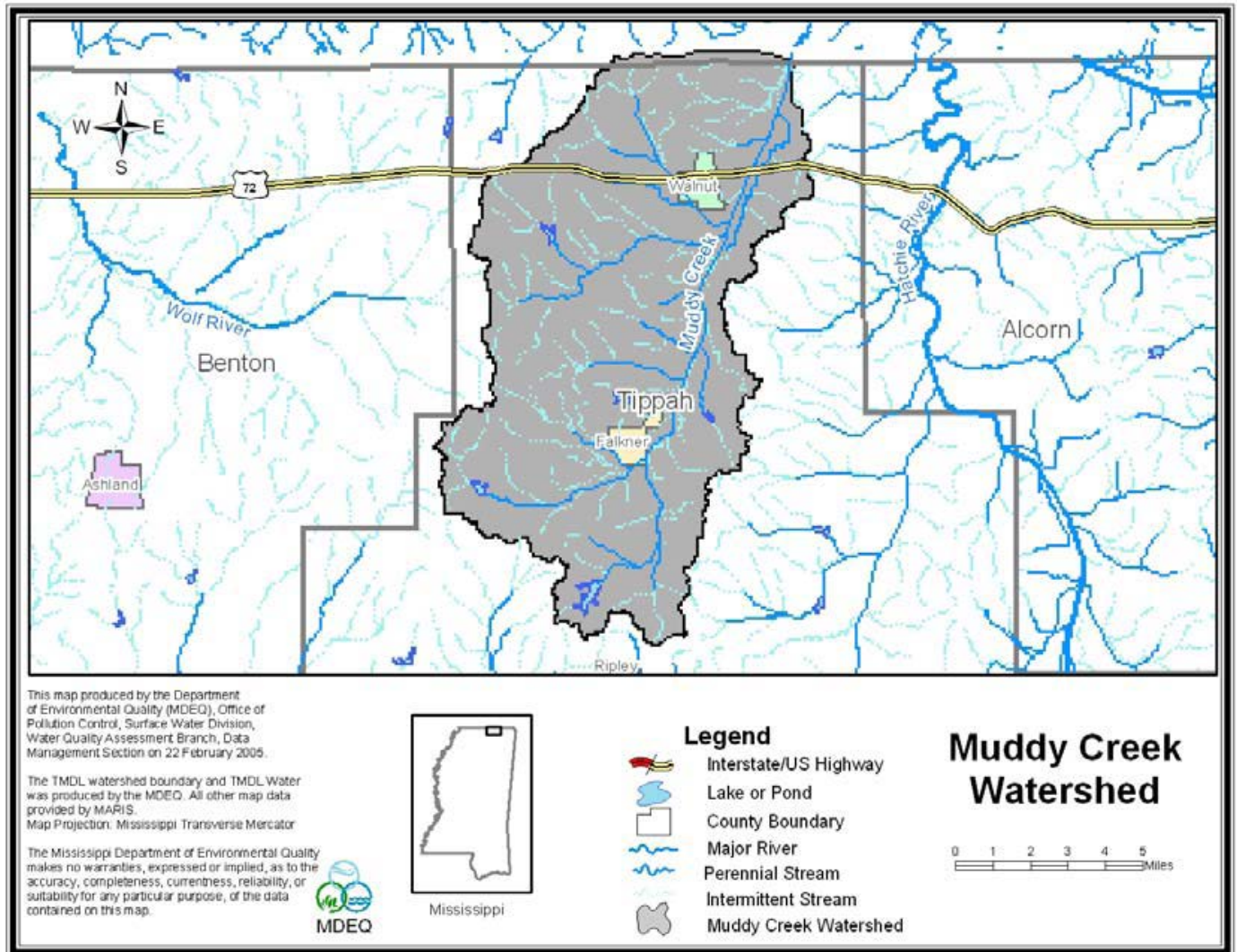
The length of this project will be 3 years.

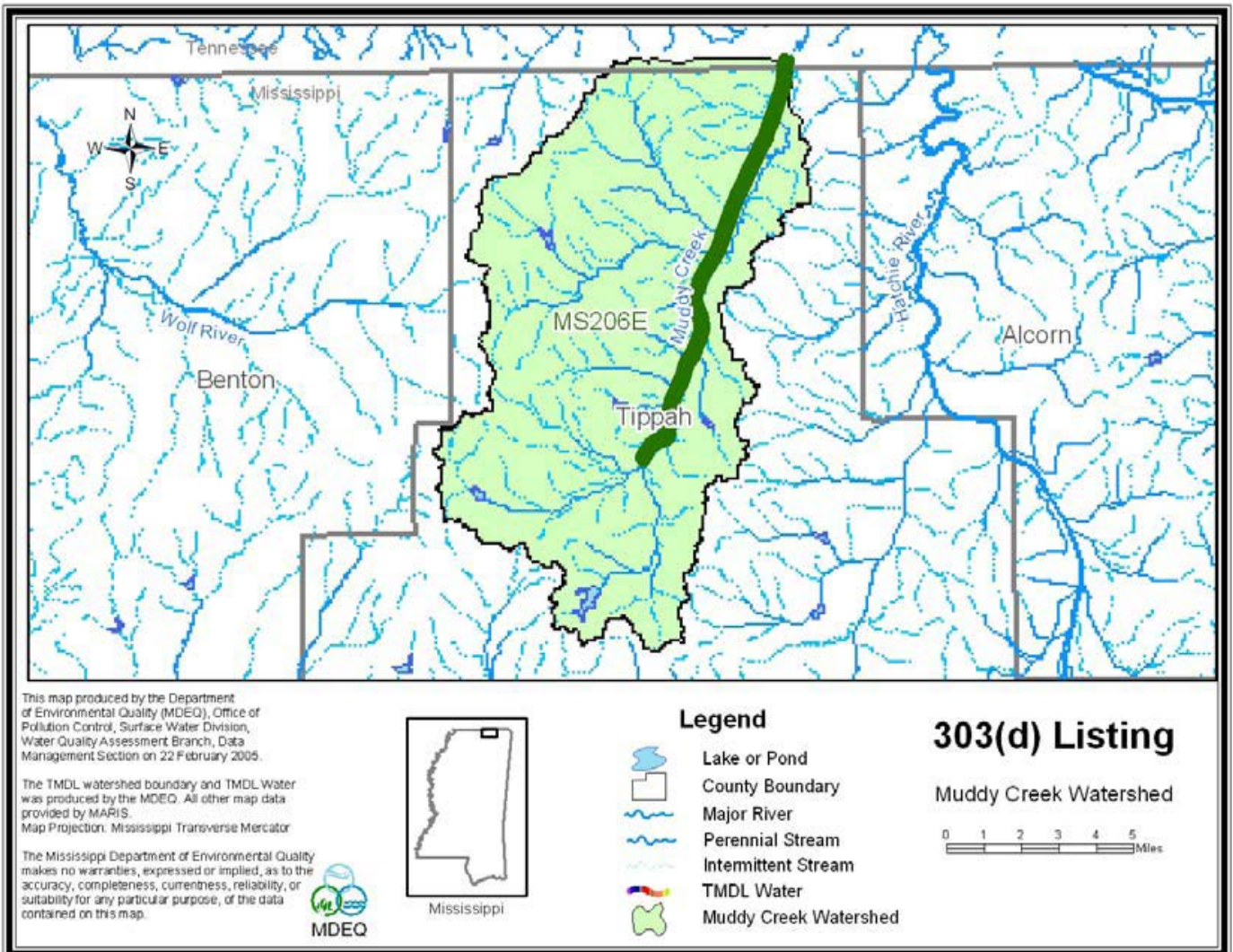
PROJECT BUDGET

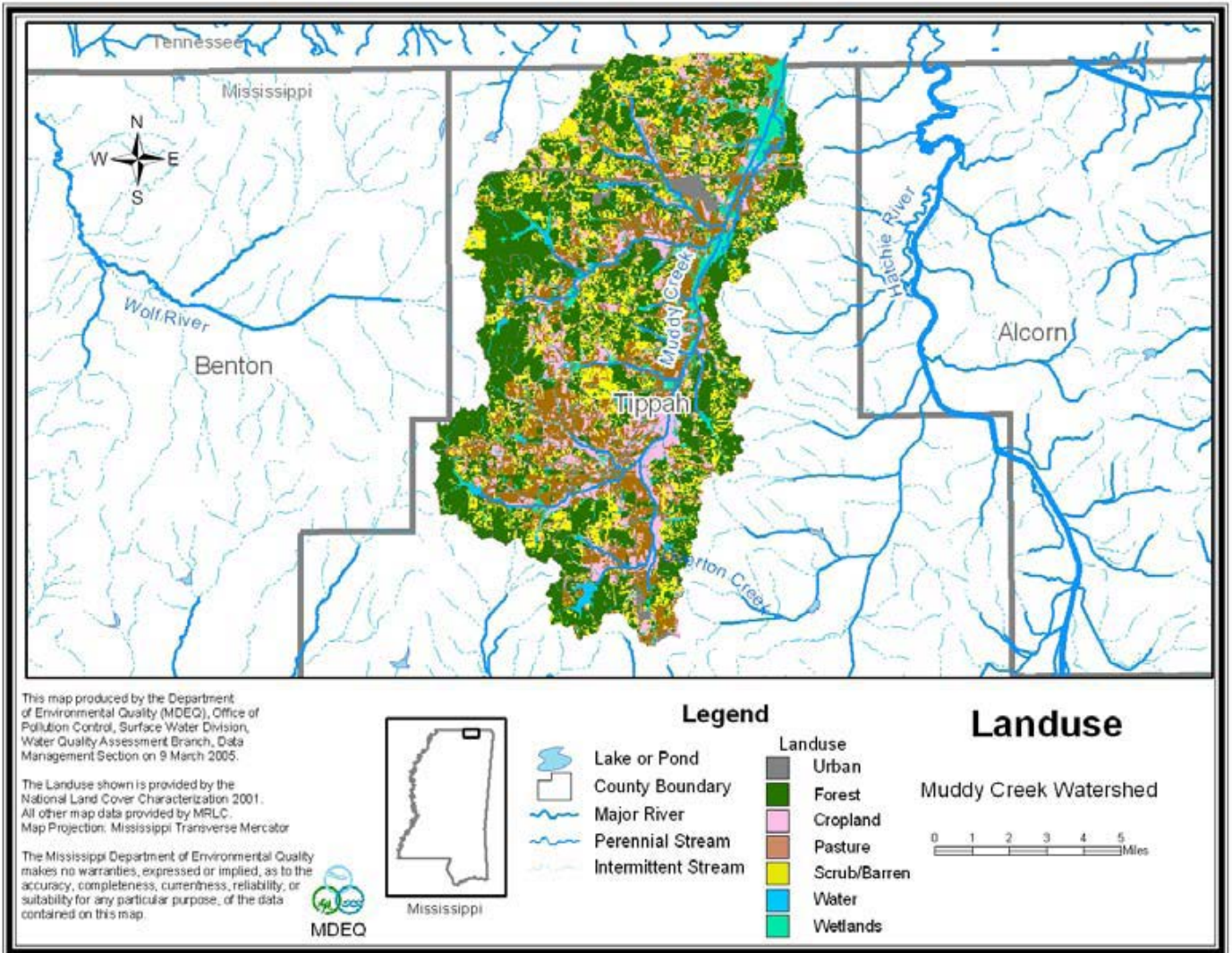
BUDGET CATEGORY	FEDERAL FUNDS	NON-FEDERAL FUNDS	TOTAL
Technical Assistance/ Travel	\$ 25,000	\$ 16,667 *	\$ 41,667
Installation of BMPs	\$ 170,000	\$ 113,333 **	\$ 283,333
Contractual	\$ 100,000	\$ 66,667 **	\$ 166,667
Information/Education	\$ 10,000	\$ 6,667 *	\$ 16,667
TOTAL	\$ 305,000	\$ 203,334	\$ 508,333

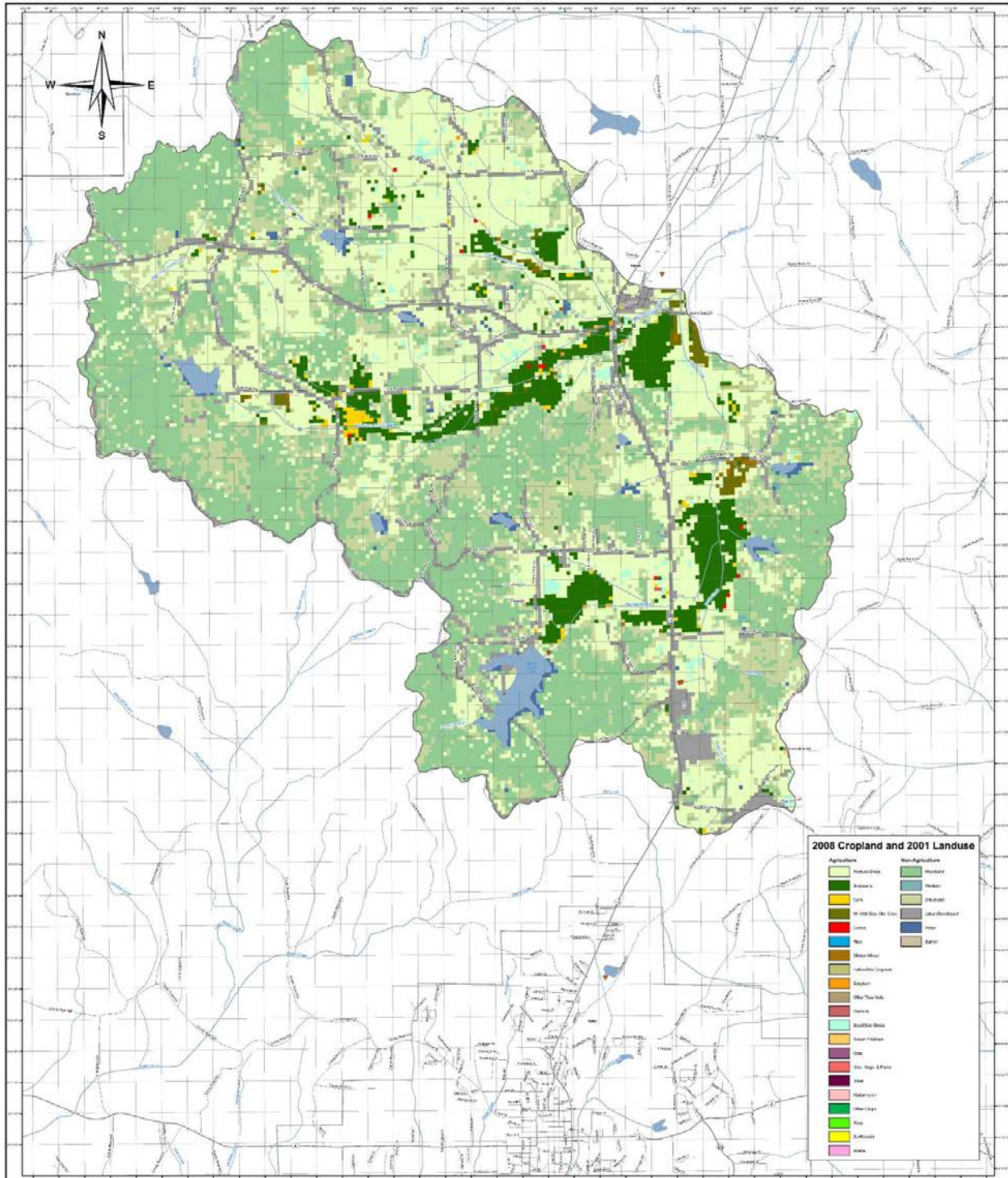
* Non-federal match for technical assistance/travel and information/education will be provided the local soil and water conservation district commissioners, soil and water conservation district staff and Mississippi Soil and Water Conservation Commission staff time spent on the project.

** Non-federal match for installation of BMPs and contractual will be provided by out of pocket expenses of the landowners and operators participating in the project.









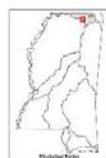
Subset of Muddy Creek Subwatershed 2008 Cropland Layer

This map produced by the Department of Environmental Quality (DEQ), Office of Pollution Control, Surface Water Division, Standards, Modeling, and TMDL Branch on June 14, 2016.

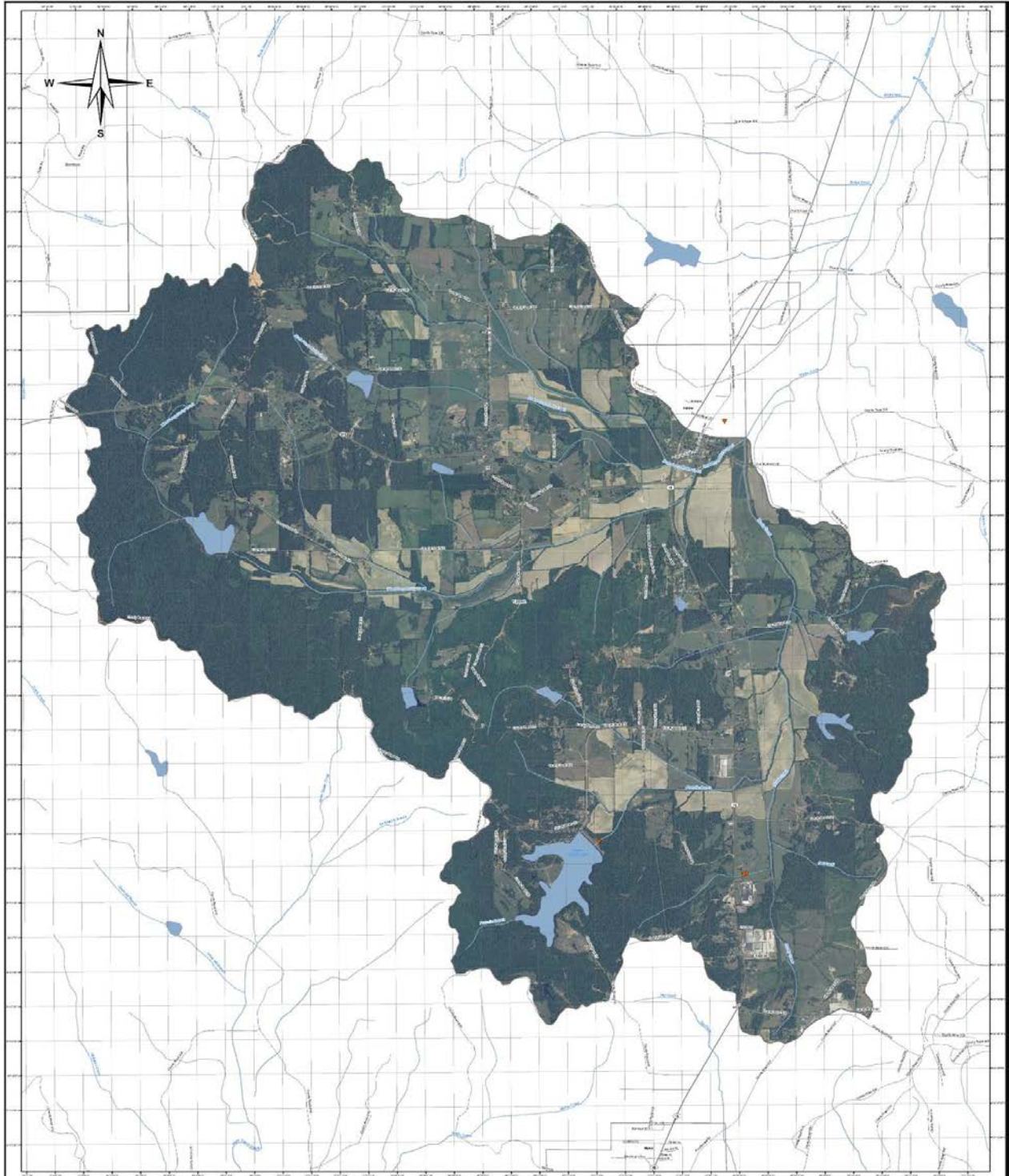
All map data is from the Mississippi Automated Resource Information System (MARIS) and DEQ.

Map Projection: Mississippi Transverse Mercator

The Mississippi Department of Environmental Quality makes no warranties, expressed or implied, as to the accuracy, completeness, currency, reliability, or suitability for any particular purpose, of the data contained on this map.



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|---|---|--|
| <ul style="list-style-type: none"> Hydrologic Unit Watershed Subwatershed BMP Location Non-Functioning Septic Systems USGS Real Time TMDL Complete Interstates US Highways State Highways Natchez Trace Local Roads | <ul style="list-style-type: none"> IRI 2010 Unimpaired Inconclusive Impaired No Score Point Source Discharges NPDES MS Stormwater MS Pre-treatment Water MSP Water MS General MS/MSR Inactive/Expired/OTHER Permits | <ul style="list-style-type: none"> Perennial Stream Intermittent Stream Large Lake/Pond State Boundary County City |
|---|---|--|



This map produced by the Department of Environmental Quality (DEQ), Office of Pollution Control, Surface Water Division, Standards, Modeling, and TMDL Branch on June 14, 2010.

All map data is from the Mississippi Automated Resource Information System (MARIS) and MDEQ.

Map Projection: Mississippi Transverse Mercator

The Mississippi Department of Environmental Quality makes no warranties, expressed or implied, as to the accuracy, completeness, currentness, reliability, or suitability for any particular purpose, of the data contained on this map.

Subset of Muddy Creek Subwatershed 2009 NAIP Aerial Photography



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|---|---|--|
| <ul style="list-style-type: none"> Hydrologic Unit Watershed Subwatershed BMP Location Non-Functioning Septic Systems USGS Real Time TMDL Complete Interstates US Highways State Highways Natchez Trace Local Roads | <ul style="list-style-type: none"> IBI 2010 Unimpaired Inconclusive Impaired No Score Point Source Discharges NPDES MS Strawwater MS Pretreatment Water MS Water MS General MS Other MS Inactive/Expired/OTHER Permits | <ul style="list-style-type: none"> Perennial Stream Intermittent Stream Large Lake/Pond State Boundary County City |
|---|---|--|

Appendix C

Stressors

Table 2
Stressor Summary Table

Concern	Link/Immediate Cause	Stressor	Description of Stressor	Location/Extent
Sediment Loading From Agricultural Lands	Landuse runoff and in-channel sediment processes	Sediment	A stressor identification study was completed for Muddy Creek Watershed. This analysis identified sediment as the a probable stressor of the water body. Certain contaminants may be associated with sediment such as pesticides and nutrients. However, these contaminants would also be controlled by the same best management practices (BMPs) that control sediment coming from fields.	See figure 5.2 for the locations of cropland along streams. There are approximately 20,416 acres of agriculture land in the watershed. The majority of this land is pastureland. All the lands referred to above are in HUC 08010207.

Concern	Link/Immediate Cause	Stressor	Description of Stressor	Location/Extent
Littering	Increasing the number of snags and the amount of debris in the creeks and streams	Litter	People dumping old appliances, old shingles and tires, household trash, old mattresses and other garbage into the creeks and streams from bridges and letting it wash down the creeks and streams when the flow is increased.	This occurs throughout the watershed at most bridge sites in rural areas.

Concern	Link/Immediate Cause	Stressor	Description of Stressor	Location/Extent
Nutrient Loading From Agricultural Lands	Degradation of in-stream biological conditions	Nutrients	A stressor identification study was completed for Muddy Creek Watershed. This analysis identified nutrients and organic enrichment as the most probable primary stressor of the water body. Certain contaminants may be associated with sediment such as pesticides and sediment. However, these contaminants would also be controlled by the same best management practices (BMPs) that control nutrients coming from fields.	See figure 5.2 for the locations of cropland along streams. There are approximately 20,416 acres of agriculture land in the watershed. The majority of this land is pastureland. All the lands referred to above are in HUC 08010207.

Concern	Link/Immediate Cause	Stressor	Description of Stressor	Location/Extent
Beavers	Increased number of beaver dams in the creeks and streams	Beavers	Beaver dams causing flooding issues on lands within the watershed. Valuable topsoil is lost to erosion. Nutrients and chemicals are washed into the streams and creeks. Production of valuable pastureland and cropland is lost.	This occurs throughout the watershed in rural areas.

Appendix D

Checklist of Watershed Implementation Elements

Table D. 9 Key Elements of a Watershed Plan for 319 Grant

Required WIP Elements for 319 Grant	Location in Watershed Implementation Plan
1. Watershed Description and Background	Chapter V, Chapter VII Section A
2. Implementation	Chapter VIII Section A Subsection 3
3. Project Goals	Chapter VIII Section A Subsections 2 and 5
4. Project Costs	Chapter VIII Section A Subsection 7 Chapter IX Section A Subsection 7, 8
5. Education and Outreach	Chapter IX
6. Implementation Schedule	Chapter VIII Section A Subsection 4
7. Milestones	Chapter VIII Section A Subsection 4
8. Adaptations and Revisions	Chapter X Section A, Chapter XI Section A
9. Monitoring	Chapter X Section B Subsections 1 and 2