

BEAR CREEK WATERSHED IMPLEMENTATION PLAN

**FINAL PLAN
August 10, 2007**

BEAR CREEK WATERSHED IMPLEMENTATION PLAN

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TABLE OF CONTENTS

Mission Statement	5
Bear Creek Watershed Description	5
Watershed Implementation Team (WIT)	8
Interests and Concerns	9
Priority Concerns	10
Bear Creek Resources	11
Water Quality Standards	11
Current Condition	11
Surface Water Quality	11
Ground Water Resources	12
TMDLs	13
Fisheries, Plant, and Wildlife Resources	14
Watershed Implementation Plan (WIP)	16
Goal	16
Sediment/Turbidity	16
Low DO/Organic Enrichment	18
High Nutrient Levels	20
Fish Advisories	21
Noxious Aquatic Vegetation	22
Fisheries Management	23
Access to Public Water	24
Education Strategy	25
Goals	25
Delta Wildlife and Delta F.A.R.M.	25
Mississippi Natural Resources Conservation Service	25
Mississippi Soil and Water Conservation Commission	28
Mississippi State University	32
Mississippi Department of Environmental Quality	32
Evaluation	35
Monitoring	35
Assessment of Progress	35
Plan Evaluation Procedure	35
References	37
Appendix	39
A – Stressors	39
B – Checklist of WIP Elements	40

LIST OF TABLES

Table 1. Priority Concerns in Bear Creek Watershed	10
Table 2. Water quality criteria for Bear Creek watershed.	11
Table 3. 2002 303(d) Listings for Bear Creek watershed	12
Table 4. Species of Special Concern in Bear Creek Watershed	14
Table 5. Projected Costs for Agricultural Best Management Practices	18
Table 6. Projected Costs for Weirs and Flow Augmentation	19
Table 7. Project Costs for Noxious Aquatic Weed Control	22
Table 8. Projected Costs for Fisheries Management on Mossy Lake	23
Table 9. MDEQ NPS Pollution Educational Activities and Materials.	34

LIST OF FIGURES

Figure 1. Bear Creek Watershed (Location within the State)	5
Figure 2. Bear Creek Watershed	6

Mission Statement

The mission of the Bear Creek Watershed Implementation Plan (WIP) is to develop a more sustainable future for the resources, residences, and businesses located within the watershed by addressing all identified natural and wildlife resources concerns. The implementation of this plan also partially fulfills the mission of all members of the Bear Creek WIT including: Ducks Unlimited, Delta Wildlife, Delta F.A.R.M., Mississippi Department of Environmental Quality, U.S. Fish and Wildlife Service, USDA Natural Resources Conservation Service, Mississippi Soil & Water Conservation Commission, Mississippi Department of Wildlife, Fisheries, and Parks, Mississippi State Department of Health, Mississippi State University, Yazoo-Mississippi Delta Joint Water Management District, and all other partnering agencies, private landowners, farmers, and business owners in the watershed.

Bear Creek Watershed Description

Bear Creek drains approximately 74,001 acres of the Yazoo River basin in portions of Leflore, Sunflower, and Humphreys counties in west central Mississippi (MDEQ 2003a,b). We estimate that approximately 7,400 people lived in this watershed in 2000 (based on Census 2000 data for Leflore County). Portions of the towns of Itta Bena and Quito are in the Bear Creek watershed. Swiftown is the largest town entirely in the watershed. In 1993 land use in the watershed was primarily agricultural (68%) and forestland (16%) (MDEQ 2003a,b). Crops produced in the watershed include catfish, rice, soybeans, milo, corn, and cotton.

Figure 1. Bear Creek Watershed (Location within the State)

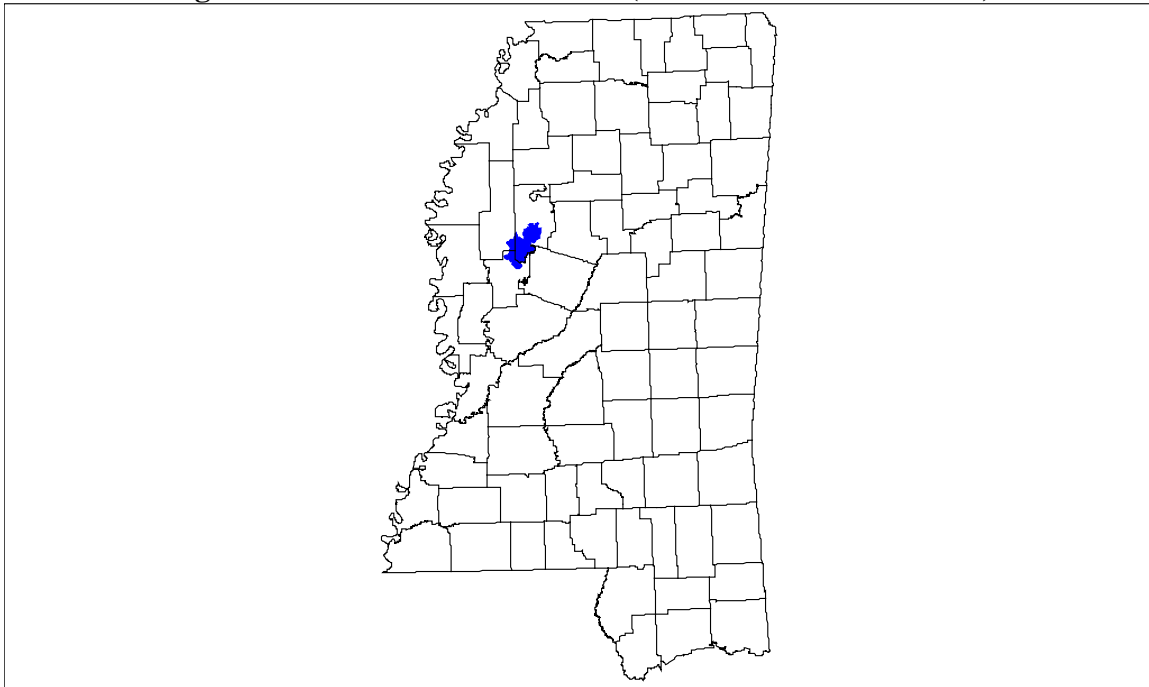


Figure 2. Bear Creek Watershed



The watershed is underlain by Mississippi River alluvium. The topography of the watershed is primarily flat, with the main topographic relief provided by river terraces (MDEQ 2000). Forestdale, Dundee, Dubbs, Sharkey, and Alligator soils are prevalent throughout the watershed. The watershed is located in the Mississippi Alluvial Plain ecoregion. Native vegetation in the watershed is bottomland hardwood forest, which includes oak, tupelo gum, cottonwood, and cypress (MARIS). The Mississippi Department of Natural Heritage has identified a number of environmentally sensitive areas in the Bear Creek watershed (MARIS).

Bear Creek is a system of small oxbow lakes connected by stream segments. Blue Lake is the upstream-most lake and is fed by Gayden Brake, a cypress-tupelo swamp that forms the headwaters of the Bear Creek system. As Bear Creek proceeds from Blue Lake it passes through One Mile Lake, Three Mile Lake, Six Mile Lake, Four Mile Lake, and Wasp Lake, which empties into the Yazoo River. A control structure between Wasp Lake and the Yazoo River controls backwater flooding of lower Bear Creek by the Yazoo River. A number of additional oxbow lakes in the watershed are connected to the Bear Creek system only during high water conditions; Mossy Lake connects to One Mile Lake, Macon Lake connects to Three Mile Lake, and Sky Lake connects to Four Mile Lake (MDEQ 2003a, Pennington et al. 1991).

Approximately 7,496 acres of wetlands occur in the watershed. Water levels in the creeks, lakes, and wetlands are maintained by rainwater and the shallow Mississippi River alluvial aquifer that underlies the watershed. 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. These withdrawals have resulted in ground water level declines in this aquifer. Deep, confined aquifers are the primary drinking water source in the watershed and are not affected by the alluvial aquifer. These confined aquifers are generally not susceptible to contamination (MDEQ 2000).

Watershed Implementation Team

Formal members of the Bear Creek Watershed Implementation Team are listed below and represent various professional resource agencies interested in the watershed. A group of 19 landowners and stakeholders also participated in the WIP development process by providing input during at the Bear Creek Watershed Stakeholder meeting. Despite their participation and contribution to this document, stakeholders and landowners that attended this meeting chose not to be formally recognized on the WIT, and therefore, not listed below.

Delta F.A.R.M. and Delta Wildlife, Inc.

Trey Cooke
Sam Franklin
Gayden Pollan

Ducks Unlimited

Stacey Shankle

Mississippi Department of Environmental Quality

Steve Goff
Ronn Killebrew

Mississippi State Department of Health

Gene Herring

Mississippi Department of Wildlife, Fisheries, and Parks

Fisheries Division
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Wildlife Division
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Mississippi State University

College of Forest Resources
Department of Wildlife & Fisheries
Todd Teitjen

Mississippi Soil and Water Conservation Commission

Patrick Vowell

USDA Natural Resources Conservation Service

Bobby McCain, Engineer
Dale Gardner, Leflore County District Conservationist
Chad Feber, Humphreys County District Conservationist
Sunflower County District Conservationist

U.S. Fish and Wildlife Service

Chris Woodson
Bo Olswanger

U.S. Geological Survey

Richard Rebich

Yazoo-Mississippi Delta Joint Water Management District

Dean Pennington

Interests and Concerns

It is recognized that production agriculture is the primary source of economic stability in the Bear Creek Watershed. Therefore, the WIT and stakeholders shall only support activities that improve the overall natural resources of the watershed while promoting a more sustainable future for agriculture.

Sedimentation and erosion was a common theme among both the WIT and stakeholders. Both groups identified multiple resource concerns that could be minimized or resolved by addressing sedimentation and erosion in the watershed. These concerns included fisheries, wetland habitat, irrigation water storage capacity, drainage, and aesthetics. Other common interests included general wetland and wildlife habitat in the watershed and noxious aquatic weeds in watershed lakes and drainage systems.

In addition to sedimentation and erosion, several other water quality concerns were listed by water quality resource agencies on the WIT. These concerns include legacy pesticides, low dissolved oxygen, organic enrichment, and nutrients. Wildlife biologists sited 27 species of special concern in the watershed, including the Louisiana Black Bear. Fisheries biologists were especially concerned with the significant disappearance of game fish populations.

Stakeholders and landowners sited drainage as an additional concern in the watershed. Sedimentation and subsequent shallowing of stream channels has allowed thick vegetation to establish in many parts of Bear Creek. Buttonbush and other aquatics have begun to impede drainage. The problem has been compound by beaver and nutria.

The last sited issue of interest and concern in the watershed is public access. Opinions on access vary greatly, among both groups. Many fishermen and residents of the watershed would like to gain access to some of the oxbows in the watershed for fishing and recreational purposes. However, access to oxbows in the watershed is almost entirely controlled by private landowners. Many landowners are opposed to granting access to the public while other landowners are not opposed.

Priority Concerns

Table 1. Priority Concerns in Bear Creek Watershed

<i>Status</i>	<i>Description</i>
Concern: Cause: Location: Extent:	Sedimentation/Turbidity Nonpoint source agricultural runoff due to erosion Impairment occurs in Mossy, Six Mile, Wasp, and Sky Lakes Entire watershed
Concern: Cause: Location: Extent:	Low DO/Organic Enrichment Nonpoint source agricultural runoff and/or failing septic systems Impairment occurs in Bear Creek, Blue, Mossy, Three Mile, and Wasp Lakes Approximately 52 miles of surface water
Concern: Cause: Location: Extent:	High Nutrient Levels Nonpoint source agricultural runoff Impairment occurs in Bear Creek, Blue, Four Mile, Mossy, Six Mile, Sky, Six Mile, Three Mile, and Wasp Lakes Approximately 52 miles of surface water
Concern: Cause: Location: Extent:	Fish Advisories Soil persistence of legacy pesticides (DDT & Toxophene) All water bodies containing gar, buffalo, carp, and catfish longer than 22” Entire watershed
Concern: Cause: Location: Extent:	Noxious Aquatic Vegetation Natural dispersal and boat hull transfer Impairment occurs in Bear Creek and all oxbows connected by Bear Creek during normal water level conditions. Entire watershed
Concern: Cause: Location: Extent:	Fisheries Management Decline of game fish populations Associated oxbow lakes able to sustain fisheries during low water Entire watershed
Concern: Cause: Location: Extent:	Access to Public Waters Lack of sufficient public access to larger oxbow lakes in watershed Associated oxbow lakes able to sustain fisheries during low water Entire watershed

Bear Creek Resources

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 Secondary Contact Recreation and Aquatic Life Support (MDEQ 2003). Table 2 lists the numeric water quality criteria applicable to Bear Creek watershed perennial surface waters (MDEQ 2002).

Table 2. Water quality criteria for Bear Creek 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 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).

Current Condition

Surface Water Quality

There is not a routine water quality monitoring station in Bear Creek watershed. Two major water quality studies have been conducted on Bear Creek, one by the National Sedimentation Laboratory in the late 1970’s, and one by the Vicksburg District Corps of Engineers during 1990. Data from the 1990 study indicate dissolved oxygen conditions that do not meet the water quality criteria for the Bear Creek system (MDEQ 2003a). Bacterial and pesticide contamination of Bear Creek was investigated by the USDA-ARS during the 1980’s (MDEQ 2003c). The USDA-ARS also conducted investigations of the fisheries, plankton, and sediments in the Bear Creek system during the 1980’s. A summary of data

collected during all of these studies as well as listings of reports associated with them are available in the Yazoo River basin data compendium (MDEQ 2003c).

A number of water bodies in the Bear Creek watershed have been evaluated as impaired (not based on water quality measurements) and are included on the Mississippi 303 (d) List. Table 3 summarizes the listings from the 2002 303(d) List. A number of water bodies in the watershed that were included on previous 303(d) Lists are being de-listed. Bear Creek, Wasp Lake and Three Mile Lake listings for nutrients, organic enrichment/low DO, and sediment/siltation are scheduled for de-listing due to completion of TMDLs for these pollutants. Previous impairment listings of Blue Lake and Mossy Lake due to nutrients and organic enrichment/low DO are also scheduled for de-listing due to completion of TMDLs; as are previous listings of Four Mile Lake, Macon Lake, Six Mile Lake, and Sky Lake for nutrients; and a Wasp Lake listing for pesticides (MDEQ 2004a).

Table 3. 2002 303(d) Listings for Bear Creek watershed

Water Body	Impairment	Pollutant/Cause
Bear Creek	Aquatic Life Support	Pesticides
Macon Lake	Aquatic Life Support	Pesticides Sediment/siltation
Mossy Lake	Aquatic Life Support	Pesticides Sediment/siltation
Six Mile Lake	Aquatic Life Support	Pesticides Sediment/siltation
Sky Lake	Aquatic Life Support	Pesticides Sediment/siltation
Upper Six Mile Lake	Aquatic Life Support	Nutrients Pesticides Sediment/siltation
Four Mile Lake	Aquatic Life Support	pesticides

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).

TMDLs

The water bodies in the Bear Creek watershed have been included on Mississippi 303(d) Lists. Three total maximum daily load studies (TMDLs) related to these listed segments have already been completed, one addressing sediment/siltation, and one addressing organic enrichment/low dissolved oxygen and nutrients.

A TMDL addressing sediment/siltation impairment listings for Bear Creek, Three Mile Lake, and Wasp Lake has been completed and approved by U.S. EPA (MDEQ 2003b). Nonpoint sources of sediment (due to erosion) are the primary sources of concern. Sources identified in the TMDL include agriculture, silviculture, rangeland, construction sites, roads, urban areas, mass wasting areas, gullies, surface mines, in-channel and in-stream processes, and historical land use activities and channel alterations. Wet weather conditions are the critical conditions for sediment loading to the water bodies. The target sediment yield for the watershed at the effective discharge is 2.4E-03 to 7.3E-03 tons/acre/day. The existing yield for the watershed is estimated to be between 3.9E-03 and 7.0E-03 tons/acre/day. Thus the TMDL does not recommend a reduction in the sediment load, but does recommend maintaining existing management practices to prevent an increase in the sediment load (MDEQ 2003b).

A phase 1 TMDL addressing organic enrichment/low dissolved oxygen and nutrients listings for Bear Creek, Blue Lake, Four Mile Lake, Macon Lake, Mossy Lake, Six Mile Lake, Sky Lake, and Three Mile Lake has been completed and approved by U.S. EPA (MDEQ 2003a). There are currently no numerical criteria for nutrient concentrations in Mississippi surface waters, so a TMDL for nutrients was not developed. However, nutrient contributions to oxygen demand were included in the dissolved oxygen TMDL. Nonpoint sources are considered to be the primary source of oxygen demand in the Bear Creek system. However, the TMDL recommends that no oxygen demanding point source discharges be added to the watershed since operation of the Wasp Lake control structure reduces the assimilative capacity of the system by reducing flow. No estimate was made of existing oxygen demanding loads or of reductions required to achieve the TMDLs. The TBODu target value for the TMDL is 7.5 mg/L. Flow varying TMDLs were calculated by multiplying the target TBODu concentration by the flow. The resulting TBODu TMDLs for Bear Creek ranged from 0 lb/day to 202,166 lb/day, or 0 lb/acre-day to 2.73 lb/acre-day (MDEQ 2003a).

The Wasp Lake pesticide impairment was addressed in a pesticide TMDL for the Yazoo River basin (MDEQ 2003d). The target for this TMDL is removal of fish consumption advisories for DDT and Toxaphene, and reduction of water column concentrations to the DDT human health and aquatic organism standard, and the Toxaphene fresh water chronic standard. The methods proposed for achieving these targets included implementation of BMPs to reduce sediment loading to water bodies (pesticides are present in basin soils) and natural attenuation (historical pesticide monitoring data from the Yazoo River basin indicate a

decreasing trend in pesticide concentrations in soils, fish tissue, and water) (MDEQ 2003d).

Fisheries, Plant, and Wildlife Resources

The only federally endangered species listed by the Mississippi Natural Heritage Inventory for the Bear Creek watershed area is pondberry (*Lindera melissifolia*) in Sunflower County. The only federally threatened species that may occur the Humphreys County portion of the watershed is the Louisiana black bear (*Ursus americanus luteolus*). Although not federally listed, the State of Mississippi has listed the American black bear (*Ursus americanus*) as threatened in the Sunflower and Leflore County portions of the watershed. These species have the potential to be present in the Bear Creek watershed. There are also approximately 27 species of “special concern” for Leflore, Humphreys, and Sunflower counties included in the Natural Heritage Inventory.

Table 4. Species of Special Concern in Bear Creek Watershed

<i>Scientific Name</i>	<i>Common Name</i>	<i>Status</i>
<i>Graptemys ouachitensis</i>	Ouachita map turtle	Special Concern
<i>Graptemys pseudogeographica kohni</i>	MS map turtle	Special Concern
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Special Concern
<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Special Concern
<i>Polyodon spathula</i>	Paddlefish	Special Concern
<i>Quadrula nodulata</i>	Wartyback	Special Concern
<i>Truncilla truncate</i>	Deertoe	Special Concern
<i>Actinonaias ligamentia</i>	Mucket	Special Concern
<i>Anodonta suborbiculata</i>	Flat Floater	Special Concern
<i>Arcidens confragosus</i>	Rock Pocketbook	Special Concern
<i>Ellipsaria lineolata</i>	Butterfly	Special Concern
<i>Ellipto dilatata</i>	Spike	Special Concern
<i>Plethobasus cyphus</i>	Sheepnose	Special Concern
<i>Potamilus ohioensis</i>	Pink Papershell	Special Concern
<i>Quadrula cylindrical cylindrical</i>	Rabbitsfoot	Special Concern
<i>Unio merus declivis</i>	Tapered Pondhorn	Special Concern
<i>Ursus americanus luteolus</i>	Louisiana Black Bear	Federally Threatened
<i>Lasiurus cinereus</i>	Hoary Bat	Special Concern
<i>Fraxinus profunda</i>	Pumpkin Ash	Special Concern
<i>Penstemon tenuis</i>	Sharp-Sepal Beardtongue	Special Concern
<i>Carya leiodermis</i>	Swamp Hickory	Special Concern
<i>Lindera melissifolia</i>	Pondberry	Federally Endangered
<i>Menispermum canadense</i>	Canada Moonseed	Special Concern
<i>Thalia dealbata</i>	Powdery Thalia	Special Concern
<i>Armoracia aquatica</i>	Lake Cress	Special Concern
<i>Bumelia reclinata</i>	Florida Bumelia	Special Concern
<i>Carex decomposita</i>	Cypress-Knee Sedge	Special Concern
<i>Iris fulva</i>	Red Flag	Special Concern
<i>Quercus mississippiensis</i>	Delta Post Oak	Special Concern
<i>Ursus americanus</i>	American Black Bear	State Threatened

All water bodies in the Delta, including those in the Bear Creek watershed, were placed under fish consumption advisory in 2001 for the legacy pesticides DDT and Toxaphene. 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. Additionally, the Sky Lake WMA was established by the USACE as a mitigation site and is now managed by the Mississippi Department of Wildlife, Fisheries and Parks. This WMA is home to the former State Champion Bald Cypress. It is estimated that nearly 20% of the watershed has been restored to bottomland hardwood forests in the past 20 years.

Because of increased forest lands and an abundance of natural wetlands, the Bear Creek Watershed has significant populations of numerous consumptive wildlife species such as white-tailed deer, migratory waterfowl, and small game. The eastern wild turkey is also making a humble living in parts of the watershed.

Fishing is only second to hunting as an outdoor recreational activity in the watershed. Among the many oxbow lakes that scatter the watershed, several are considered outstanding crappie fisheries. Unfortunately, MDWFP have cited declines in bluegill and other sunfish populations in Mossy Lake and other more productive fisheries in the watershed. The cause is unknown, but siltation is suspected.

Watershed Implementation Plan (WIP)

Goal

The goals of this watershed implementation plan is to remove named waterbodies in this watershed from the 303(d) list (Table 3), thereby removing the potential regulatory actions carried by approved TMDLs on named waterbodies in this watershed. This can only be accomplished through the reduction of named pollutants in named waterbodies in the watershed. Ultimately, all waterbodies in this watershed must reach and maintain their MDEQ designated use for Fish and Wildlife Support, Secondary Contact Recreation, and Aquatic Life Support. The goals of this watershed plan can be achieved through the implementation of agricultural BMPs. Priority Concerns (Table 1) that do not directly identify 303(d) listed impairments or TMDLs in the watershed may also be addressed by this watershed plan because it is comprehensive in nature. But it must be noted that these concerns are secondary objectives.

Sediment/Turbidity

Participants

Delta F.A.R.M.
Local Soil and Water Conservation Districts (SWCD)
Mississippi Department of Environmental Quality (MDEQ)
Mississippi Partners for Fish and Wildlife (MPFW)
Mississippi State University Extension Service (ES)
Private Landowners and Farmers
US Army Corps of Engineers (USACE)
USDA-ARS National Soil Sedimentation Laboratory (Sedimentation Lab)
USDA Farm Service Agency (FSA)
USDA Natural Resources Conservation Service (NRCS)
Yazoo-Mississippi Delta Joint Water Management District (YMD)

Implementation/Action

Silt and soil that choke drainage, stress fisheries, increase turbidity, and shorten the overall life span of most lakes in Bear Creek come from adjacent cropland, bank sloughing, and head cutting due to flooding. All causes can be addressed by programs authorized and funded through the Conservation Title of the Farm Bill. Programs such as the Environmental Quality Incentives Program (EQIP), Conservation Reserve Program (CRP), Wildlife Habitat Incentives Program (WHIP), and Wetland Reserve Program (WRP) all provide significant financial incentives to help landowners address sedimentation issues in Bear Creek. The USDA NRCS and/or FSA administers these programs and also provides significant technical assistance opportunities to private landowners. Those

landowners concerned about sedimentation in Bear Creek can often find technical and financial assistance by simply contacting their local county USDA Service Center.

Other funding opportunities for BMP installation within the watershed would include the Mississippi Partners for Fish and Wildlife and grants from other entities like the National Fish and Wildlife Foundation. Technical assistance to address sedimentation in the Bear Creek Watershed can be provided by Delta F.A.R.M., Sedimentation Laboratory, Mississippi State University Extension Service, YMD, MPFW, USACE, and MDEQ.

If installed and maintained property, the following Best Management Practices could be used to reduce sedimentation by 35% - 67% in the Bear Creek Watershed.

- Structures for Water Control (100 units minimum)
- Overfall Pipes (40 units minimum)
- Riparian Buffers (100 acres minimum)
- Grass Filter Strips (included in riparian buffer estimate)
- Grass Waterways (25 acres minimum)
- Stiff Grass Hedges (+100 sites)
- Field Borders (40 acres)
- Reforestation (1000 acres)
- Wetland Construction (100 acres)
- Hydrology Restoration (included in wetland construction estimate)
- Land Forming (1000 acres)
- Bank Stabilization (as needed, minimum 25 sites)
- No-Till (1000 acres)
- Cover/Double Cropping (1000 acres)

Budget

Projected costs for implementing practices that address sedimentation and siltation can be found in Table 5.

Table 5. Projected Costs for Agricultural Best Management Practices

Practice	Unit Cost (w/installation)	Number of Units	Total Cost
Water Control Structures	\$1,500.00	100	\$150,000.00
Overfall Pipes	\$1,600.00	40	\$64,000.00
Riparian Buffers (rental payment*)	\$125.00/acre \$55.00/acre x 15 years*	100/acres 100/acres*	\$12,500.00 \$82,500.00*
Grass Waterways	\$35.00/acre	25/acres	\$875.00
Stiff Grass Hedges	\$250.00/site	100/sites	\$25,000.00
Field Borders	\$125.00/acre	40/acres	\$5,000.00
Reforestation	\$145.00/acre	1000/acres	\$145,000.00
Wetland Construction	\$500.00/acre	100/acres	\$50,000.00
Land Forming	\$400.00/acre	1000/acres	\$400,000.00
Bank Stabilization	\$3,000.00/site	25/sites	\$75,000.00
No-Till*	\$20.00/acre x 15 years*	1000/acres*	\$300,000.00*
Cover/Double Cropping	\$20.00/acre x 15 years*	1000/acres*	\$300,000.00*
TOTAL			\$1,609,874.00

Low DO/Organic Enrichment

Participants

Delta F.A.R.M.
Local Soil and Water Conservation Districts (SWCD)
Mississippi Department of Environmental Quality (MDEQ)
Mississippi Department of Health (MDH)
Mississippi Partners for Fish and Wildlife (MPFW)
Mississippi State University Extension Service (ES)
Private Landowners and Farmers
US Army Corps of Engineers (USACE)
USDA-ARS National Soil Sedimentation Laboratory (Sedimentation Lab)
USDA Farm Service Agency (FSA)
USDA Natural Resources Conservation Service (NRCS)
US Geological Survey (USGS)
Yazoo-Mississippi Delta Joint Water Management District (YMD)

Implementation/Action

Although there are many causes for low DO levels and high organic enrichment, it is thought that non-point sources from agricultural runoff and failing septic systems are the primary causes in the Bear Creek Watershed.

Implementing agricultural BMPs that reduce erosion and sedimentation improve DO levels and reduce organic enrichment. Therefore, the first course of action would be to implement those BMPs listed in the previous section as addressing sediment and turbidity.

Low DO levels can also be caused by low flow/shallow waters, algae blooms, and extreme water temperatures. These issues can be addressed by the installation of low water weirs to impound more water during periods of drought. Furthermore, flows could be augmented by other water sources as they have in other Yazoo Basin streams. MDEQ, USACE, USGS, and YMD all have experience in these activities. Extreme water temperatures can also be mitigated by installing riparian forest buffers near waters to provide shading. The die-off of noxious aquatics may also cause low DO levels in the fall. However, an action plan to address noxious aquatics will be discussed in a later section.

Outside of agriculture, failing septic systems may also be a major contributor to organic enrichment in the Bear Creek Watershed. Many secondary homes (weekend homes, fish camps, hunting camps, etc...) line the banks of several lakes in the watershed. It is thought that many of these homes do not have adequate septic systems. However, this must be confirmed before action is taken. The Mississippi Department of Health and MDEQ shall take the lead on further identifying the problem and any further action.

Budget

Projected costs for implementing ag BMPs that address Low DO and Organic Enrichment are listed in Table 5. Other efforts to address Low DO and Organic Enrichment are listed below in Table 6.

Table 6. Projected Costs for Weirs and Flow Augmentation

Practice	Unit Cost (w/installation)	Number of Units	Total Cost
Weir	\$250,000.00	3	\$750,000.00
Flow Augmentation	\$100,000.00	1	\$100,000.00
TOTAL			\$850,000.00

High Nutrient Levels

Participants

Delta F.A.R.M.
Local Soil and Water Conservation Districts (SWCD)
Mississippi Department of Environmental Quality (MDEQ)
Mississippi Department of Health (MDH)
Mississippi Partners for Fish and Wildlife (MPFW)
Mississippi State University Extension Service (ES)
Private Landowners and Farmers
US Army Corps of Engineers (USACE)
USDA-ARS National Soil Sedimentation Laboratory (Sedimentation Lab)
USDA Farm Service Agency (FSA)
USDA Natural Resources Conservation Service (NRCS)
US Geological Survey (USGS)
Yazoo-Mississippi Delta Joint Water Management District (YMD)

Implementation/Action

High nutrient levels are also attributed to non-point agricultural run-off. Similar to sediment and organic enrichment, nutrients can be significantly reduced by using those same BMPs listed in Table 5. By implementing these BMPs, nutrients can be reduced by approximately 70% (Freedman et al. 2003, Klapproth and Johnson 2000).

Budget

Projected costs for implementing ag BMPs that reduce nutrient loading are listed in Table 5.

Fish Advisories

Participants

Delta F.A.R.M.
Local Soil and Water Conservation Districts (SWCD)
Mississippi Department of Environmental Quality (MDEQ)
Mississippi Department of Health (MDH)
Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP)
Mississippi Partners for Fish and Wildlife (MPFW)
Mississippi State University Extension Service (ES)
Private Landowners and Farmers
US Army Corps of Engineers (USACE)
USDA-ARS National Soil Sedimentation Laboratory (Sedimentation Lab)
USDA Farm Service Agency (FSA)
USDA Natural Resources Conservation Service (NRCS)
Yazoo-Mississippi Delta Joint Water Management District (YMD)

Implementation/Action

Fish advisories stem from the persistence and existence of levels of legacy pesticides like DDT and Toxaphene in fish tissue. The EPA sets tolerance levels for said fish advisories and MDEQ enforces these advisories. The Fisheries Bureau of MDWFP also assists MDEQ with educational processes associated with fish advisories.

The goal of this action item is to removal fish consumption advisories for DDT and Toxaphene, and reduction of water column concentrations to the DDT human health and aquatic organism standard, and the Toxaphene fresh water chronic standard. The methods proposed for achieving these targets included implementation of BMPs to reduce sediment loading to water bodies (pesticides are present in basin soils) and natural attenuation (historical pesticide monitoring data from the Yazoo River basin indicate a decreasing trend in pesticide concentrations in soils, fish tissue, and water) (MDEQ 2003d). Therefore, those BMPs listed in Table 5 will also serve to achieve this goal.

Budget

Projected costs for implementing BMPs that would reduce the loading of legacy pesticides are listed in Table 5.

Noxious Aquatic Vegetation

Participants

Mississippi Department of Wildlife, Fisheries, and Parks
Mississippi State University Extension Service
U.S. Army Corps of Engineers

Implementation/Action

Alligator weed has been identified as the primary noxious aquatic weed found in the Bear Creek Watershed. Biological control measures such as the use of the Alligator Flea Beetle can and will be used. MDWFP will stock said insects in those lakes with higher public use and access to control the weed. The USACE rears these insects and provides them to MDWFP upon request.

Herbicides may also be used to successfully treat Alligator weed. However, these means are typically very expensive and labor intensive, requiring a significant investment. MDWFP is conducting some herbicide treatment on area lakes, but it is cost prohibitive for the entire watershed.

The Mississippi State University Extension Service is also working on the development of new control measures. As these new measures are identified and perfected, it is hopeful that they could be utilized in the Bear Creek Watershed and throughout the Yazoo Basin wherever Alligator weed exists.

Budget

Projected costs for control and/or eradication of targeted noxious aquatic vegetation in the Bear Creek Watershed are listed in Table 7.

Table 7. Project Costs for Noxious Aquatic Weed Control

Practice	Unit Cost (w/installation)	Number of Units	Total Cost
MDWFP Monitoring	\$300 day	3 days/yr./5 years	\$4,500.00
MDWFP Stocking	\$300 day	1 day/yr/5 years	\$1,500.00
Flea Beatles	\$0.00/500 insects	N/A	\$0.00
Herbicide Treatments	\$90.00/ac.	1000 acres	\$90,000.00
Total			\$96,000.00

Fisheries Management

Participants

Mississippi Department of Wildlife, Fisheries, and Parks

Implementation/Action

MDWFP Bureau of Fisheries takes an active role in the management of most popular public waters in the state. Of those many lakes in the Bear Creek watershed, only a very few offer public access, thereby reducing public use and the importance of MDWFP's activities in the watershed. However, public access can be gained to several of the lakes, of which, Mossy Lake is the most popular fishery.

For Mossy Lake, MDWFP has proposed to map the lakes depth profile as a part of a comprehensive, statewide effort to provide new lake maps to the public. This project is ongoing. Furthermore, it is proposed that a fisheries management plan be developed, implemented and its subsequent results monitored. Management actions may include the implementation of specific creel and slot sizes on certain species of game fish like white crappie and black bass.

No other actions have been proposed for other lakes in the watershed.

Budget

Projected costs associated with fisheries management on Mossy Lake are outlined in Table 8.

Table 8. Projected Costs for Fisheries Management on Mossy Lake

Practice	Unit Cost (w/installation)	Number of Units	Total Cost
Monitoring			\$13,622.00
Field	\$590/day	4	
Fish Pop. Reports	\$266/day	2	
Field	\$288/day	28	
Harvest Survey	\$266/day	10	
Mgt. Plan Development	\$266/day	7	\$1,860.00
Mapping	\$554/day	4	\$2,216.00
TOTAL			\$17,698.00

Access to Public Water

Participants

Mississippi Department of Wildlife, Fisheries, and Parks
Mississippi Department of Environmental Quality
Private Landowners
General Public/Lake Users

Implementation/Action

The Technical Committee of this Watershed Implementation Team, along with the public users in the watershed, have identified access to public waters as a primary concern in this watershed. However, this point was generally contested by the private landowners in the watershed who own land surrounding these public waters. Although there were exceptions, the landowners generally agreed to oppose any efforts to increase public access to the public waters in the watershed.

Because the entire Watershed Implementation Team did not reach consensus on this issue, no plan of action will be recommended.

Budget

Because no action item was developed, there is no budget for this priority concern.

Education Strategy

Goal

The overall objective of the education strategy in the Bear 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 farmer and landowner awareness of the value of clean water and their responsibility to insure others down stream 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 public awareness of the value of clean water.
- Increase public awareness of how common activities affect water quality and critical flora and fauna.
- Increase public awareness of how BMPs can be used to reduce negative water quality and habitat affects.
- Increase public awareness of the long term environmental and economic advantages of protecting and improving water quality and habitat in the Bear Creek watershed.

Delta Wildlife and Delta F.A.R.M.

Education and outreach are part of Delta Wildlife and Delta F.A.R.M.'s mission. Delta Wildlife publishes a quarterly magazine as Delta F.A.R.M. publishes a quarterly newsletter for members and make educational presentations at schools and to various groups. A portion of these efforts will be targeted towards landowners and residents in this watershed. Furthermore, the organization will use other means of outreach through press releases and their website. This implementation plan will also be available on both organization's website along with information for landowners in the watershed who wish to participate.

Mississippi Natural Resources Conservation Service

The Mississippi Natural Resources Conservation Service (NRCS) provides technical resources and education through a number of conservation programs, the Natural Resource Inventory, public service announcements, technical resources, and their website (<http://www.ms.nrcs.usda.gov>). Information on some of these programs and resources is provided below. Additional information is available on

the Mississippi NRCS website or by contacting Mississippi NRCS or county USDA Service Centers. Education and outreach activities are performed primarily by county conservationists.

Conservation Programs

The Mississippi Natural Resources Conservation Commission assists in implementing a number of conservation programs in Mississippi. These programs provide technical and/or financial assistance to landowners for conservation of particular land uses and restoration of natural habitats. A list of these programs is provided below.

- Conservation of Private Grazing Lands
- Conservation Technical Assistance
- Emergency Watershed Protection
- Environmental Quality Incentives Program (EQIP)
- Farmland Protection Program
- Grassland Reserve Program
- Grazing Lands Conservation Initiative
- Resource Conservation and Development
- Soil Survey Programs
- Watershed Protection and Flood Prevention
- Wetlands Reserve Program
- Wildlife Habitat Incentives Program

NRCS also assists in the Conservation Reserve Program (CRP) managed by Farm Service Agency, and the Stewardship Incentive Program managed by Forest Service. Information about these programs is available on the website, or by contacting the County USDA Service Centers.

Technical Resource Documents

Technical resource documents are available on a wide variety of subjects. These documents can be obtained through the website, or by contacting the County USDA Service Centers. Technical resource documents are available for the following subject areas:

- Agronomy, wind and water erosion,
- Air quality,
- Conservation practice standards,
- Cultural resources,
- Economics resources,
- Engineering tools and resources,

- Environmental compliance,
- Farmland information center,
- Forestry and agroforestry,
- Invasive species,
- Natural resource data and analysis,
- Nutrient management,
- Pest management,
- Plants,
- Range and pasture,
- Soils,
- Streams,
- Understanding ecosystems,
- Water resources, and
- Wildlife biology.

Technical Tools and Models

Technical tools and models are available through the Mississippi NRCS. These tools are available on the website, or by contacting the County USDA Service Centers. The available tools and models include:

- Animal waste management software,
- Computer tools for conservation decision making,
- Engineering documents and tools,
- Irrigation and water management tools,
- Manure Master decision support system,
- Pest management,
- Interactive web tool for selecting and sizing buffer practices for the Conservation Buffer Initiative,
- SITES water resources site analysis program,
- Soil Data Viewer,
- Soil quality test kits,
- STATSGO soils browser,
- TR-55, urban hydrology for small watersheds, and
- The web based VegSpec program.

Conservation Education Resources

The Mississippi NRCS is also involved in a number of conservation education efforts. Most of these programs are geared toward children in kindergarten through 12th grade. Information on these programs and how to obtain educational materials is available on the website at

<http://www.nrcs.usda.gov/feature/education/>. Included are materials about soil science education, backyard conservation, conservation history, and living in harmony with wetlands. An interactive educational program “S.K. Worm Teaches Soils” is available on the website at <http://www.nrcs.usda.gov/feature/education/squirm/skworm.html>.

Mississippi Soil and Water Conservation Commission

The Mississippi Soil and Water Conservation Commission (MSWCC) maintains a number of educational programs and materials. Detailed information is provided below. In addition to these programs, the Soil and Water Conservation Commission and county districts also maintain websites for the purpose of providing information and outreach (www.mswcc.state.ms.us).

Educational videos

Five educational videos have been produced for adults. These videos can be obtained from local Soil and Water Conservation District (SWCD) offices or from the MSWCC.

- Conservation Tillage
- Native Mississippi Wildflowers
- Scenic Rivers
- Urban Nonpoint Source Pollution: A citizen’s Guide
- Our Little River

Models

Working models of an aquifer, farm, urban area, and watershed are available. These models can be used to demonstrate pollution problems, and conservation practices. The models can be obtained from SWCD offices or from the MSWCC.

Activity booklets

Three activity booklets have been developed for education of children. Two of the booklets are appropriate for ages pre-kindergarten through three years; “Sammy Soil” teaches the basics of soil and water conservation and, “Wendy Water” teaches basic water conservation. One booklet can be used for ages pre-kindergarten through junior high school: “Earthworms, Recycling and Composting in the Classroom”. These booklets can be obtained from local SWCD offices or from the MSWCC.

Newsletters

Three newsletters are published regularly. Current issues are available from MSWCC.

- MSWCC Annual Report
- MACD “Conservation Outlook”
- Envirothon “EnviroUpdate”

Awards

An awards program for outstanding conservation teachers at the elementary and secondary level, and outstanding conservation education program is sponsored. These awards are given yearly and recognized at the Annual Meeting of the Mississippi Association of Conservation Districts in January. They spotlight the Conservation Education efforts of individual teachers in local schools who integrate responsible conservation awareness into their everyday classroom curriculum. The Conservation Education Program District award is presented to the Soil and Water Conservation District that has shown innovative methods of delivering the conservation message to students as well as adults through a comprehensive education program. Each state winner is nominated for the national award sponsored by Zeneca and the National Association Conservation Districts.

Carnivals and field days

Local SWCDs organize and conduct educational hands-on field days to provide school age students an opportunity to participate in conservation activities in various natural areas. Local and state resource professionals, as well as trained volunteers, conduct the stops and lead or guide the groups in the learning process. The event is often held at local parks or environmental sites, as well as at some schools. The age span varies from kindergarten to eighth grade, depending on the local SWCD. However, fifth grade is the most popular grade attending Carnivals.

Conservation grandparents

This program provides a series of activity sheet and conservation kits for an adult to work with one or more children using everyday materials to teach conservation awareness. Materials are available from SWCD offices or MSWCC. Workshops can be arranged through Gail Spears at the MSWCC office.

Farm tours

The MSWCC works with a Soil & Water Conservation District and a local landowner to schedule a tour of an installed Best Management Practice (BMP). This gives those observing the process a hands-on look at the results of using such a conservation practice. Touring these farms along with District personnel and Commissioners are other farmers, the general public, local media representatives and local municipal or county officials.

Food, land, and people

FLP is a nonprofit, interdisciplinary, supplementary educational program emphasizing agriculture, the environment, people of the world, and their relationships. This nationwide PreK-12 agricultural-environmental education curriculum project provides hundreds of high-quality, objective and easily-integrated curriculum materials. The MSWCC participates and trains teachers and facilitators and is a co-sponsor of this program with USDA/NRCS, MS Farm Bureau, and other state and federal agencies and organizations. Contact Susan Thompson at MSWCC.

License tags for conservation education

During the 2000 Legislative Session, the Legislature passed the MSWCC's proposal for a distinctive vehicle license tags, with the special tag fee to go into a fund for conservation education. The design on the license plate is a native Mississippi wildflower, the Black-eyed Susan. These tags are available in local county Tax Collector offices for a \$30 fee in addition to regular license fees.

Poster and essay contest

A conservation education poster/essay contest is held yearly. The poster contest is divided by grade levels, K-1, 2-3, 4-6, 7-9, 10-12. The rules and topic (which is usually the Soil Stewardship topic from NACD) are sent to local districts in the fall with the entries (posters or essays) due in the local SWCD office in the spring. The posters are judged at the local, area and state level with the state winners being entered in the national contest. The essay contest has the same theme but is conducted in grades 7-12 and is only judged at the local, area and state level. The awards at the state level are US Savings Bonds.

Teacher workshops

The Commission conducts teacher workshops on conservation education in the classroom at local schools, state subject area conferences, environmental education conferences, and other educational meetings and summer workshops. These may be in support of the two curriculums the Commission distributes or developed for the needs of the target audience. In addition, Education Specialists can assist in scheduling workshops for Project Learning Tree and Project Wet. Contact Clay Burns at MSWCC.

Envirothon

The Mississippi Envirothon is a hands-on educational competition for students in grades 9-12 who compete as five-member teams. They prepare in the areas of soils, aquatics, forestry, wildlife, and a current environmental issue that changes each year. They compete at the area level in March to earn the right to compete at the state contest in May. The state champions advance to the international contest, Canon Envirothon, in the summer as Mississippi's representative. The state program is funded by a grant from Chevron Mississippi. Contact Jimmy Booth at MSWCC.

Soil and water conservation youth camp

The Warren A. Hood Soil & Water Conservation Youth Camp is held at Hinds Community College in Raymond, Mississippi the first week of June, starting on Sunday evening and concluding at noon on Thursday. The camp is designed to make learning about conserving our natural resources fun as well as educational. Participants from high schools in each SWCD are exposed to all aspects of soil and water conservation including cropland, grassland, woodland, and wildlife. This is achieved through hands-on activities conducted by local and state resource professionals, field trips, and planned recreation. Contact your local SWCD.

Mississippi State University Cooperative Extension Service

Educational and outreach activities of the Mississippi State University Cooperative Extensions Service include newsletters, bulletins, information sheets, research reports, a website (msucare.com), conferences, workshops, seminars, environmental quality programs, and fish and wildlife programs. These activities are performed primarily by county extension agents.

MDEQ

Nonpoint Source Education/Outreach is a statewide effort that focuses education of the public, students, land managers, road builders, communities, and public officials, on cleaning up and preventing nonpoint source (NPS) pollution in a watershed. One of the primary goals of MDEQ's NPS pollution education program is to create awareness among school age children and adults of where and how polluted runoff is generated. How it affects Mississippian's quality of life, and how practices can be implemented to improve water quality or to maintain a pristine water body. MDEQ reaches the general public with statewide distribution campaigns of NPS literature, the Mississippi Environment newsletter, NPS/water lesson plans to libraries and schools, NPS public service announcement for radio, exhibits at conferences and professional meetings. Since the inception of the Basin Management Approach to Water Quality in 1998, NPS education activities are being coordinated, as appropriate, with the Implementation Phase activities of each basin group. NPS education activities are described below.

Aqua Fair

Aqua Fair is an annual event to educate fifth grade students on water quality. Aqua Fair is presented in a different region of the state each year and reaches an audience of about 2000 fifth graders, 100 teachers and 250 resource people annually. The students participate in 5 different activities

ranging from “building a watershed in a pan” to “running a relay race with buckets of water”. Every session is interactive and teaches a concept about water. The spring, 2004 Aqua Fair is scheduled to be held in the Basin group I geographical region.

Adopt-A-Stream Program

This program involves individual citizens and local community groups in water quality monitoring and protection. Through participation in an educational 2-day workshop, citizens and teachers learn watershed and land use mapping and how to make water quality determinations by conducting water chemistry tests and macroinvertebrate counts on a perennial stream. Some participants attend for the educational benefits and others commit to monitoring a stream for several years. Co-sponsors of this program include the Mississippi Wildlife Federation, Mississippi Natural Science Museum and Mississippi State University’s Coastal Research and Extension Service.

Nonpoint Education for Municipal Officials (NEMO)

NEMO is an education program that makes the link between land use and water quality using geographic information systems (GIS) technology. NEMO focuses on the role of impervious surfaces in the transport and concentration of pollutants. The core presentation of NEMO is divided into three parts. First, GIS images of topography and drainage systems are used to emphasize the water cycle, the watershed concept and the need for watershed management. Second, the land cover/land use data, interspersed with ground and aerial photographs, show local participants the current land use patterns in their town and the common polluted runoff problems associated with each major type of land use. After which, existing land use in critical watersheds is compared with “build-out” scenarios based on the town’s zoning regulations. The emphasis is on the potential increases in the amount of impervious surface and how it can reach a problem point where streams will be degraded. DRAFTly, NEMO outlines a three-tier strategy of natural resource-based planning, site design and the use of stormwater best management practices that towns can use to address their land use and better plan for future growth while protecting their water resources.

Teacher Education

Teacher education is an important component of the NPS pollution education program and a number of lesson plan packages are available for different grades. The *Unclear Future of Clear Creek*, a lesson plan for grades 7-12 is based on Clear Creek in the Big Black River Basin. This lesson Plan package was initially distributed to the County Soil and Water Conservation Districts that placed them in the schools of each of Mississippi’s eighty-two counties. The lesson plan package continues to be distributed at teacher workshops and at Adopt-A-Stream workshops. Other educational activities and materials are described below in Table 4.1.

Table 9. MDEQ NPS Pollution Educational Activities and Materials.

Educational Activity and Materials	Recommended Audience	Contact Information
Enviroscape & Groundwater Model (Water Model)	5-12 grades	Cooperative Extension Service County Agents & MS Dept. of Health Environmentalists
Storm Drain Marking/Stenciling Project-involves both marking storm drains with an anti-pollution message and a door-to-door awareness campaign in the vicinity of the marked storm drains.	All age groups	MDEQ NPS Pollution Program
The Backyard Conservation Literature Campaign & Demonstration Projects-contains information on how to reduce pesticide usage, how to create a water garden that doubles as a retention basin and how to attract wildlife to your backyard.	Garden clubs, Farmers, and other Individual Landowners	MDEQ NPS Pollution Program
MS Planning & Design Manual for Control of Erosion, Sediment, and Stormwater-contains detailed descriptions of NPS Best Management Practices. An accompanying Field Manual is also available.	Highway Construction Firms, Engineering Firms, Landscape Architects, Homebuilders and Developers	MDEQ NPS Pollution Program

Evaluation

Monitoring

Water quality sampling was recommended in the Bear Creek TMDLs, however there are currently no known plans for studies of the Bear Creek system.

Assessment of progress

Progress for this watershed implementation plan will be assessed and evaluated five (5) years (2012) . Water quality data, as well as information on activities occurring in the watershed and stakeholder concerns collected during the period from 2005 through 2007 will be utilized. The following criteria will be used to determine progress toward plan goals:

- Reduction of sediment load by at least 2 tons/year, and
- Achievement of all Mississippi water quality criteria.

Plan Evaluation Procedure

This watershed implementation plan will be evaluated and revised in 2012. The evaluation of this plan will be organized by the Bear Creek Implementation Team beginning in January 2012. At this time the Implementation Team will develop a detailed schedule for review and revision of this watershed implementation plan. The Implementation Team 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. Second, to determine if it reflects the current condition of the watershed, state of science, and issues in the watershed.

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 Bear Creek 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 restoring Bear Creek watershed quality will be revised based on knowledge that has been gained since 2007.

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 watershed restoration and protection activities.

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Appendix

APPENDIX A – Stressors

<i>Status</i>	<i>Description</i>
Stressor: Justification: Location: Extent:	Sedimentation/Turbidity Nonpoint source agricultural runoff due to erosion Impairment occurs in Mossy, Six Mile, Wasp, and Sky Lakes Entire watershed
Stressor: Justification: Location: Extent:	Low DO/Organic Enrichment Nonpoint source agricultural runoff and/or failing septic systems Impairment occurs in Bear Creek, Blue, Mossy, Three Mile, and Wasp Lakes Approximately 52 miles of surface water
Stressor: Justification: Location: Extent:	High Nutrient Levels Nonpoint source agricultural runoff Impairment occurs in Bear Creek, Blue, Four Mile, Mossy, Six Mile, Sky, Six Mile, Three Mile, and Wasp Lakes Approximately 52 miles of surface water
Stressor: Justification: Location: Extent:	Fish Advisories Soil persistence of legacy pesticides (DDT & Toxophene) All water bodies containing gar, buffalo, carp, and catfish longer than 22” Entire watershed
Stressor: Justification: Location: Extent:	Noxious Aquatic Vegetation Natural dispersal and boat hull transfer Impairment occurs in Bear Creek and all oxbows connected by Bear Creek during normal water level conditions. Entire watershed
Stressor: Justification: Location: Extent:	Fisheries Management Decline of game fish populations Associated oxbow lakes able to sustain fisheries during low water Entire watershed
Stressor: Justification: Location: Extent:	Access to Public Waters Lack of sufficient public access to larger oxbow lakes in watershed Associated oxbow lakes able to sustain fisheries during low water Entire watershed

APPENDIX B – Checklist of WIP Elements

Required Watershed Elements	Located Reference
<p>1a. Sediment/Siltation is the primary concern of both regulatory agencies and stakeholders. Sediment, erosion, and all other contributors to sediment loading must be stopped through the used of BMPs. Primary contributor is non-point source agricultural runoff.</p> <p>1b. Low DO/Organic Enrichment. Specific lakes and stream segments in the Bear Creek Watershed are listed for Organic Enrichment although all the causes are not known. MDEQ will continue to monitor Organic Enrichment and attempt to identify all causes before any action is taken.</p> <p>1c. High Nutrients. Specific lakes and stream segments in the Bear Creek Watershed are listed for High Nutrients. The cause is unknown. However, ag BMPs should address most nutrient loading.</p> <p>1d. Fish Advisories/Legacy Pesticides. DDT can be found in fish tissue and soils within the watershed. The only course of action is to further reduce sedimentation by using ag BMPs.</p> <p>1e. Noxious Aquatic Vegetation. Alligator Weed threatens both recreational access and water quality through organic enrichment and DO demand during the fall and winter. Alligator Weed will be treated by a biological means and funded by the USACE and MDWFP.</p> <p>1f. Fisheries Management. MDWFP will continue to monitor the fishery and place more strict creel and/or slot limits on pressured lakes in the watershed, as needed.</p> <p>1g. Lake Access. Fishermen want additional access to the lake.</p>	<p>Table 1</p>
<p>Remove lakes and stream segments from 303(d) list</p>	<p>Page 15</p>
<p>Structures for Water Control (100 units minimum) Overfall Pipes (40 units minimum) Riparian Buffers (100 acres minimum) Grass Filter Strips (included in riparian buffer estimate) Grass Waterways (25 acres minimum) Stiff Grass Hedges (+100 sites) Field Borders (40 acres) Reforestation (1000 acres) Wetland Construction (100 acres) Hydrology Restoration (included in wetland construction estimate) Land Forming (1000 acres) Bank Stabilization (as needed, minimum 25 sites) No-Till (1000 acres)</p>	<p>Page 16</p>

Cover/Double Cropping (1000 acres)	
Ag BMP \$1,609,874.00 Low DO \$850,000.00 Noxious Aquatics \$96,000.00 Fisheries Management \$17,698.00 TOTAL \$2,573,572.00	Tables 5, 6, 7, 8
The overall objective of the education strategy in the Bear Creek watershed is to develop an atmosphere that promotes sustained, long-term protection and improvement of aquatic resources in the watershed.	Page 23
Implementation will be dependent on the cooperation of the private landowners.	Page 16
There are no current plans for water quality monitoring in Bear Creek Watershed.	Page 33