BOGUE CHITTO CREEK WATERSHED IMPLEMENTATION PLAN

FINAL
April 7, 2004

BOGUE CHITTO CREEK WATERSHED IMPLEMENTATION PLAN

Prepared for

Big Black – Tombigbee
Tennessee River Basins Team

Prepared by

FTN Associates, Ltd.
3 Innwood Circle, Suite 220
Little Rock, AR 72211

FINAL
April 7, 2004

GOALS AND ACTIONS FOR BOGUE CHITTO CREEK WATERSHED IN THE COMING BASIN MANAGEMENT CYCLE

GOAL	WHO	WHAT	WHERE	WHEN	CONTACTS
Reduce organic matter loads, achieve state dissolved oxygen standards, and Fish and Wildlife Support designated use	MS Forestry Commission	Aerial survey to determine silviculture activity and sampling locations	Entire Watershed	2004	Michael Sampson, MS Forestry Commission 601-359-1812
		Evaluate potential risks to water quality from recently harvested forest tracts.		2005	
		Contact owners of forest tracts at risk for water quality to inform them of risk and suggest BMPs		2005	
	MS Department of Health	Locate failing septic systems	Entire Watershed	2004-2005	Eugene Herring, MS State Department of Health 601-576-7779
	MDEQ	Water quality sampling	Bogue Chitto Creek	2005	Adrien Carroll, MDEQ 601-961-5716
	MSWCC, USDA NRCS, MSU Cooperative Extension Service, US FWS	Continue existing programs and projects related to farmer education, BMP implementation, and habitat conservation.	Entire Watershed	2004-2008	Larry Williams, NRCS 601-965-5227 Mark Gilbert, MSWCC 601-354-7645 Larry Oldham MSU-Extension Service 662-325-2701 Lloyd Inmon, US FWS 601-321-1134
	MSU Cooperative Extension Service	Initiate Phase I of Medallion Farmer Program	Hinds & Madison Counties	2005	Larry Oldham, MSU-Extension Service 662-325-2701
	City of Clinton	Implement pollution reduction activities specified in Storm Water Management Plan	Clinton City Limits	2004-2008	Richard Broome, City of Clinton 601-924-5462
	US Fish and Wildlife Service	Wetland inventory	Entire watershed	2005	Lloyd Inmon, US FWS 601-321-1134

TABLE OF CONTENTS

GOALS AND ACTIONS FOR BOGUE CHITTO CREEK WATERSHED IN THE COMING BASIN MANAGEMENT CYCLE i
1.0 MISSION STATEMENT 1-1
2.0 BOGUE CHITTO CREEK WATERSHED 2-1
2.1 Watershed Description 2-1
2.2 Water Quality 2-6
2.2.1 Standards 2-6
2.2.2 Current Condition 2-7
2.2.3 TMDLs 2-8
2.2.4 Nonpoint Pollution Sources 2-10
2.3 Stakeholder Concerns 2-11
3.0 WATERSHED IMPLEMENTATION PLAN 3-1
3.1 Goal 3-1
3.2 Management Actions 3-2
3.2.1 Storm Water Pollution Prevention Plans for Urban Areas 3-2
3.2.2 Locate Failing Septic Systems 3-5
3.2.3 Fix Failing Septic Systems 3-7
3.2.4 Agriculture BMPs 3-9
3.2.5 Inventory Silviculture BMPs 3-11
3.2.6 Manage Point Source Discharges 3-15
4.0 EDUCATION STRATEGY 4-1
4.1 Objectives 4-1
4.2 Activities 4-1
4.2.1 Mississippi Soil and Water Conservation Commission 4-1
4.2.2 Mississippi State University Cooperative Extension Service 4-5
4.2.3 Natural Resources Conservation Service 4-6
4.2.4 City of Clinton, MS 4-9
4.2.5 MDEQ 4-9

TABLE OF CONTENTS (CONTINUED)

5.0 EVALUATION 5-1
5.1 Monitoring 5-1
5.2 Assessment of Progress 5-1
5.3 Plan Evaluation Procedure 5-2
5.4 Plan Revision Procedure 5-3
6.0 REFERENCES 6-1

LIST OF APPENDICES

APPENDIX A: Water Quality Data
APPENDIX B: Natural Heritage Inventory Species of Special Concern
APPENDIX C: Stressors
APPENDIX D: History of the Bogue Chitto Watershed Implementation Plan
APPENDIX E: Checklist of Watershed Implementation Plan Elements
APPENDIX F: Proposed Section 319 Funded Projects

LIST OF TABLES

Table 2.1 Major Soils in Bogue Chitto Creek Water 2-3
Table 2.2 Water Quality Criteria for Bogue Chitto Creek watershed 2-6
Table 2.3 Federally Listed Species in Hinds and Madison Counties 2-9
Table 2.4 Bogue Chitto Creek TMDL 2-10
Table 2.5 Estimated Nonpoint Pollutant Loads in Bogue Chitto Creek Watershed 2-11
Table 2.6 Estimated Nonpoint Pollutant Loads by Sub-basin 2-12
Table 2.7 Detailed Listing of Stakeholder Concerns 2-13

Table 3.1 Urban Land Use BOD5 Loads for Bogue Chitto Creek Sub-basins 3-3
Table 3.2 Projected Costs for Urban Best Management Practices 3-4
Table 3.3 Budget for Developing GIS Maps of Onsite Wastewater Systems in Basin Group I 3-6
Table 3.5 Cost Estimates for Agricultural BMPs in Bogue Chitto Creek Watershed 3-11
Table 3.6 Budget for Evaluation of Silviculture BMPs in Basin Group I 3-15

Table 4.1 MDEQ NPS Pollution Educational Activities and Materials 4-12

LIST OF FIGURES

Figure 2.1 Bogue Chitto Creek Watershed 2-2
Figure 2.2 1993 Land use in Bogue Chitto Creek Watershed 2-4
Figure 2.3 2001 Land Use in Bogue Chitto Creek Watershed 2-5
Figure 2.4 Bogue Chitto Creek Sub-basins for Nonpoint Pollutant Inventory 2-14

Figure 3.1 Locations of Septic Tanks in Watershed. Condition 1 and 2 Suspected to be Failing 3-8
Figure 3.2 Locations of Cattle Sites Adjacent to Streams 3-3
Figure 3.3 Locations of Horse and Swine Sites Adjacent to Streams 3-13

1.0 MISSION STATEMENT

The Mississippi Department of Environmental Quality (MDEQ) mission is to safeguard the health, safety, and welfare of present and future generations by conserving and improving Mississippi's environment and fostering wise economic growth through focused research and responsible regulations. Restoration of Bogue Chitto Creek water quality will not only contribute directly the environmental aspect of MDEQ's mission, but also contribute to economic viability within the watershed.

2.0 BOGUE CHITTO CREEK WATERSHED

2.1 Watershed Description

Bogue Chitto Creek drains approximately 103,833 acres of the Big Black River Basin in portions of Hinds and Madison Counties in western Mississippi (Figure 2.1) (MDEQ 2000a). We estimate that approximately 32,600 people lived in this watershed in 2000 (based on Census 2000 data for Hinds and Madison Counties). Heavier concentrations of people are present in the headwater areas, in the Jackson Metropolitan Area. Portions of the cities of Flora, Clinton, and Jackson are in the Bogue Chitto Creek Watershed. Other communities in the watershed include Tinnin, Greens Crossing, Pocahontas, Mannsdale and Annadale.

The majority of the watershed is underlain by Yazoo clay, with Forest Hill formation occurring along the western watershed boundary and in localized areas east of Bogue Chitto Creek. The topography of the watershed is gently rolling hills and irregular plains, with features characteristic of the deep, silty, erosive loess soils that occur in the watershed (MDEQ 1998). Table 2.1 is a list of the major soils in the watershed and their characteristics. The watershed is located in the Mississippi Valley Loess Plains ecoregion. Native vegetation in the watershed is oak-hickory and oak-hickory-pine forest (MDEQ 1998). The Mississippi Petrified Forest is located in the watershed south of Flora (DeLorme 1998).

Named creeks in the watershed include Bogue Chitto Creek, and two of its tributaries, Straight Fence Creek and Limekiln Creek. There are three reservoirs in the upper Limekiln Creek watershed; Lake Lorman, Lake Cavalier, and Stribling Lake. Numerous smaller impoundments are present in the Limekiln Creek and Straight Fence Creek watersheds (DeLorme 1998). Approximately 9,955 acres of wetlands occur along these primary streams and their tributaries. Water levels in the creeks and wetlands are maintained by a shallow aquifer that underlies the watershed. A deep, confined aquifer underlying the Yazoo clay is the primary drinking water source in the watershed. This aquifer is generally protected from contamination within the watershed by the Yazoo clay (MDEQ 1998).

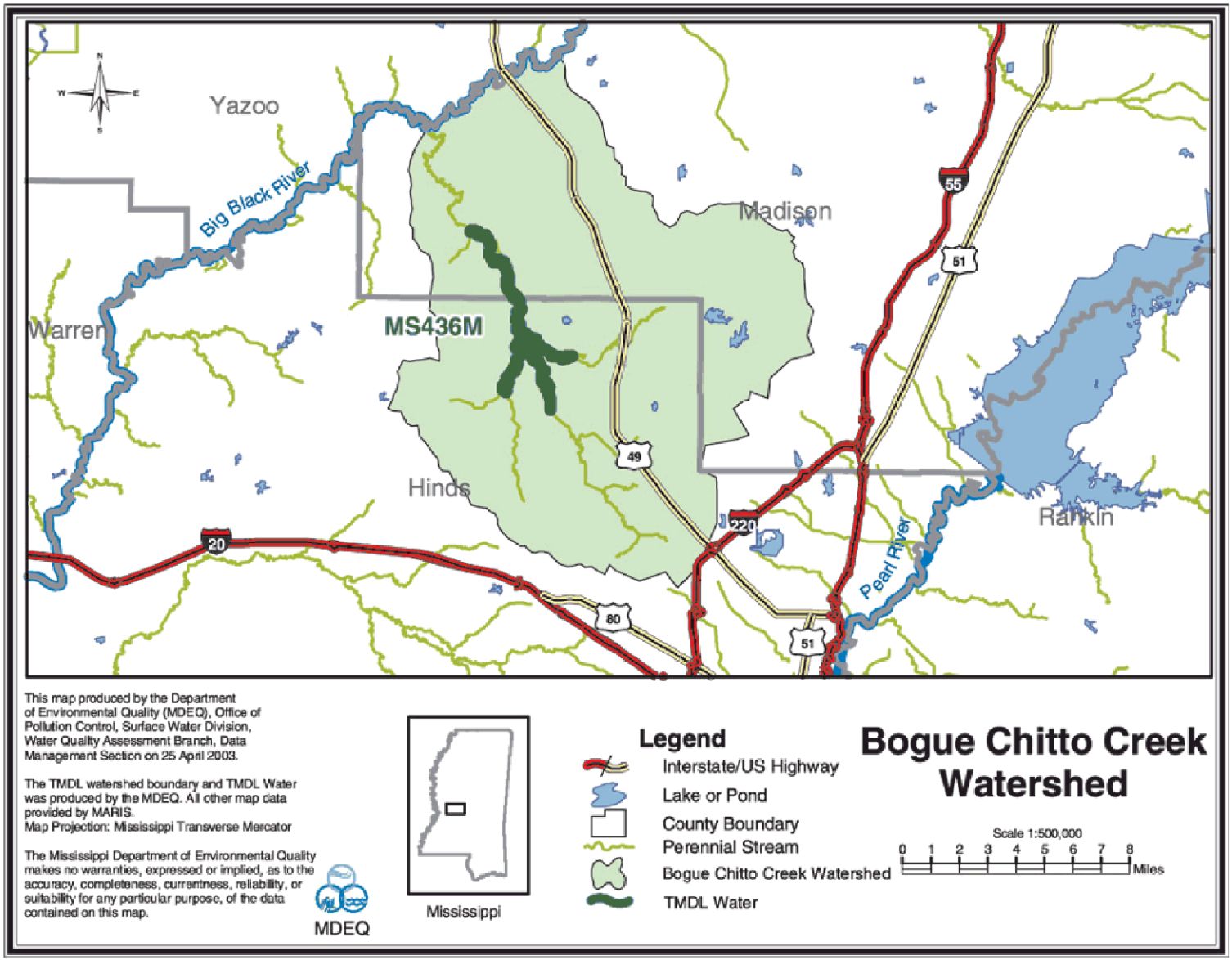


Figure 2.1. Bogue Chitto Creek watershed.

Table 2.1. Major Soils in Bogue Chitto Creek Watershed (SCS 1982, 1978).

Soil Association	Description
Riedtown-Oaklimeter-M°Raven	Nearly level, moderately well drained and somewhat poorly drained silty soils; on flood plains
Loring-Providence-Grenada	Nearly level to rolling, moderately well drained silty soils that have a fragipan, uplands
Memphis-Natchez	Undulating to hilly, well drained silty soils, mainly on uplands
Memphis-Loring	Gently sloping to moderately steep, well drained soils that do not have a fragipan and moderately well drained silty soils that have a fragipan, uplands and stream terraces
Loring-Memphis	Gently sloping to moderately steep, moderately well drained silty soils that have a fragipan and well drained silty soils that do not have a fragipan, uplands and stream terraces
Riedtown-Aerial	Nearly level, moderately drained and well drained silty soils, on flood plains
Providence-Smithdale	Gently sloping to steep, moderately well drained silty soils that have a fragipan and well drained loamy soils that do not have a fragipan, upland ridges and side slopes
Byram-Loring	Gently sloping to strongly sloping, moderately well drained silty soils that have a fragipan, uplands and stream terraces

In 1993 land use in the watershed was primarily agricultural (53%) and forestland (32%) (see Figure 2.2). A 2001 land use analysis of the watershed indicated that agricultural land use had decreased to approximately 36%, and forestland had become the dominant land use (43%) (see Figure 2.3). There has been rapid growth in Madison County since 1993, and urban land use in the watershed increased between 1993 and 2001. These changes reflect the observed conversion of agricultural lands to residential subdivisions. The growth map on the Clinton, Mississippi website (www.clintonms.org) indicates that there are plans to develop a shopping center, a Natchez Trace visitor center, an assisted living facility, and a 300 lot subdivision in the Bogue Chitto Creek and Straight Fence Creek watersheds in northern Clinton.

Prior to European settlement, these lands were occupied by Choctaw Indian tribes. Choctaw lands were ceded to the United States in the 1820's (www.geneologyinc.com/usgenweb/mshinds/history.htm). This area was settled primarily by people migrating from east coast states (www.rootsweb.com/msmadiso/history.htm). Because of

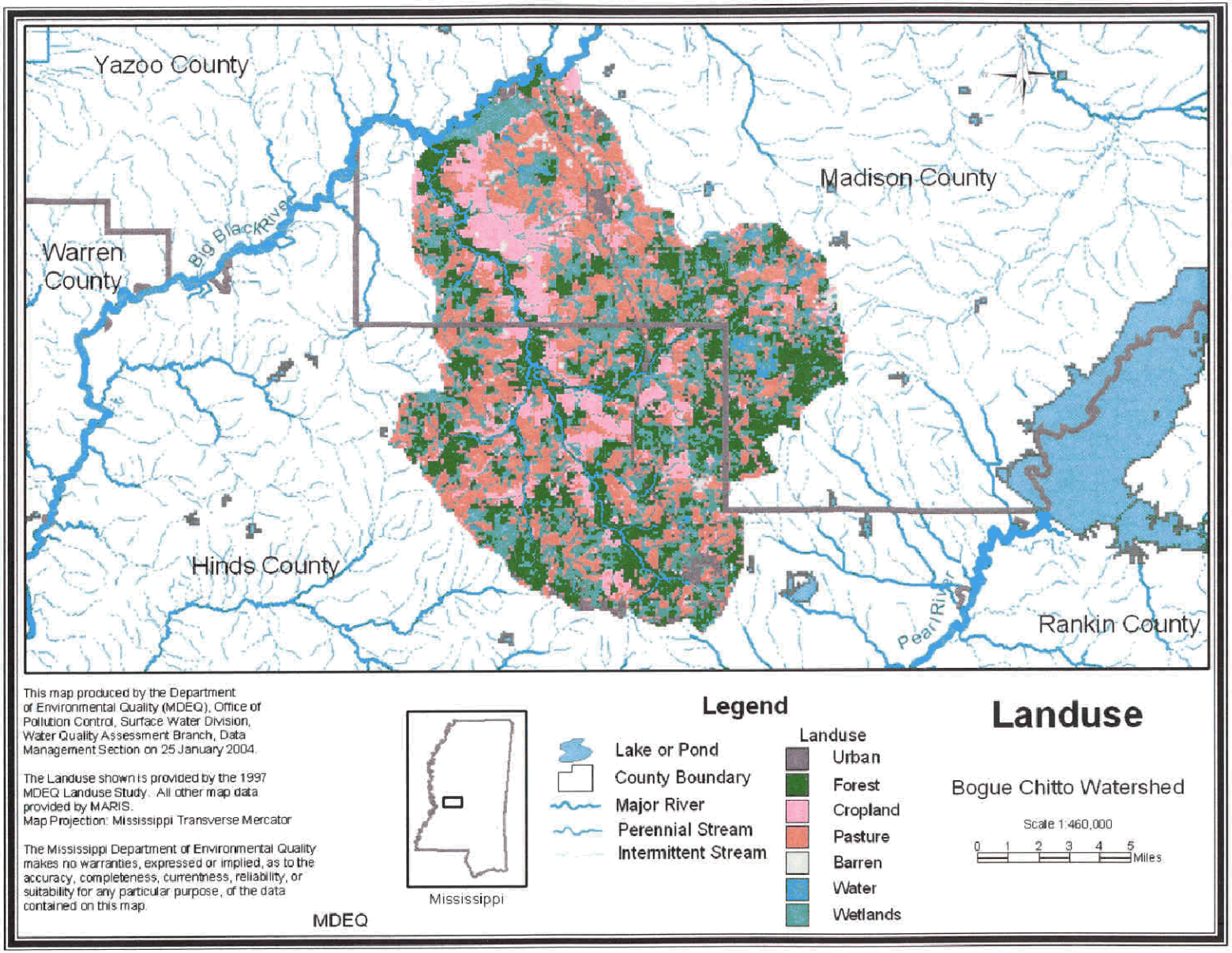


Figure 2.2. 1993 Land use in Bogue Chitto Creek watershed.

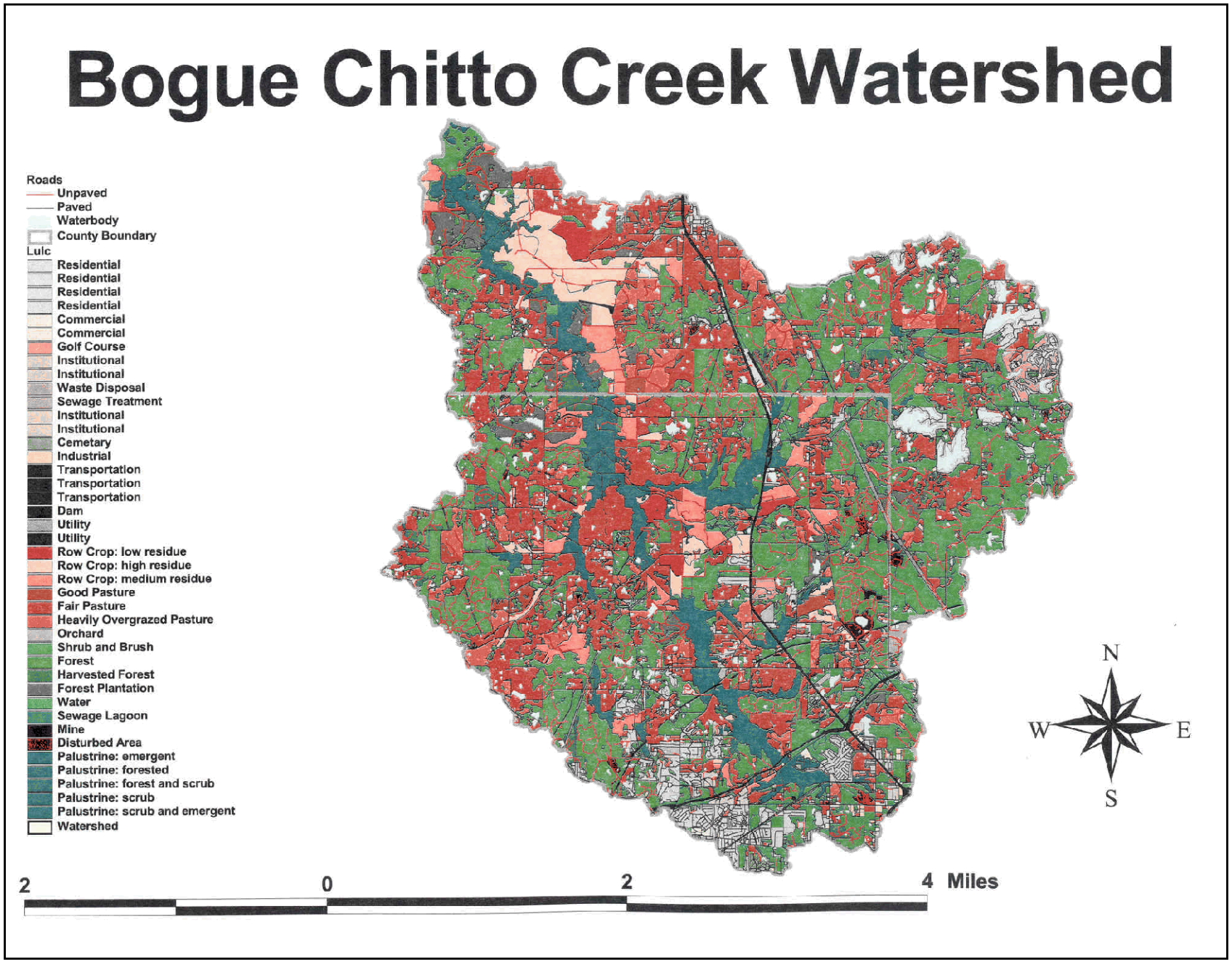


Figure 2.3. 2001 land use in Bogue Chitto Creek watershed.

its proximity to the state capitol, this area has historically been important economically and heavily impacted by human use. Forestry, cattle and agriculture, including cotton and soy beans, are still primary industries in the area, although it is seeing growth in manufacturing and commercial industries (www.mceda.com/madisoncnty.cfm).

2.2 Water Quality

2.2.1 Standards

The designated use for all surface waters of this watershed stated in the Mississippi water quality regulations is Fish and Wildlife Support. Mississippi state regulations indicate that waters with this designated use must meet water quality criteria for Secondary Contact Recreation (http://www.deq.state.ms.us/MDEQ.nsf/page/WQAB_bigblackdesignate?OpenDocument). Table 2.2 Lists the numeric water quality criteria applicable to Bogue Chitto Creek watershed surface waters (MDEQ 2002).

Table 2.2. Water Quality Criteria for Bogue Chitto 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

MDEQ uses an Index of Biotic Integrity (M-BISQ) to determine if water bodies are achieving their aquatic life support designated use (MDEQ 2003). The aquatic life support attainment threshold M-BISQ score for the bioregion associated with Bogue Chitto Creek is 57.55.

2.2.2 Current Condition

2.2.2.1 Surface Water Quality

There is not a routine water quality monitoring station in Bogue Chitto Creek Watershed. During the period 1991 through 1995 water quality sampling and screening-level biological assessments were conducted in the watershed as part of the Bogue Chitto Creek Watershed Project (MSWCC 1995). The water quality data were collected at a monitoring station located at the edge of a farm property where erosion control best management practices (BMPs) had been installed, and on Bogue Chitto Creek at Highway 22 near Flora. MDEQ conducted water quality sampling and biological assessments on Bogue Chitto Creek at Highway 22 near Flora in August 1999. These data are summarized in Appendix A (MDEQ 1999). MDEQ also conducted an assessment of Bogue Chitto Creek water quality, benthics, and habitat in the spring of 2001. Water quality data were collected on Bogue Chitto Creek as part of a special study of the Big Black River in 2002. These data are all included in Appendix A. A listing of known reports on Bogue Chitto Creek water quality with a summary of their findings is also included in Appendix A.

Bogue Chitto Creek along with portions of Limekiln and Straight Fence Creeks are shown on the Mississippi 1998 Section 303(d) List as impaired waterbodies. Bogue Chitto Creek appears on the 303(d) List for organic enrichment/low dissolved oxygen and biological impairment. Based on the 1999 data, MDEQ determined that low dissolved oxygen levels caused the biological impairment in portions of Bogue Chitto Creek, Limekiln Creek, and Straight Fence Creek. The M-BISQ score for Bogue Chitto Creek (sampled near Nevada) is 44.64. This value is less than the attainment threshold M-BISQ value for the bioregion (57.55), and Bogue Chitto Creek has been classified as not attaining the designated use of Fish and Wildlife Support.

2.2.2.2 Groundwater Resources

The majority of drinking and irrigation water use in this watershed is supplied by groundwater from the deep aquifer. No issues have yet been raised with regard to the quality or quantity of groundwater in this watershed.

2.2.2.3 Wildlife Resources

A number of threatened and endangered species are listed for Hinds and Madison Counties and have the potential to be present in the Bogue Chitto Creek watershed. These species are listed in Table 2.3. There are also approximately 50 species of "special concern" for Hinds and Madison Counties included in the Natural Heritage Inventory (www.mdwfp.com/museum/thml/research/inventory.asp). These species may be present in the watershed. A listing of the species of "special concern" for Hinds and Madison Counties is included in Appendix B. The Bogue Chitto Creek Watershed is in the portion of the Big Black River basin classified as a Freshwater Biodiversity Conservation Area by the Nature Conservancy (Smith et al. 2002).

2.2.3 TMDLs

Bogue Chitto Creek from Tinnin Road to its confluence with Big Black River, along with parts of Limekiln Creek and Straight Fence Creek (see Figure 2.1) is included on the 1998 Mississippi 303(d) List as impaired due to organic enrichment/low dissolved oxygen and biological impairment. Two total maximum daily load studies (TMDLs) related to these listed segments have been completed, one addressing organic enrichment/low dissolved oxygen and biological impairment, and one addressing low pH.

A phase I TMDL addressing organic enrichment/low dissolved oxygen and biological impairment has been completed and approved by U.S. EPA (MDEQ 2002a). The biological impairment was determined to be a result of the low dissolved oxygen conditions in the listed stream reaches, so this TMDL addresses both issues. Lack of data prevented a detailed analysis of nonpoint sources of oxygen demanding load (organic enrichment) so this Phase I TMDL did not include specific load reduction allocations. Table 2.4 lists the target total maximum daily loads for the listed water bodies in the Bogue Chitto Creek Watershed (MDEQ 1998). These loads are equivalent to approximately 88 tons/yr of organic load. Since a Phase I TMDL addressing biological impairment has been approved, only a Phase II TMDL may be required (M. K. Brown, MDEQ).

Table 2.3. Federally Listed Species for Hinds and Madison Counties.

Scientific Name	Common Name	Federal Status	Habitat
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Threatened	Primarily marine/estuarine in winter; migrates to rivers in spring for spawning; returns to sea/estuary in fall. First two years are spent in riverine habitats. Big river, low gradient, medium river, moderate gradient
Falco peregrinus	Peregrine Falcon	Endangered	Herbaceous wetland, riparian Cliff, urban/edificarian, woodland - conifer, woodland – hardwood, woodland – mixed When not breeding, occurs in areas where prey concentrate, including farmlands, marshes, lakeshores, river mouths, tidal flats, dunes and beaches, broad river valleys, cities, and airports.
Graptemys oculifera	Ringed Map Turtle	Threatened	Medium river, moderate gradient Most abundant in streams with moderate to fast current, numerous basking logs, nearby sand and gravel bars, and channel wide enough to allow sun to reach basking logs from 1000-1600 hrs (McCoy and Vogt 1980, Dickerson and Reine 1996). Not in tributaries or tidal areas. Requires high water quality to support main food sources. Eggs are laid in nests dug in sandy beaches or gravel bars.
Haliaeetus leucocephalus	Bald Eagle	Threatened	Near waterbodies, forested areas, away from human activity and development
Nicrophorus americanus	American Burying Beetle	Endangered	Cropland/hedgerow, forest - conifer, forest - hardwood, grassland/herbaceous, old field, shrubland/chaparral Soil characteristics important to the beetle's ability to bury carrion. Extremely xeric, saturated, or loose sandy soils are unsuiTable for these activities.
Etheostoma rubrum	Bayou Darter	Threatened	Creeks and small to medium rivers. Prefers stable, moderately swift riffles of large gravel and rock; seldom occurs over shifting substrates. Adults most commonly collected near heads of gravel riffles in water less than 15-30 cm deep. Upstream distribution apparently limited by low water flow in summer and fall (USFWS 1990). Mid-reach, typically third to fourth order, stream Sections; swift (mean 79 cm/sec), shallow water with firm coarse substrate (mean particle size 16-32 mm); associated in winter with logs, cobble, and boulders, which may comprise important refugia during periods of high stream flow (Ross et al. 1990, 1992).
Potamilus inflatus	Inflated Heelsplitter	Threatened	Found in sand, mud, silt, and sandy-gravel substrates in slow to moderate currents and is usually collected on the protected side of bars in water as deep as 20 feet (Stewart, 1990). It has not been found in large gravel. big river, medium river, moderate gradient, pool, riffle

Table 2.4 Bogue Chitto Creek TMDL

Type	Summer Conditions (May – October)	Winter Conditions (November – April)	Unit
Waste Load Allocation	408.0	515.8	Lbs/day TBODu
Load Allocation	17.3	17.3	Lbs/day TBODu
Margin of Safety	(implicit)	(implicit)	Lbs/day TBODu
TMDL	425.3	531.1	Lbs/day TBODu

Negotiations are currently under way to take the Jackson POTW that discharges to the watershed off-line (J. MacLellan, MDEQ). This is one of the major point source contributors of oxygen demanding load in the watershed.

A TMDL addressing low pH in Bogue Chitto Creek has also been completed and approved by U.S. EPA. This TMDL determined that pH standards are being met in the stream.

2.2.4 Nonpoint Pollution Sources

Analyses in the organic enrichment/low dissolved oxygen and biological impairment TMDL indicated that nonpoint sources could be a significant contributor of oxygen demanding load in the watershed, potentially contributing as much as 75% of the load (J. MacLellan, MDEQ). An inventory of potential pollutant sources in the Bogue Chitto Creek Watershed was initiated after the TMDL was completed (TVA unpublished). The oxygen demanding loads estimated for various land uses as a result of this inventory are summarized in Table 2.5. These nonpoint sources also contribute other pollutants, such as sediments and nutrients, that can contribute to biological impairment. Estimated loads of these pollutants from the inventory are also included in Table 2.5. Estimated nonpoint pollutant loads are summarized by sub-basin in Table 2.6. Sub-basins are mapped in Figure 2.4.

Table 2.5 Estimated Nonpoint Pollutant Loads in Bogue Chitto Creek Watershed (TVA unpublished).

Nonpoint Source	BOD5 Load (tons/year)	TSS Load (tons/year)	Total Nitrogen Load (tons/year)	Total Phosphorus Load (tons/year)
Residential areas	118	1753	27	4
Commercial areas	55	843	13	2
Industrial areas	5	55	1	0.1
Transportation and utility areas	40	602	9	1
Row crops	30	5837	9	1
Pasture	95	16887	26	2
Forest	15	2920	4	0.3
Disturbed areas	8	1509	2	0.2
Stream banks	5	1036	2	0.1
Road banks	5	902	1	0.1
Unpaved roads	5	854	1	0.1
Livestock in streams	35	126	10	4

2.3 Stakeholder Concerns

Bogue Chitto Creek was selected for implementation of restoration activities based on its 303(d) listing for organic enrichment/low dissolved oxygen (MDEQ 2002b). Currently, increases in permitted oxygen demanding loads to Bogue Chitto Creek are not allowed and there is a moratorium on expansion of wastewater treatment facilities in Clinton that discharge to Bogue Chitto Creek watershed. Nonpoint sources of pollutants are also a concern in this watershed. Anecdotal information included nutrients, sedimentation/siltation, habitat alteration, pH, and pesticides as sources of surface water impairment for Bogue Chitto Creek. Runoff from both agricultural and urban lands are of concern. The City of Clinton established a Phase II stormwater management program in March 2003 to address concerns related to the effects of urban runoff. Bogue Chitto Creek Watershed is located in a Nature Conservancy Freshwater Biodiversity Conservation Area.

Table 2.7 is a listing of stakeholder concerns that includes suspected causes, locations, and extent of the problems identified. The concern about low pH conditions in Bogue Chitto

Creek and its tributaries is not included in this listing because the streams have been reevaluated and determined to be meeting their pH standards.

Table 2.6. Estimated Nonpoint Pollutant Loads by Sub-Basin (TVA unpublished).

Sub-basin Name	Sub-basin number	BOD5 Load (tons/year)	Total Phosphorus Load (tons/year)	Total Nitrogen Load (tons/year)	TSS Load (tons/year)
Bogue Chitto Creek, Mouth to approx 1 mile upstream to Cox Ferry Road	01	3	0	1	501
Bogue Chitto Creek, approx 1 mile upstream of Cox Ferry Road to Straight Fence Creek	02	37	1	10	4615
Unnamed Creek, approx 1 mile upstream of Cox Ferry Road to Head (near town of Flora)	0201	41	1	11	4570
Straight Fence Creek	0301	76	3	19	6308
Bogue Chitto Creek, Limekiln to head of Bogue Chitto Creek	04	146	5	36	7107
Limekiln Creek to approx 1000 ft upstream of Joe Coker Road	0401	41	1	11	3850
Limekiln Creek, approx 1000 ft upstream of Joe Coker road to Head	0402	51	2	13	3478
Unnamed Creek, approx 1000 ft upstream of Joe Coker Road to Head	040201	27	1	7	2893
Total		422	15	107	33322

Table 2.7. Detailed Listing of Stakeholder Concerns.

STATUS	DESCRIPTION
Concern:	Biological impairment and organic enrichment/low dissolved oxygen
Causes:	Agricultural runoff, runoff from lawns and golf courses, runoff from urban areas, malfunctioning on-site wastewater treatment units, loss or alteration of wetlands, NPDES point sources, hydromodification
Location:	Impairment occurs in Bogue Chitto Creek, Limekiln Creek, and Straight Fence Creek
Extent:	Headwaters to confluence with Big Black River
Concern:	High nutrient levels in surface water
Causes:	Runoff from croplands, pastures, livestock operations, lawns, golf courses, and urban areas; loss or alteration of wetlands; hazardous waste operations
Location:	Impairment occurs in Bogue Chitto Creek, Limekiln Creek, and Straight Fence Creek
Extent:	Headwaters to confluence with Big Black river
Concern:	Pesticides in surface water
Causes:	Runoff from croplands, pastures, livestock operations, lawns, and golf courses; loss or alteration of wetlands; and hazardous waste operations
Location:	Impairment occurs in Bogue Chitto Creek, Limekiln Creek, and Straight Fence Creek
Extent:	Headwaters to confluence with Big Black River
Concern:	Sediment/siltation of waterways
Causes:	Runoff from croplands, pastures, silvaculture, livestock operations, construction sites, urban areas and mining operations; and loss or alteration of wetlands
Location:	Impairment occurs in Bogue Chitto Creek, Limekiln Creek, and Straight Fence Creek
Extent:	Headwaters to confluence with Big Black River
Concern:	Habitat alteration
Causes:	Construction/development, agriculture, silvaculture, hydromodification, sedimentation, change water quality
Location:	Impairment occurs in Bogue Chitto Creek from Tinnin Road upstream approximately 14 miles along with lower reaches of Limekiln and Straight Fence Creeks
Extent:	Approximately 14 miles of stream
Concern:	Restrictions on increases in permitted discharges of oxygen demanding loads
Causes:	Low dissolved oxygen levels, lack of knowledge of sources of existing oxygen demanding load to surface waters, lack of controls of nonpoint sources of oxygen demanding load, lack of knowledge of dynamics of system oxygen demanding loading and dissolved oxygen
Location:	Headwaters to confluence with Big Black River
Extent:	Entire watershed

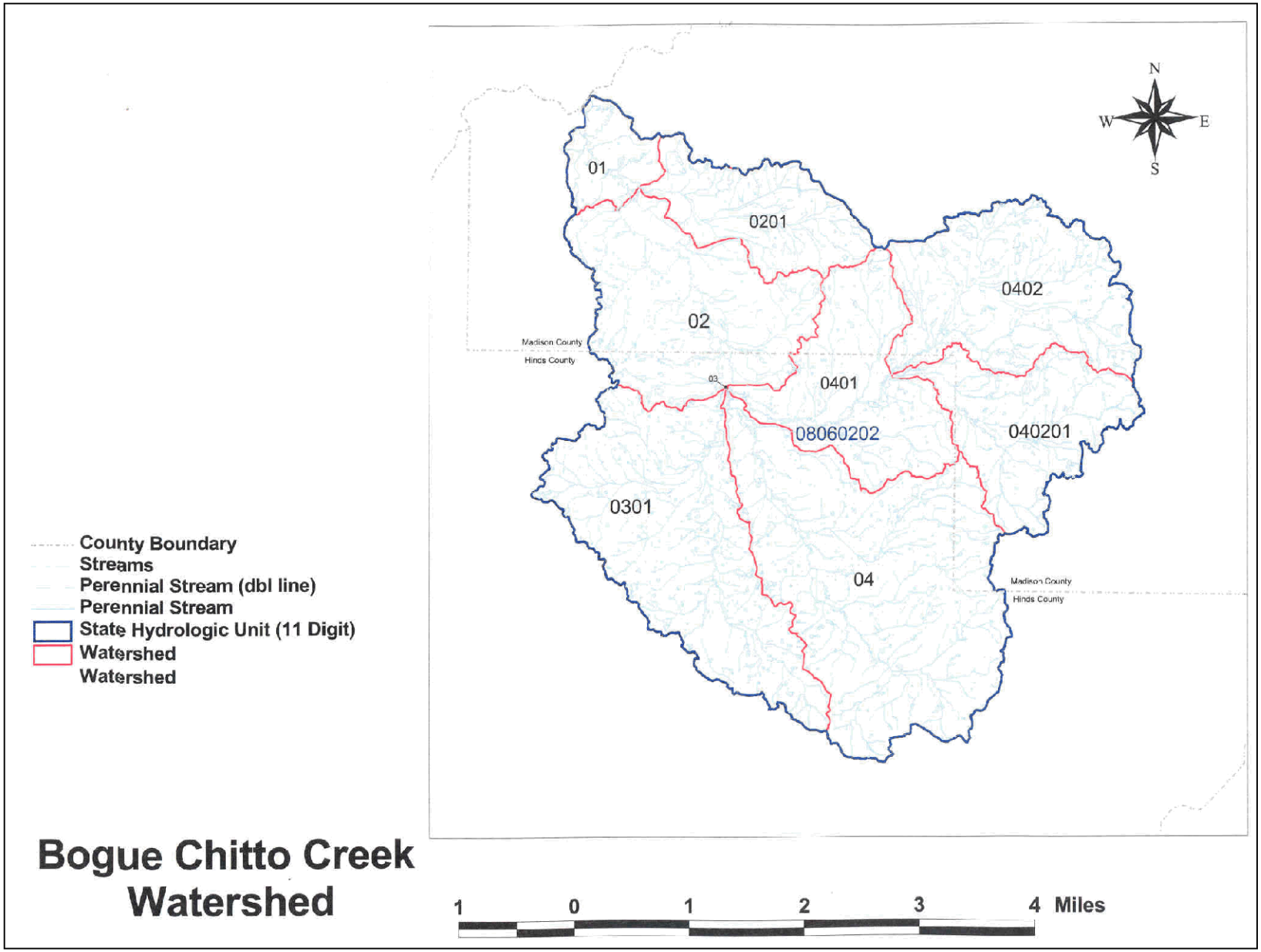


Figure 2.4. Bogue Chitto Creek subbasins for nonpoint pollutant inventory.

3.0 WATERSHED IMPLEMENTATION PLAN

3.1 Goal

The underlying principle of this watershed implementation plan (and the Basin Management Program itself) is adaptive management. The goals and objectives of this plan reflect this principle. The goal for this watershed implementation plan is to reduce the oxygen demanding load to the water bodies in the watershed included on the 1998 303(d) List so they will attain their designated use of Fish and Wildlife Support, and achieve Mississippi's dissolved oxygen water quality standard within five years. Goals related to other existing or potential issues in this watershed (e.g. hydromodification) will be included in future implementation plans for this watershed. The following actions will need to be taken to meet the watershed implementation plan goal:

- Reduce oxygen demanding loads to streams
  - Storm water pollution prevention plans for urban areas
  - Locate failing septic systems
  - Fix failing septic systems
  - Agriculture BMPs
- Reduce sediment loads to streams
  - Storm water pollution prevention plans for urban areas
  - Agriculture BMPs
  - Inventory silviculture BMPs
- Reduce nutrient loads to streams
  - Storm water pollution prevention plans for urban areas
  - Agriculture BMPs
  - Inventory silviculture BMPs
- Manage point source discharges

3.2 Management Actions

Below are detailed descriptions of management actions planned for the next basin management cycle. Note that the values shown for load reductions, number of management practices to be installed, and costs are planning estimates and subject to change.

3.2.1 Storm Water Pollution Prevention Plans for Urban Areas

The Cities of Clinton and Jackson have developed storm water pollution prevention plans as required under the 1987 Clean Water Act storm water rules.

3.2.1.1 Objectives

The objectives of this action are to reduce the amount of pollutants exposed to storm water, hinder the conveyance of pollutants to the storm water system, and improve instream habitat (City of Clinton 2003). The BOD5 load reduction objective for this action is listed below, along with anticipated reductions in sediment and nutrient loads associated with this objective.

- Reduce BOD5 loads from urban land uses to 20 tons/year over a three-year period (J. MacLellan, MDEQ), resulting in a reduction of approximately 153 tons/year of BOD5 load, a 70% reduction.
- Up to approximately 2928 tons/year reduction of suspended solids load, a 90% reduction (Freedman et al. 2003)
- Up to approximately 38 tons/year reduction of total nitrogen load, a 77% reduction (Freedman et al. 2003)
- Up to approximately 5 tons/year reduction of total phosphorus load, a 74% reduction (Freedman et al. 2003)

3.2.1.2 Activities

Table 3.1 Shows a summary of estimated nonpoint source BOD5 loads associated with urban land uses for sub-basins in the Bogue Chitto Creek Watershed (TVA unpublished). Based on this information, pollution management practices need to be implemented in almost all residential and commercial areas, along with the majority of land associated with transportation and utilities in order to achieve the BOD5 reduction objective for these land uses. Priority sub-

basins for implementing practices in residential and commercial areas are Straight Fence Creek, Bogue Chitto Creek upstream of Limekiln Creek, and Limekiln Creek upstream of a point approximately 1,000 feet upstream of Joe Coker Road (see Figure 2.4). Priority sub-basins for implementing practices associated with transportation and utility land uses are Bogue Chitto Creek upstream of Limekiln Creek, and Limekiln Creek upstream of a point approximately 1,000 feet upstream of Joe Coker Road (see Figure 2.4).

Table 3.1 Urban Land Use BOD5 Loads for Bogue Chitto Creek Sub-basins.

Sub-basin Name	Sub-basin Number	Residential	Commercial	Industrial	Transportation and Utilities	Total
Bogue Chitto Creek, Mouth to approx 1 mile upstream of Cox Ferry Road	01	0.1	0.3	0.0	0.0	0.4
Bogue Chitto Creek, approx 1 mile upstream of Cox Ferry Road to Straight Fence Creek	02	4.5	1.1	0.0	0.0	5.6
Unnamed Creek, approx 1 mile upstream of Cox Ferry Road to Head (near town of Flora)	0201	4.9	2.7	0.3	5.1	13.0
Straight Fence Creek	0301	27.1	5.5	0.0	2.4	35.0
Bogue Chitto Creek, Limekiln to head of Bogue Chitto Creek	04	43.8	38.0	3.4	21.3	106.5
Limekiln Creek to approx 1000 feet upstream of Joe Coker Road	0401	6.4	1.3	0.0	9.6	17.3
Limekiln Creek, approx 1000 feet upstream of Joe Coker Road to Head	0402	22.8	6.9	0.0	0.4	30.1
Unnamed Creek, approx 1000 feet upstream of Joe Coker Road to Head	040201	7.2	0.3	0.0	1.2	8.7
Total		116.8	56.2	3.6	40.0	216.6

Potential management practices to be implemented include, but are not limited to, street sweeping, storm water retention basins, tree planting, hay bale barriers, and grassed waterways. MDEQ and the Natural Resources Conservation Service can provide technical assistance with implementation of these practices. City and town governments have primary responsibility for

implementing these practices. The Cities of Clinton and Jackson will implement management practices under their storm water management plans as required by the 1987 Clean Water Act storm water rules. Ultimate responsibility for ensuring installation of these measures rests with MDEQ under MS Code Ann. 49-17-29(a)(2).

3.2.1.3 Schedule

The storm water management plans of the Cities of Clinton and Jackson have been approved and implemented. These plans include schedules for practices that are repeated every year (e.g. street sweeping, tree planting days, and trash clean up days).

Management practices will be implemented on an additional 2,000 acres of residential land, 500 acres of commercial land, and 450 acres of transportation and utility lands each year, during the period from 2004 through 2006.

3.2.1.4 Budget

Projected costs for implementing potential management practices are listed in Table 3.2. Potential funding sources for implementing management practices include city funds, MDEQ, US EPA, and Natural Resources Conservation Service.

Table 3.2. Projected Costs for Urban Best Management Practices.

Practice	Unit Cost	Number of Units	Total Cost
Street sweeping	$69,000 - $170,000 /machine+	10 machines	$690,000 - $1,700,000
	$35 - $70 /hr to operate+	1,000 hrs	$35,000 - $70,000
Retention basins	$100,000 /basin*	30 basins	$3,000,000
Grassed swales	$3,500 / 5 ac*	6,000 ac	$4,200,000
Total			$7,925,000 - $8,970,000

+from www.fhwa.dot.gov/environment/ultraurb/3fs16.htm
*from Freedman et al. 2003, Table B-3

3.2.2 Locate Failing Septic Systems

3.2.2.1 Objectives

The general goal of this project is the development of GIS layers of the basin management areas statewide to locate nonpoint pollution sources, e.g. individual onsite wastewater systems (IOWS). Specific objectives associated with this action are outlined below.

- Create GIS layers(s) with delineated polygons encompassing all unsewered communities or significant clusters of unsewered dwellings/businesses in the state; compare with PSC maps for percent coverage of the state.
- Create GIS layer(s) showing 90% of existing IOWS, dairy farms, recreational vehicle campgrounds, and food facilities using IOWS and/or having NPDES permits.
- Map 90% of new IOWS
- Provide data analysis to include estimated percent failure rates for IOWS and comparison of GIS layers for IOWS with NRCS soil maps.
- Make recommendations for corrections to enhance surface water quality in the basin management areas.

3.2.2.2 Activities

The Mississippi State Department of Health will use GPS units to identify locations of individual onsite wastewater systems (septic systems), and unsewered areas within Hinds and Madison Counties. These locations will then be mapped to a GIS layer. Locations of onsite wastewater systems visited by county personnel for the purpose of permit approval or re-approval, or investigation of complaints will be identified and mapped. Approximately 19,000 locations will be identified statewide and mapped over a one-year period.

3.2.2.3 Schedule

The initiation of the project to map onsite wastewater disposal units will take approximately 12 months, from March 2004 to March 2005.

- Two months are scheduled for purchasing hand held computing devices, GPS units, and their associated software and training personnel in Health Department districts in their use
- The use of GPS units in the field in six districts and development maps of unsewered communities is scheduled to begin the first month.
- All nine districts are scheduled to be using the GPS units in the field within two months.
- Creation of GIS map layers is scheduled to begin in the second month.
- Nine months are scheduled for collection of GPS location data and information about the status of onsite wastewater systems, identification of unsewered areas and onsite wastewater systems located in soils unsuitable for onsite wastewater systems, and making recommendations for corrections to enhance surface water quality in the watershed. During this nine-month period the collected information will be continually added to the developed GIS map layers.
- The GIS map layers will be provided to MDEQ at the end of the 12 month period.

3.2.2.4 Budget

The budget for mapping onsite wastewater systems is shown in Table 3.3 The budget shown is for performing these activities for the whole of Basin Group I.

Table 3.3. Budget for Developing GIS Maps of Onsite Wastewater Systems in Basin Group I.

Category	319 Funds	State Funds	Total
Personnel (15 PHEs)	$ 0	$70,000	$ 70,000
Travel	$25,000	$0	$25,000
Equipment	$37,400	$0	$37,400
1 Plotter	$10,000	$0	$10,000
23 PDAs	$4,900	$0	$4,900
15 Computers	$15,000	$0	$15,000
15 Printers	$7,500	$0	$7,500
Commodities (20 GPS's)	$3,000	$0	$3,000
Contractual (ArcView, 2 data collectors, software, contract administration)	$65,100	$0	$65,100
Total	$130,500	$70,000	$200,500

3.2.3 Fix Failing Septic Systems

3.2.3.1 Objectives

Approximately 100 suspected failing septic systems were identified during the 2001 nonpoint source pollution inventory (TVA unpublished). Assuming 50% of these are fixed; daily per-capita loads of 50 g/day BOD, 10 g/day total nitrogen, and 3.5 g/day total phosphorus (US EPA 1980) from the failed units; and that each unit serves two people, the following load reductions would be expected:

- Approximately 2,000 tons/year BOD load,
- Approximately 400 tons/year total nitrogen load, and
- Approximately 140 tons/year total phosphorus load.

3.2.3.2 Activities

Fix approximately 50 failing septic systems over the next three years. Priority areas for this activity are the locations of suspected failing septic systems shown in Figure 3.1. The majority of the suspect systems are located in the Bogue Chitto Creek Watershed upstream of Limekiln Creek, north of Clinton. The Mississippi State Department of Health can provide technical assistance related to fixing failing septic systems, and has primary responsibility for ensuring failing septic systems are fixed.

3.2.3.3 Schedule

Failing septic systems will be fixed during the period 2004 through 2007. Approximately 17 failing systems will be fixed each year for the next three years.

3.2.3.4 Budget

Projected costs for repair of failing onsite wastewater systems are listed in Table 3.4. Potential sources of homeowner funding assistance for these activities include programs of the Mississippi Soil and Water Conservation Districts for Hinds and Madison Counties, Natural Resources Conservation Service, MDEQ, and US EPA.

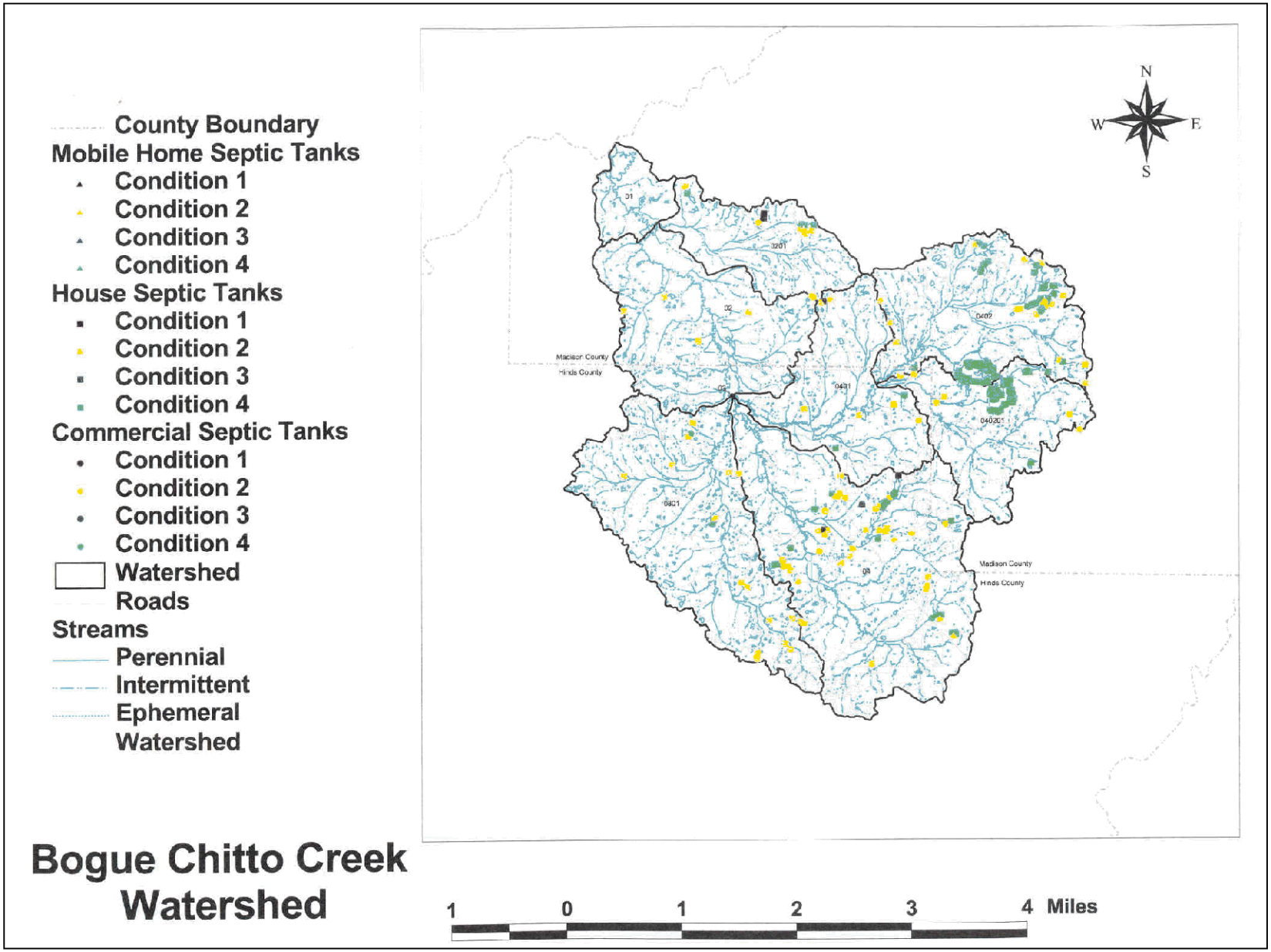


Figure 3.1. Locations of septic tanks in watershed. Condition 1 and 2 suspected to be failing (TVA unpublished)

Table 3.4. Projected Costs of Activities.

Activity	Unit cost*	Number of units	Total cost
Fix failing onsite wastewater systems	$3,300	50 systems	$165,000

*avg on previous 319 project (Eugene Herring, MSDH)

3.2.4 Agriculture BMPs

3.2.4.1 Objectives

The objective of this action is to reduce BOD5 loads from agricultural land uses and livestock to approximately 60 tons/year (20 tons/year each from crop lands, pastures, and livestock). Estimated load reductions associated with this objective are listed below:

- Approximately 154 tons/year reduction of BOD5 load, 96% reduction;
- Approximately 15,000 tons/year reduction of TSS load, 67% reduction;
- Approximately 11 tons/year reduction of total nitrogen load, 24% reduction; and
- Approximately 25 tons/year reduction of total phosphorus load, 80% reduction.

3.2.4.2 Activities

As part of this action, the Mississippi Soil and Water Conservation Commission will implement a Section 319 watershed nonpoint source pollution project in Bogue Chitto Creek Watershed during the period 2004 through 2007 (see Appendix F). Potential BMPs to be installed in the watershed through this project include, but are not limited to:

- 50 acres of critical are planting,
- 15 grade stabilization structures,
- 200 acres of pasture and hayland planting,
- 20 water and sediment control basins,
- 1,850 acres of nutrient management/grazing land improvement,
- 15 livestock watering ponds,
- 85,000 ft of fencing,
- 8 stream crossings,
- 450 acres of tree planting, and
- 350 acres of filter strips.

A number of additional practices are eligible for funding in Hinds and Madison Counties through the USDA Environmental Quality Incentives Program (EQIP)

(http://www.ms.nrcs.usda.gov/programs/MS%20CountyEQIP%20Information.html) and the US Fish and Wildlife Partners for Wildlife program.

The Mississippi Soil and Water Conservation Commission will utilize existing assessment data for the watershed to determine target areas where stressors (see Appendix C) are causing the greatest damage, and application of BMPs will yield beneficial reductions in pollutant loadings. The four sub-basins with the greatest BOD5 loads due to agricultural land uses are Straight Fence Creek Watershed, Bogue Chitto Creek from Cox Ferry Road to Straight Fence Creek, Bogue Chitto Creek from Limekiln Creek to headwaters, and the unnamed creek approximately one mile upstream of Cox Ferry Road to its headwaters near Flora (see Figure 2.4). Heavily overgrazed pastures (see Figure 2.3) are priority areas, as are livestock operations adjacent to streams (see Figures 3.2 and 3.3), and crop lands with low crop residual (see Figure 2.3).

The Mississippi Soil and Water Conservation Districts for Madison and Hinds Counties, Mississippi State University Cooperative Extension Service, USDA Farm Services Agency, Natural Resources Conservation Service, and the Mississippi Department of Agriculture and Commerce under the Natural Resources Initiative are potential sources of technical assistance related to these practices. Landowners, Natural Resources Conservation Service, and Soil and Water Conservation Districts will bear primary responsibility for getting these measures installed. Ultimate responsibility for ensuring installation of these measures rests with MDEQ under MS Code Ann. 49-17-29(a)(2).

3.2.4.3 Schedule

The Mississippi Soil and Water Conservation Districts of Hinds and Madison Counties will work over the next three years to inform potential participants in the watershed about needed BMPs, secure commitments from landowners and operators willing to install BMPs, and assist these participants in developing conservation plans and implementing BMPs. The first meeting to inform potential participants is scheduled for about June 2004. Commitments will be secured during June and July 2004. Conservation planning and BMP installation is scheduled to begin about July or August 2004. All conservation plans will be completed within two to three years.

3.2.4.4 Budget

Cost estimates for the practices specified in Section 3.2.3.2 are shown in Table 3.5. The Mississippi Soil and Water Conservation Commission will be using Section 319 funds to provide cost share assistance to landowners for installation of agricultural BMPs in the watershed (see Appendix F). Other potential sources of funding assistance to landowners for implementing BMPs include programs of Natural Resources Conservation Service, US fish and Wildlife Service, and USDA Farm Services Agency.

Table 3.5 Cost Estimates for Agricultural BMPs in Bogue Chitto Creek Watershed.

Activity	Unit Cost*	Number of Units	Total Cost
Critical area planting	$250/acre	50 acres	$12,500
Grade stabilization structures	$2,000/structure	15 structures	$30,000
Pasture & hayland planting	$100/acre	200 acres	$20,000
Water & sediment control basins	$25,000/basin	20 basins	$500,000
Nutrient Management/grazing land improvement	$84/acre	1850 acres	$155,400
Livestock watering ponds	$2,000/pond	15 ponds	$30,000
Fencing	$1/foot	85,000 feet	$68,000
Stream crossings	$5,000/crossing	8 crossings	$40,000
Tree planting	$34/acre	450 acres	$15,300
Filter strips	$176/acre	350 acres	$932,800
Total			$932,800

* Mark Gilbert, MSWCC

3.2.5 Inventory Silviculture BMPs

3.2.5.1 Objectives

The objective of this project is to evaluate the use of voluntary silviculture best management practices (BMP's) in the Big Black, Tombigbee and Tennessee River Basins.

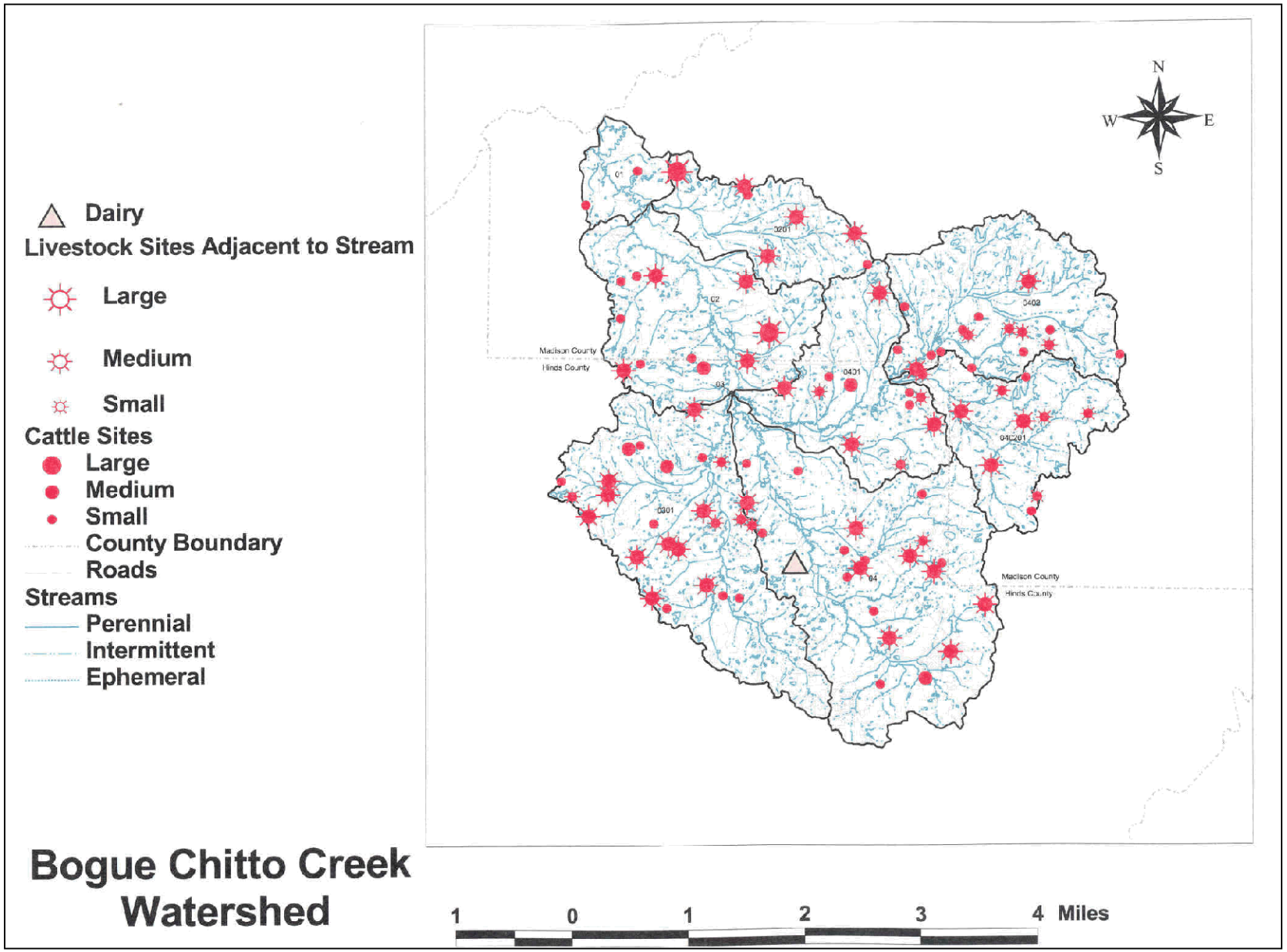


Figure 3.2. Locations of cattle sites adjacent to streams (TVA unpublished).

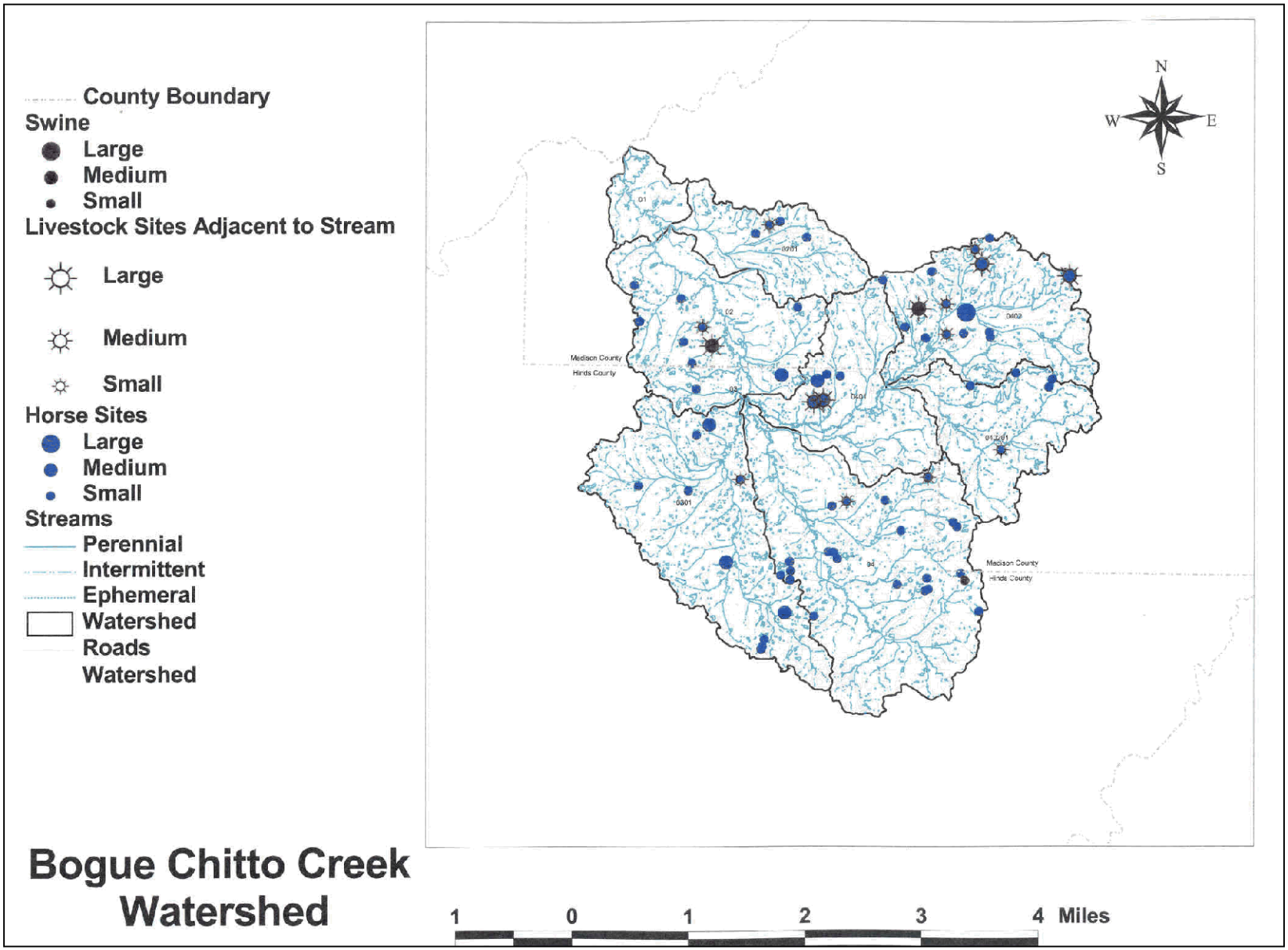


Figure 3.3. Locations of horse and swine sites adjacent to streams (TVA unpublished).

3.2.5.2 Activities

The Mississippi Forestry Commission, in cooperation with the Mississippi Forestry Association, Mississippi Automated Resource Information System, and Southern Group of Foresters, will inventory silviculture best management practices in the Bogue Chitto Creek Watershed. Mississippi Forestry Commission personnel will determine a set of sites harvested within 24 months to be evaluated, based primarily on aerial surveys of the watershed provided by the Mississippi Automated Resource Information System. The number of sites to be evaluated will be statistically determined. Mississippi Forestry Commission water quality team personnel will visit the selected sites and evaluate them with regard to use of silviculture BMPs and the effectiveness of the BMPs in use. Results of these evaluations will be tabulated and summarized in a report that will be prepared by the Mississippi Forestry Commission, a copy of which will be provided to MDEQ. Mississippi Forestry Association and Southern Group of Foresters will assist with determining if silviculture activities pose a significant water quality threat, and developing suggestions for alleviating any threats identified. The Mississippi Forestry Commission will notify landowners of identified water quality threats from silviculture activities. Mississippi State University Extension Service will assist with any education and training needed to reduce any water quality threats identified

3.2.5.3 Schedule

The assessment of silvilculture BMPs by the Mississippi Forestry Commission will take approximately 18 months, from March 2004 to September 2005.

- Six months are scheduled for determining the number of sites to evaluate, perform the aerial survey, and identify the specific sites to be evaluated.
- Three months are scheduled for ground-truthing of the sites selected from the aerial survey.
- Three months are scheduled for visiting the sites to evaluate BMPs. Three months are scheduled for analysis of the results of the evaluations. This will include statistical analysis, evaluation of water quality risks identified, and determination of what is needed to reduce the identified water quality risks.
- Three months are scheduled to prepare the final report of the evaluation. During this three month period landowners will be informed of any water quality risks

identified on their properties and provided with recommendations for reducing the identified risks.

3.2.5.4 Budget

The budget for the silviculture BMP evaluation is shown in Table 3.6. The budget shown is for performing these activities for the whole of Basin Group I (see Appendix F).

Table 3.6 Budget for Evaluation of Silviculture BMPs in Basin Group I.

Category	319 Funds	MS Forestry Commission Funds	Total
Personnel (salary + fringe benefits)	$48,864	$32,576	$81,440
Travel	$4,000	$0	$4,000
Equipment	$0	$0	$0
Supplies	$1,500	$0	$1,500
Contractual (includes MARIS fee)	$2,000	$0	$2,000
Other (aircraft cost, database construction)	$6,500	$0	$6,500
Indirect Charges	$0	$0	$0
Total	$62,864	$32,576	$95,440

3.2.6 Manage Point Source Discharges

3.2.6.1 Objectives

The Phase I TMDL for organic enrichment/low dissolved oxygen and biological impairment for Bogue Chitto Creek analyzed point source discharges of oxygen demanding load in the watershed. The TMDL recommended reducing point source oxygen demanding loads. MDEQ is currently negotiating to re-route discharge from the City of Jackson Presidential Hills POTW out of the Bogue Chitto Creek Watershed (J. MacLellan, MDEQ). This action is expected to reduce the point source oxygen demanding load in the watershed by approximately 30 lb/day TBODu, or 5 tons/year (MDEQ 2002a).

3.2.6.2 Activities

MDEQ is currently negotiating with the City of Jackson to shut down the Presidential Hills POTW. The Savannah Street POTW will treat the wastewater currently being sent to the Presidential Hills POTW.

3.2.6.3 Schedule

Negotiations are expected to be completed in 2004. Shut down of the Presidential Hills POTW is expected in 2004.

3.2.6.4 Budget

Cost information is not available for this activity.

4.0 EDUCATION STRATEGY

4.1 Objectives

The overall objective of community education in the Bogue Chitto 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 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 Bogue Chitto Creek Watershed.

4.2 Activities

4.2.1 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). Education and outreach activities are performed primarily by county districts. Education and outreach activities are also included in the Commission's 319 project for this watershed (see Appendix F).

4.2.1.1 Educational Videos

Five educational videos have been produced for adults.

- Conservation Tillage
- Native Mississippi Wildflowers

- Scenic Rivers
- Urban Nonpoint Source Pollution: A Citizen's Guide
- Our Little River

These videos can be obtained from local Soil and Water Conservation District (SWCD) offices or from the MSWCC.

4.2.1.2 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.

4.2.1.3 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.

4.2.1.4 Newsletters

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

- MSWCC Annual Report
- MACD "Conservation Outlook"
- Envirothon "EnviroUpdate"

4.2.1.5 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 of Conservation Districts.

4.2.1.6 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.

4.2.1.7 Conservation Grandparents

This program provides a series of activity sheets 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.

4.2.1.8 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.

4.2.1.9 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 Pre-K-12 agricultural-environmental education curriculum project provides hundreds of high-quality, objective and easily-integrated curriculum materials. 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.

4.2.1.10 License Tags for Conservation Education

During the 2000 Legislative Session, the Mississippi Legislature passed the MSWCC's proposal for a distinctive vehicle license tag, 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.

4.2.1.11 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.

4.2.1.12 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.

4.2.1.13 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", each summer as Mississippi's representative. The state program is funded by a grant from Chevron Mississippi. Contact Jimmy Booth at MSWCC.

4.2.1.14 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 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.

4.2.2 Mississippi State University Cooperative Extension Service

The Mississippi State University Cooperative Extension Service will be initiating the Medallion Farmer Program in Madison and Hinds Counties during 2005. The Mississippi Medallion Farmer Program is a voluntary effort aimed at helping Mississippi farmers proactively address agriculture related environmental issues. The program is a multi-agency effort to help farmers promote environmental stewardship through voluntary, effective and economically achievable best management practices.

The program is designed to help farmers demonstrate that they can reduce the potential impact of agricultural practices on environmental quality in Mississippi by using best management practices. The program includes education programs in environmental stewardship, agricultural production and farm management. By participating in this voluntary program, farmers will receive commodity-specific information on best management practices and their implementation. Model farms also will demonstrate how these best management practices can reduce the potential impact of agriculture production on environmental resources (http://msucares.com/environmental/medallion/index.html).

Other educational and outreach activities include newsletters, bulletins, information sheets, research reports, a website (msucares.com), conferences, workshops, seminars, environmental quality programs, and fish and wildlife programs. These activities are performed primarily by county extension agents.

4.2.3 Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) in Mississippi 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 NRCS or county USDA Service Centers. Education and outreach activities are performed primarily by county conservationists.

4.2.3.1 Conservation Programs

The Natural Resources Conservation Service 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.

- Agricultural Management Assistance
- Conservation of Private Grazing Lands

- Conservation Security Program
- Conservation Technical Assistance
- Emergency Watershed Protection
- Environmental Quality Incentives Program (EQIP)
- Farm and Ranch Lands Protection Program
- Forestry Incentives Program
- Grassland Reserve Program
- Grazing Lands Conservation Initiative
- Resource Conservation and Development
- Rural Abandoned Mine Program
- Soil Survey Programs
- Soil and Water Conservation Assistance
- Snow Survey and Water Supply Forecasting
- Watershed Protection and Flood Prevention
- Watershed Rehabilitation
- 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 Hinds or Madison County USDA Service Centers.

4.2.3.2 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 Hinds or Madison 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.

4.2.3.3 Technical Tools and Models

Technical tools and models are available through the NRCS. These tools are available on the website, or by contacting the Hinds or Madison 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.

4.2.3.4 Conservation Education Resources

The NRCS in Mississippi 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.

4.2.4 City of Clinton, MS

Public education and outreach activities are included in the City Storm Water Management Plan. Activities outlined in this plan include:

- Annual mailouts of brochures or fact sheets to residential customers covering residential storm water pollution issues (e.g. proper use of landscape chemicals, backyard conservation, maintenance of individual wastewater systems).
- Annual mailouts of brochures or fact sheets to commercial and non-residential facilities covering appropriate storm water pollution issues (e.g. hazardous material disposal, waste management, utility maintenance).
- Information display at City Hall with brochures or fact sheets covering city storm water issues and city storm water public involvement activities.
- Annual public storm water meetings.
- Storm water page on city's website (www.clintonms.org).

4.2.5 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 Mississipians'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.

4.2.5.1 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.

4.2.5.2 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.

4.2.5.3 Community Growth Readiness (CGR)

CGR is an education program that makes the link between land use and water quality using geographic information systems (GIS) technology. CGR focuses on the role of impervious

surfaces in the transport and concentration of pollutants. The core presentation of CGR 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. Finally, CGR 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.

4.2.5.4 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 4.1. 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

5.0 EVALUATION

5.1 Monitoring

Those BMPs installed under the Mississippi Soil and Water Conservation Commission Section 319 funded project in the Bogue Chitto Creek Watershed will be subject to documentation of pre-installation conditions, and post-installation monitoring. The purpose of the post-installation monitoring is to determine the pollutant load reductions achieved by the installation of the BMPs. During this three year project, the USGS will develop a monitoring plan for this purpose in coordination with the Mississippi Soil and Water Conservation Commission.

MDEQ does not maintain a routine ambient water quality monitoring station in the Bogue Chitto Creek Watershed. Sampling in the Bogue Chitto Creek Watershed is scheduled for summer 2005 as part of a water quality study of the Big Black River. During this sampling event water quality samples will be collected by MDEQ field personnel from three stations on Bogue Chitto Creek (at river miles 4.8, 11, and 21) and from the publicly owned wastewater treatment plants located in the headwaters. Samples will be analyzed for CBOD, ammonia, nitrate+nitrite, TKN, total nitrogen, dissolved and total phosphorus, chlorophyll, and TOC at MDEQ laboratory facilities. In-situ measurements will be made of flow, pH, dissolved oxygen, temperature, and light transmission. Twenty-four hour diel measurements of temperature, specific conductivity, TDS, DO, pH, and turbidity will be made at the three Bogue Chitto Creek sampling stations at half-hour intervals using continuous monitors.

The US Fish and Wildlife Service has scheduled a wetland inventory of the Bogue Chitto Creek Watershed for 2005 (pending approval of funding).

5.2 Assessment of Progress

Agencies responsible for implementing management activities will track implementation and provide annual reports to the Basin Group I Coordinator. Progress will be assessed based on meeting the scheduled management activity milestones outlined in Chapter 3. Success of

Section 319 funded projects in the watershed will be evaluated based on the criteria specified in the project proposals (Appendix F).

During 2007, the Assessment year for Basin Group I under the Basin Management Cycle, progress towards the goals of this watershed implementation plan will be assessed. Water quality data, as well as information on activities occurring in the watershed and stakeholder concerns collected during the period from 2003 through 2006 will be utilized. The following criteria will be used to determine progress toward plan goals:

- IBI greater than 44.64 (improvement) or 57.55 (achieving Fish and Wildlife Support).
- Achievement of all Mississippi water quality criteria (currently not meeting dissolved oxygen criterion).

Not meeting any one of these criteria warrants investigation of the effectiveness of implementation of management practices, and/or the effectiveness of the management practices themselves.

5.3 Plan Evaluation Procedure

This watershed implementation plan will be evaluated and revised in 2008, the Planning year for Basin Group I under the Basin Management Cycle. The evaluation of this plan will be organized by the Bogue Chitto Creek Implementation Team (see Section 3.0), beginning in January 2008. 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.

5.4 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 Bogue Chitto 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 Bogue Chitto Creek watershed quality will be revised based on knowledge that has been gained since 2003. The draft of the revised watershed implementation plan will be completed in April, one month after the evaluation has been completed.

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.

6.0 REFERENCES

American Ornithologists' Union (AOU), Committee on Classification and Nomenclature. 1983. Check-list of North American Birds. Sixth Edition. American Ornithologists' Union, Allen Press, Inc., Lawrence, Kansas.

Burkhead, N. M., and R. E. Jenkins. 1991. Fishes. Pages 321-409 in K. Terwilliger (coordinator). Virginia's Endangered Species: Proceedings of a Symposium. McDonald and Woodward Publishing Company, Blacksburg, Virginia.

City of Clinton. 2003. City of Clinton, Mississippi Storm Water Management Program. Clinton, Mississippi.

Cummings, K. S., and C. A. Mayer. 1992. Field Guide to Freshwater Mussels of the Midwest. Illinois History Survey Manual 5. 194 pp.

DeLorme. 1998. Mississippi Atlas and Gazette. Yarmouth, Maine.

Dickerson, D. D., and K. J. Reine. 1996. Habitat assessment and relative abundance estimates for the ringed sawback turtle (GRAPTEMYS OCULIFERA) in dredging sites of the West Pearl River navigation project (Louisiana). Final Project Report submitted to U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Michigan. 21 pp + appendices.

Freeman, P.L., W.M. Larson, D.W. Dilks, D. Schechter, A. Nemura, T. Naperala, J.V. DePinto, M.G. Prothro, G.W. Boese, A. Dettelbach, L. Notham, K. Thornton, D. Ford, P. Massirer, K.B. Stevens, J.A. Sobrinho. 2003. Navigating the TMDL Process: Evaluation and Improvements. 00-WSM-1. Water Environment Research Foundation.

Gordon, M.E. and Layzer, J.B. 1989. Mussels (Bivalvia: Unionoidea) of the Cumberland River review of life histories and ecological relationships. Biological Report 89(15): 1-99.

Heard, W.H. 1979. Identification manual of the fresh water clams of Florida. State of Florida, Department of Environmental Regulation. Technical Series 4(2):1-82.

Johnsgard, P. A. 1990. Hawks, eagles, and falcons of North America. Smithsonian Inst. Press, Washington, D.C. xvi + 403 pp.

McCoy, C. J., and R. C. Vogt. 1980. Distribution and population status of the ringed sawback GRAPTEMYS OCULIFERA (Baur) in Mississippi and Louisiana. U.S. Fish and Wildlife Service Contract No. 14-16-0004-79-038.

MDEQ. 2002a. Phase I TMDL for Organic Enrichment/Low Dissolved Oxygen and Biological Impairment, Bogue Chitto Creek, Big Black Basin, Hinds and Madison Counties, Mississippi. Jackson, Mississippi. Mississippi Department of Environmental Quality. Jackson, Mississippi.

MDEQ. 2002b. Big Black-Tombigbee-Tennesssee River Basins Prioritization and Implementation Process. Jackson, Mississippi.

MDEQ. 1998. Big Black River Basin Status Report. Mississippi Department of Environmental Quality. Jackson, Mississippi.

Mississippi soil and Water conservation Commission (MSWCC). 1995. Bogue Chitto Watershed Project Final Report. Mississippi Soil and Water Conservation Commission.

Ode, David. Botanist/Ecologist, South Dakota Natural Heritage Database. Personal communication.

Parmalee, Paul W. 1967. The freshwater mussels of Illinois. Popular Science Series, Vol VIII. Springfield, Ill. 107pp.

Ross, S. T., J. G. Knight, and S. D. Wilkins. 1990. Longitudinal occurrence of the bayou darter (Percidae: ETHEOSTOMA RUBRUM) in Bayou Pierre--a response to stream order or habitat availability? Polskie Archiwum Hydrobiologii 37:221-233.

Ross, S. T., J. G. Knight, and S. D. Wilkins. 1992. Distribution and microhabitat dynamics of the threatened bayou darter, ETHEOSTOMA RUBRUM. Copeia 1992:658-671.

SCS (USDA Soil Conservation Service). 1978. Soil Survey of Hinds County, Mississippi.

SCS. 1982. Soil Survey of Madison County, Mississippi.

Schafale, Mike. Community Ecologist, North Carolina Heritage Program.

Stewart, James. 1990. Endangered and threatened wildlife and plants; determination of threatened status for the inflated heelsplitter, POTAMILUS INFLATUS. Federal Register. Vol. 55, No. 189.

Terres, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York.

U.S. Fish and Wildlife Service. 1990. Bayou darter recovery plan. U.S. Fish and Wildlife Service, Jackson, Mississippi. 25 pp.

Young, Steve. Botanist, New York Natural Heritage Program. Personal communication

APPENDIX A

Water Quality Data

Table A.1. Reports on Bogue Chitto Creek.

Report	Findings Summary
Bogue Chitto Creek Water Quality Monitoring Project – MSDEQ Office of Pollution Control	Installing BMPs to reduce erosion from crop lands did significantly reduce field soil loss and in some cases reduced nutrients. However, there was not enough participation to cause a noticeable improvement in Bogue Chitto Creek water quality at Highway 22.
Bogue Chitto Creek Watershed Project Final Report – MS Soil and Water Conservation Commission	A total of 78 BMPs were installed on 1,421 acres which saved approximately 787,000 tons of soil/year. Summary of project activities and costs.
Phase I TMDL for Organic Enrichment/Low Dissolved Oxygen and Biological Impairment, Bogue Chitto Creek, Big Black Basin, Hinds and Madison Counties, Mississippi – MS DEQ Office of Pollution Control	Biological impairment is due to low dissolved oxygen. Not enough data to adequately characterize organic loads and dissolved oxygen conditions of listed stream segments.
TMDL for Low pH in Bogue Chitto Creek, Big Black River Basin, Hinds and Madison Counties, Mississippi – MS DEQ Office of Pollution Control	Listed stream segments are meeting pH standard.

Table A.2. 1999 In-situ Water Quality Data for Bogue Chitto Creek at Hwy 22.

	Average	Maximum	Minimum
Water Temperature (^{o}C)	28.52	32.91	23.04
PH	7.51	8.21	7.07
Dissolved Oxygen (mg/L)	5.20	9.09	2.04
Dissolved Oxygen Saturation (%)	68.43	110.00	25.10
Conductivity (us/cm)	409.69	451.00	232.00
Total Dissolved Solids (mg/L)	262.00	289.00	148.00

Program **SSIS** Project **IBI01** Lat: **32 25 55.8** Lon: **90 19 54.3**

Station Id **BB092** Alias **297** Name **BOGUE CHITTO CREEK**

Location **NEVADA** County **MADISON**

Benthics Sample

Sample Id	**413**	Collection Date	**03-12-01**
Activity Id	**B-413**	Collection Time	
Visit Number	**1**	Collection Method	**Ben-01**
Medium	**Biological**	Activity Type	**Sample**
Inten	**Taxon Abundance**	GearName	**D-frame net**
Community	**Benthic Macroinvertebrates**	GearType	**Net/Non-Tow**

Benthics Replicates

Repnu	Activity Category	Grids	Cobble/ Gravel	Snags	Submerged Macrophytes	Vegetate Banks	Sand Silt
0	**Routine Sample**	**0**	**0**	**4**	**0**	**11**	**5**
1	**Field Replicate**	**0**	**0**	**5**	**0**	**10**	**5**

Benthics

Repnum	Sno	TaxaId	Stag	FinalId	Individuals	Ind Orig	Ind.Rec	TCR
0	1	70	L	Caenis	23	22	1	1
0	2	76	A	Cambaridae	1	1	0	1
0	3	84	L	Ceratopogonidae	15	13	2	1
0	4	94	L	Cheumatopsyche	1	1	0	1
0	5	150	L	Dicrotendipes	2	2	0	1
0	6	160	L	Dubiraphia	1	0	1	1
0	7	104	L	Cladotanytarsus	15	14	1	1
0	8	126	L	Cryptochironomus	3	3	0	1
0	9	6	L	Ablabesmyia mallochi	3	3	0	1
0	10	7	L	Ablabesmyia rhamphe	2	2	0	1
0	11	10	L	Acerpenna	1	0	1	1
0	12	37	L	Argia	3	2	1	1
0	13	66	A	Branchiura sowerbyi	2	2	0	1
0	14	68	A	Caecidotea	11	11	0	1
0	15	302	A	Limnodrilus	6	6	0	1
0	16	308	A	Lirceus	3	3	0	1
0	17	314	A	Lymnaeidae	4	4	0	1
0	18	317	L	Macromia	1	1	0	1
0	19	405	L	Paralauterborniella	1	1	0	1
0	20	425	L	Perlesta	1	1	0	1
0	21	357	A	Neoporus	1	0	1	1
0	22	357	L	Neoporus	1	1	0	1
0	23	166	A	Eclipidrilus	2	2	0	2
0	24	177	A	Enchytraeidae	18	18	0	1
0	25	646	L	Conchapelopia	1	1	0	1
0	26	522	L	Somatochlora	1	0	1	2
0	27	533	L	Stenacron	12	12	0	1
0	28	534	L	Stenelmis	2	2	0	1
0	29	547	A	Synurella	8	8	0	1
0	30	550	L	Tabanus	1	1	0	1
0	31	556	L	Tanytarsus	10	8	2	1
0	32	592	L	Tribelos	3	2	1	1
0	33	601	A	Hydracarina	1	1	0	1
0	34	609	A	Sphaeriidae	8	7	1	1
0	35	610	L	Procladius	1	1	0	1
0	36	453	L	Polypedilum halterale	9	3	6	1
0	37	454	L	Polypedilum illinoense	1	1	0	1
0	38	457	L	Polypedilum scalaenum	12	10	2	1
0	39	781	L	Chironomidae Unid	1	1	0	1
0	40	781	P	Chironomidae Unid	7	6	1	1
0	41	782	A	Tubificidae Unid	14	14	0	1
0	42	786	L	Paraphaenocladius	1	0	1	1

Program **SSIS** Project **IBI01** Lat: **32 25 55.8** Lon: **90 19 54.3**

Station Id **BB092** Alias **297** Name **BOGUE CHITTO CREEK**

Location **NEVADA** County **MADISON**

Benthics Sample

Sample Id	**413**	Collection Date	**03-12-01**
Activity Id	**B-413**	Collection Time	
Visit Number	**1**	Collection Method	**Ben-01**
Medium	**Biological**	Activity Type	**Sample**
Inten	**Taxon Abundance**	GearName	**D-frame net**
Community	**Benthic Macroinvertebrates**	GearType	**Net/Non-Tow**

Benthics Replicates

Repnu	Activity Category	Grids	Cobble/ Gravel	Snags	Submerged Macrophytes	Vegetate Banks	Sand Silt
0	**Routine Sample**	**0**	**0**	**4**	**0**	**11**	**5**
1	**Field Replicate**	**0**	**0**	**5**	**0**	**10**	**5**

Benthics

Repnum	Sno	TaxaId	Stag	FinalId	Individuals	Ind Orig	Ind.Rec	TCR
0	43	790	A	Nematoda	1	1	0	1
0	44	795	L	Heptageniidae Unid	3	3	0	1
0	45	799	L	Meropelopia (=Conchapelopia)	2	2	0	1
0	46	809	L	Gonomyia	5	4	1	1
0	47	816	L	Polypedilum flavum	3	3	0	1
0	48	900	L	Coenagrionidae Unid Diff	1	1	0	1
0	49	938	L	Corynoneura/Thienemanniella	1	1	0	1
0	50	702	L	Amphipoda	7	7	0	1
0	51	724	A	Rhyacodrilus	1	1	0	3
0	52	1109	A	Varichaetodrilus	10	10	0	1
0	53	1018	L	Orthocladius O.	1	1	0	1
1	1	70	L	Caenis	18	17	1	1
1	2	76	A	Cambaridae	2	2	0	1
1	3	84	L	Ceratopogonidae	17	15	2	1
1	4	94	L	Cheumatopsyche	3	3	0	1
1	5	150	L	Dicrotendipes	8	8	0	1
1	6	160	L	Dubiraphia	1	1	0	1
1	7	104	L	Cladotanytarsus	16	16	0	1
1	8	126	L	Cryptochironomus	3	3	0	1
1	9	6	L	Ablabesmyia mallochi	2	2	0	1
1	10	7	L	Ablabesmyia rhamphe	1	1	0	1
1	11	68	A	Caecidotea	5	5	0	1
1	12	68	L	Caecidotea	1	0	1	1
1	13	302	A	Limnodrilus	6	6	0	1
1	14	308	A	Lirceus	5	5	0	1
1	15	425	L	Perlesta	1	1	0	1
1	16	337	A	Nais	2	2	0	1
1	17	344	L	Nanocladius	2	2	0	1
1	18	166	A	Eclipidrilus	3	3	0	1
1	19	176	L	Enallagma	1	1	0	1
1	20	177	A	Enchytraeidae	8	8	0	1
1	21	188	L	Erioptera	2	2	0	1
1	22	518	L	Simuliidae	2	2	0	1
1	23	521	L	Smittia	1	0	1	1
1	24	533	L	Stenacron	21	21	0	1
1	25	534	L	Stenelmis	2	2	0	1
1	26	535	L	Stenochironomus	1	1	0	1
1	27	547	A	Synurella	5	5	0	1
1	28	556	L	Tanytarsus	8	8	0	1
1	29	563	L	Tipula	1	1	0	1
1	30	572	L	Tvetenia	1	1	0	1
1	31	592	L	Tribelos	2	2	0	1

Program **SSIS** Project **IBI01** Lat: **32 25 55.8** Lon: **90 19 54.3**

Station Id **BB092** Alias **297** Name **BOGUE CHITTO CREEK**

Location **NEVADA** County **MADISON**

Benthics Sample

Sample Id	**413**	Collection Date	**03-12-01**
Activity Id	**B-413**	Collection Time	
Visit Number	**1**	Collection Method	**Ben-01**
Medium	**Biological**	Activity Type	**Sample**
Inten	**Taxon Abundance**	GearName	**D-frame net**
Community	**Benthic Macroinvertebrates**	GearType	**Net/Non-Tow**

Benthics Replicates

Repnu	Activity Category	Grids	Cobble/ Gravel	Snags	Submerged Macrophytes	Vegetate Banks	Sand Silt
0	**Routine Sample**	**0**	**0**	**4**	**0**	**11**	**5**
1	**Field Replicate**	**0**	**0**	**5**	**0**	**10**	**5**

Benthics

Repnum	Sno	TaxaId	Stag	FinalId	Individuals	Ind Orig	Ind.Rec	TCR
1	32	603	A	Hyalella	10	10	0	1
1	33	609	A	Sphaeriidae	7	6	1	1
1	34	610	L	Procladius	1	1	0	1
1	35	453	L	Polypedilum halterale	6	5	1	1
1	36	457	L	Polypedilum scalaenum	1	1	0	1
1	37	781	P	Chironomidae Unid	11	9	2	1
1	38	782	A	Tubificidae Unid	6	6	0	1
1	39	790	A	Nematoda	1	1	0	1
1	40	794	A	Crangonyctidae Unid	1	1	0	1
1	41	795	L	Heptageniidae Unid	2	2	0	1
1	42	804	A	Corbiculidae	1	1	0	1
1	43	809	L	Gonomyia	3	3	0	1
1	44	816	L	Polypedilum flavum	2	2	0	1
1	45	863	L	Amphipoda Unid	3	3	0	1
1	46	975	L	Libellulidae Unid	1	1	0	1
1	47	993	L	Tabanidae Unid	1	0	1	1
1	48	1109	A	Varichaetodrilus	3	3	0	1
1	49	1018	L	Orthocladius O.	1	1	0	1

Program **SSIS** Project **IBI01** Lat: **32 25 55.8** Lon: **90 19 54.3**

Station Id **BB092** Alias **297** Name **BOGUE CHITTO CREEK**

Location **NEVADA** County **MADISON**

Chemistry Sample

Sample Id	**169**	Collection Date	**03-12-01**
Activity Id	**C-169**	Collection Time	
Visit Number	**1**	Collection Method	
Medium	**Water**	Activity Type	**Sample**
		GearName	
		GearType	

Chemistry Replicates

Repnu	Activity Category	CollTime	Comments
1			

Chemistry

Repnu	Sno	ParamId	Parameter	ChemValue	Below Det	Deq	Uploaded
1	1	2	Ammonia	0.51	0	0	N
1	2	7	Chemical Oxygen Demand	10.00	1	0	N
1	3	8	Chlorides	7.70	0	0	N
1	4	21	Dissolved Oxygen	120.10	0	1	N
1	5	22	Dissolved Oxygen	12.03	0	1	N
1	6	36	Nitrate and Nitrite	0.35	0	0	N
1	7	39	pH	7.12	0	1	N
1	8	42	Sample Depth	1.00	0	1	N
1	9	46	Stream Flow, Instant	60.00	0	1	N
1	10	48	Total Alkalinity as CaCO3	38.90	0	0	N
1	11	50	Total Dissolved Solid	91.00	0	1	N
1	12	52	Total Kjeldahl Nitrogen	1.48	0	0	N
1	13	53	Total Organic Carbon	9.00	0	0	N
1	14	54	Total Phosphorus	0.34	0	0	N
1	15	58	Turbidity	167.00	0	1	N
1	16	59	Water Temperature	15.27	0	1	N
1	17	63	Specific Conductance	140.00	0	0	N

Program **SSIS** Project **IBI01** Lat: **32 25 55.8** Lon: **90 19 54.3**

Station Id **BB092** Alias **297** Name **BOGUE CHITTO CREEK**

Location **NEVADA** County **MADISON**

HABITAT Sample

Sample Id **423** Collection Date **03-12-01**

Activity Id **H-423** Collection Time

Visit Number **1** Collection Method

Activity Type **Field Msr/Obs**

HABITAT Replicates

Repnu	Activity Category	Collector	Form Version
0	**Routine Msr/Obs**		**MS DEQ**
1	**Duplicate Msr/Obs**		**MS DEQ**

Habitat Values

ASSESSMENT DATA

Repnum	**0**
Fallen Trees/Large Woody Debris	**1**
Deep Pools	**1**
Shallow Pools	**1**
Overhanging Shrubbery in Water	**0**
Large Rocks	**0**
Undercut Banks	**1**
Thick Root Mats	**0**
Dense Macrophbyte Beds	**0**
Deep Riffles/Runs with Turbulence	**0**
Bottom Substrate/Available Cover	**7**
Pool Substate Characterization	**6**
Pool Variability	**9**
Channel Alteration	**3**
Sediment Deposition	**9**
Channel Sinousity	**2**
Channel Flow Status	**18**
Bank Vegetative Protection(Left Bank	**3**
Bank Vegetative Protection(Right Bank)	**3**
Bank Stability (Left Bank)	**5**
Band Stability (Right Bank)	**5**
Riparian Vegetation Zone Width (Left Bank)	**1**
Riparian Vegetation Zone Width (Right Bank)	**1**

Program **SSIS** Project **IBI01** Lat: **32 25 55.8** Lon: **90 19 54.3**

Station Id **BB092** Alias **297** Name **BOGUE CHITTO CREEK**

Location **NEVADA** County **MADISON**

Pebble Sample

Sample Id **216** Collection Date **03-12-01**

Activity Id **PC-216** Collection Time

Visit Number **1** Collection Method **Wohlman Pebble Count**

Activity Type **Field Msr/Obs**

Comments

Pebble Replicates

Repnu	Activity Category	CollTime	Comments
0			

Pebble Values

Repnu	Sno	Feature Desc	Particle	Type	Num. Presen	Range E	Range M
0	1	2 - Pool	Silt/Clay	Silt/Clay	20.00	<.062 mm	<.04 inches
0	2	2 - Pool	Very Fine	Sand	3.00	.062-.125 mm	.04-.08 inches
0	3	2 - Pool	Fine	Sand	5.00	.125-.25 mm	.04-.08 inches
0	4	2 - Pool	Hardpan Clay	Hardpan Clay	72.00	?	?

Program **SSIS** Project **IBI01** Lat: **32 25 55.8** Lon: **90 19 54.3**

Station Id **BB092** Alias **297** Name **BOGUE CHITTO CREEK**

Location **NEVADA** County **MADISON**

Physical Characteriazions Sample

Sample Id **485** Collection Date **03-12-01**

Activity Id Collection Time

Visit Number **1**

Comments **297-BD -- DS side of reach in US end of 297.**

Physical Characterizations Replicates

Repnu	Activity Category	CollTime	Comments
1			
2			

Physcial Characterizations Values

RIPARIAN ZONE/INSTREAM FEATURES

Sample Id **485** RepNum **1**

Forest **0** Field/Pasture **0** Agriculture **100**

Residential **0** Commercial **0** Industrial **0**

Other **0** Description

Local Watershed Erosion **Moderate , Channelized**

Local Watershed NPS Pollution **Obvious Sources**

Description **Ag fields**

Estimated Stream Width(m) **8** High Water Mark (m) **4.5**

Bank Width(m) **8** Average Stream Depth (m) **1.5**

Canopy Cover **Partly Open (26-50%)**

SEDIMENT SUBSTRATE

Sediment Odors **Normal** Other

Sediment Oils **Absent**

Sediment Deposits **Sand , Silt** Other Clay

Are the Undersides of stones which are not deeply embedded black ? **No**

SECTION II - WATER QUALITY

Water Odor **Normal** Other % Affected **0**

Surface Oils **None** PhotoId **#12 US** % Affected **0**

Turbid **Opaque** Water Color **Very brown** NTU **167**

HYDROLOGICAL DATA

Stream Tape Reading **0** Stream Ding Whap (ft) **0**

Stream Tide Stage Stream Remarks

Program **SSIS** Project **IBI01** Lat: **32 25 55.8** Lon: **90 19 54.3**

Station Id **BB092** Alias **297** Name **BOGUE CHITTO CREEK**

Location **NEVADA** County **MADISON**

Physical Characteriazions Sample

Sample Id **485** Collection Date **03-12-01**

Activity Id Collection Time

Visit Number **1**

Comments **297-BD -- DS side of reach in US end of 297.**

Physical Characterizations Replicates

Repnu	Activity Category	CollTime	Comments
1			
2			

Physcial Characterizations Values

Sample Id **485**

Forest **0** Field/Pasture **0** Agriculture **100**

Residential **0** Commercial **0** Industrial **0**

Other **0** Description

Local Watershed Erosion **Moderate , Channelized**
Obvious Sources

Description **Ag fields**

Estimated Stream Width(m) **8** High Water Mark (m) **4.5**

Bank Width(m) **8** Average Stream Depth (m) **1.5**

Canopy Cover **Partly Open (26-50%)**

Sediment Odors **Normal** Other

Sediment Oils **Absent**

Sediment Deposits **Sand , Silt** Other Clay

Are the Undersides of stones which are not deeply embedded black ? **No**

Water Odor **Normal** Other % Affected **0**

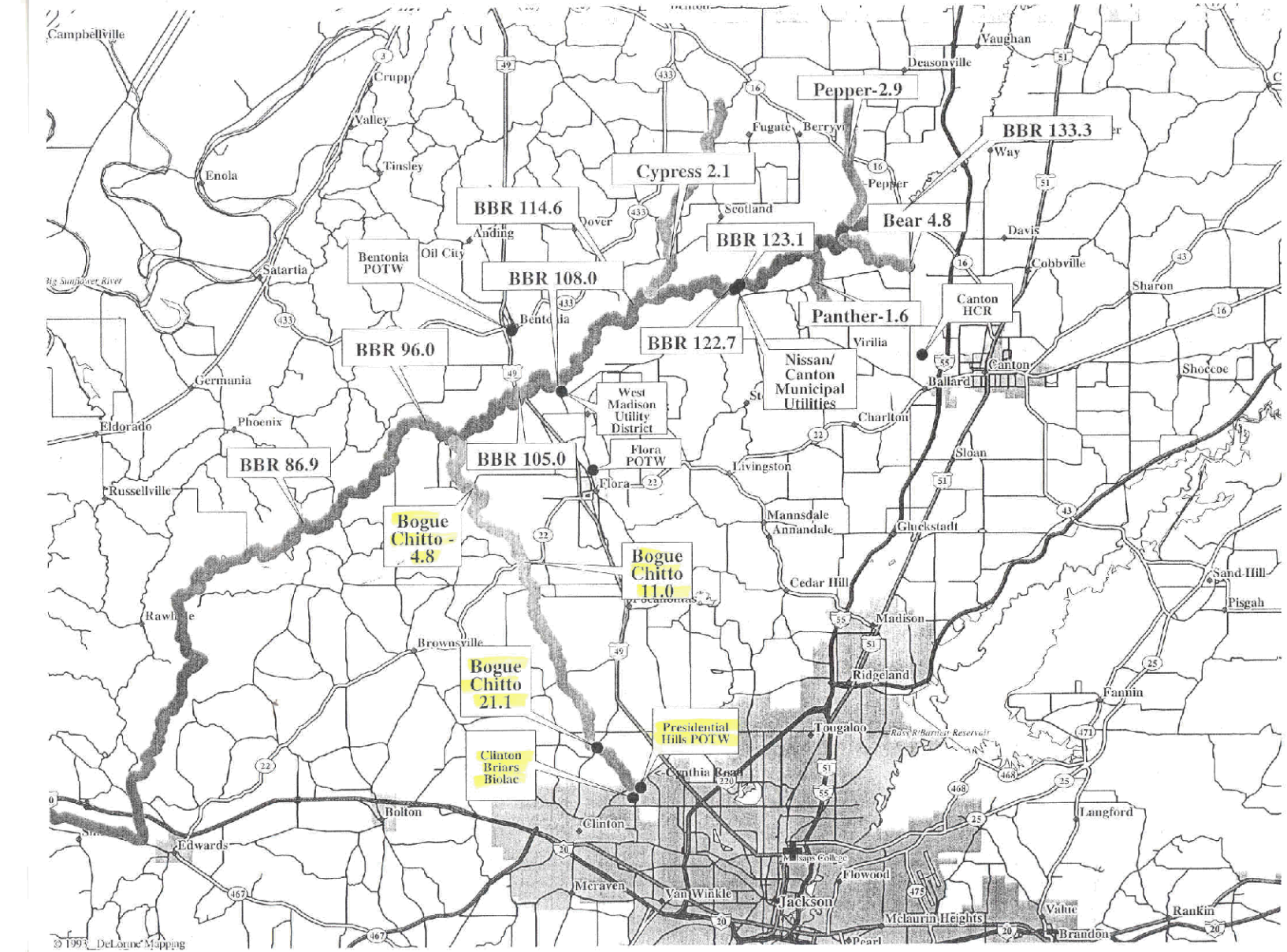
Surface Oils **None** PhotoId **#13 US** % Affected **0**

Turbid **Opaque** Water Color **Very brown** NTU **0**

Stream Tape Reading **0** Stream Ding Whap (ft) **0**

Stream Tide Stage

Bogue Chitto Creek data from Big Black River Water Quality Data Report


Pepper-2.9
BBR 133.3
Cypress 2.1
BBR 114.6
Bear 4.8
BBR 123.1
BBR 108.0
Bentonia POTW
Panther-1.6
Canton HCR
BBR 96.0
BBR 122.7
Nissan/ Canton Municipal Utilities
West Madison Utility District
BBR 86.9
BBR 105.0
Flora POTW
Bogue Chitto - 4.8
Bogue Chitto 11.0
Bogue Chitto 21.1
Presidential Hills POTW
Clinton Briars Biolac
Campbellville
Vaughan
Deasonville
Crupp
Valley
Tinsley
Enola
Fugate
Berryville
Way
Pepper
Scotland
Anding
Oil City
Satartia
Davis
Cobbville
Sharon
Canton
Ballard
Shoccoe
Germania
Eldorado
Phoenix
Russellville
Virilia
Charlton
Sloan
Livingston
Flora
Mannsdale
Annandale
Gluckstadt
Cedar Hill
Sand Hill
Pisgah
Madison
Rawlinville
Brownsville
Ridgeland
Fannin
Tougaloo
Ross R Barnett Reservoir
Cynthia Road
Bolton
Clinton
Edwards
Langford
Flowood
Mcraven
Van Winkle
Jackson
Mclaurin
Heights
Value
Rankin
Brandon
Pearl
© 1993 DeLorme Mapping

02bbr-cal.wk3

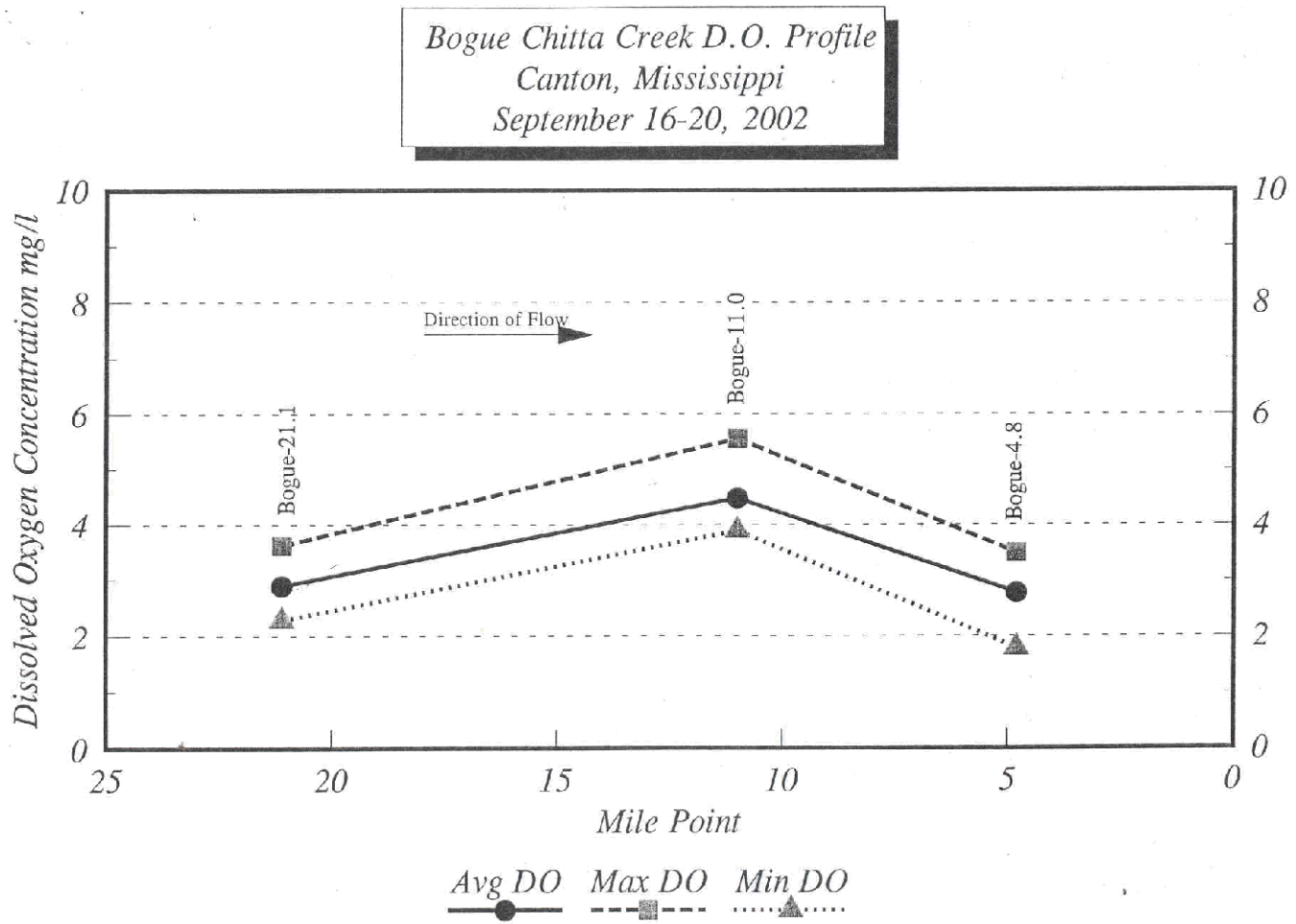
Table
Water Quality Monitor Calibration Record
Big Black River Wasteload Allocation Study
Canton, Mississippi
September 2002

Beginning Calibration

Station	Meter #	pH 7 su	pH4 su	pH10 su	Turbidity 0	Turbidity 100	Cond std 10,000 umhos/cm	D.O. avg= 7.25 mg/l
BBR 133.3	0	cal	sloped	10.14	0	100	10000	7.26
Pepper 2.9	21	cal	sloped	10.12	0	100	10000	7.26
Bear Ck 4.8	2	cal	sloped	10.02	0	100	10000	7.24
Panther 1.6	4	cal	sloped	10.11	-0.1	100.1	10000	7.25
BBR 123.1	5	cal	sloped	10.11			10000	7.24
Cypress 2.1	6	cal	sloped	10.16	0	100	10000	7.23
BBR 114.6	7	cal	sloped	10.23			10000	7.24
BBR 108.0	9	cal	sloped	10.21			10000	7.26
BBR 105.0	10	cal	sloped	10.16			10000	7.27
Bogue 4.8	11	cal	sloped	10.02	0	100	10000	7.24
Bogue 11.0	13	cal	sloped	10.11	0.3	99	10000	7.27

Ending Check

Station	Meter #	pH 4 su	pH7 su	pH10 su	Turbidity 0	Turbidity 100	Cond std 10,000 umhos/cm	D.O. avg = 7.10 mg/l
BBR 133.3	0	4.08	7.09	10.23	0.9	108.6	9964	7.0
Pepper 2.9	21	4.03	7.05	10.06	-1	112	9952	7.3
Bear Ck 4.8	2	4.09	7.04	10.05	0.9	109.2	9794	6.7
Panther 1.6	4	4.05	6.94	10.02	-0.4	110.8	9954	7.0
BBR 123.1	5	4.03	7.05	10.2			9896	7.1
Cypress 2.1	6	4	7.04	10.22	-0.5	110.6	9978	7.6
BBR 114.6	7	4.17	7.25	10.44			10027	7.0
BBR 108.0	9	4	7.07	10.21			10195	7.1
BBR 105.0	10	4.02	7.03	10.18			10089	6.8
Bogue 4.8	11	4.08	7.04	10.21	0.7	106.9	10180	7.2
Bogue 11.0	13	4.17	7.06	10.24	0.4	109.8	10186	7.2

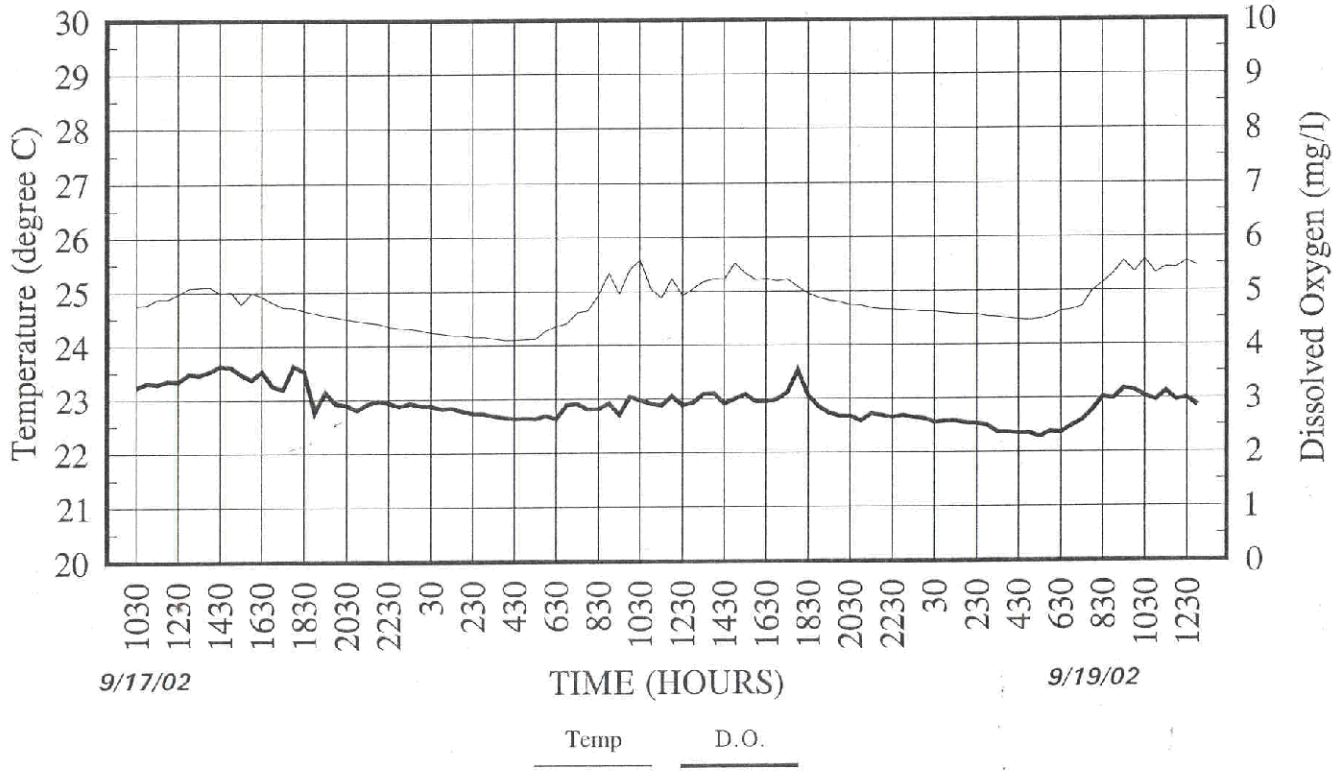

Bogue Chitta Creek D.O. Profile
Canton, Mississippi
September 16-20, 2002
Dissolved Oxygen Concentration mg/l
10
8
6
4
2
0
Direction of Flow
Bogue-21.1
Bogue-11.0
Bogue-4.8
25
20
15
10
5
0
Mile Point
Avg DO
Max DO
Min DO

DO-Tsum.drw

2002 Water Quality Summary
Big Black River Tributaries
September 16–20, 2002

	Station	Date(s)	Time(S)	Temperature degree C	pH su	SpCond uS/cm	D.O. mg/l
max	Bogue–21.1	9/17–19/02	1330–1630	25.6	7.4	677	3.63
avg				24.8	7.3	602	2.90
min				24.1	7.2	571	2.28
max	Bogue–11.0	9/17–19/02	1400–1700	26.7	7.7	389	5.56
avg				25.5	7.4	308	4.48
min				24.6	7.3		3.89
max	Bogue–4.8	9/17–19/02	1500–1730	26.2	7.2	269	3.49
avg				25.7	7.1	242	2.77
min				25.0	7.0	226	1.78
max	Bear–4.8	9/17–19/02	1000–1730	26.0	7.4	250	2.11
avg				25.1	7.0	247	1.02
min				24.4	7.0	245	0.43
max	Panther–1.6	9/18–19/02	1200–1830	24.5	7.1	155	0.49
avg				23.8	6.8	151	0.08
min				23.4	6.8	147	0.02
max	Cypress–2.1	9/17–20/02	1600–0830	28.4	10.0	173	10.67
avg				26.4	8.5	168	8.19
min				24.3	7.6	165	5.21
max	Pepper–2.9	9/17–19/02	1000–1700	28.2	7.4	0	9.64
avg				26.4	7.3	0	5.02
min				24.9	7.2	0	2.50
			max	28.4	10.0	677.0	10.67
			avg	25.4	7.3	245.6	3.49
			min	23.4	6.8	0.0	0.02

Fig ,DO & Temp@ Bogue Chitta Ck Sta, Bogue-21.1
Big Black River Low Flow Study, Sep 2002
Canton, Mississippi

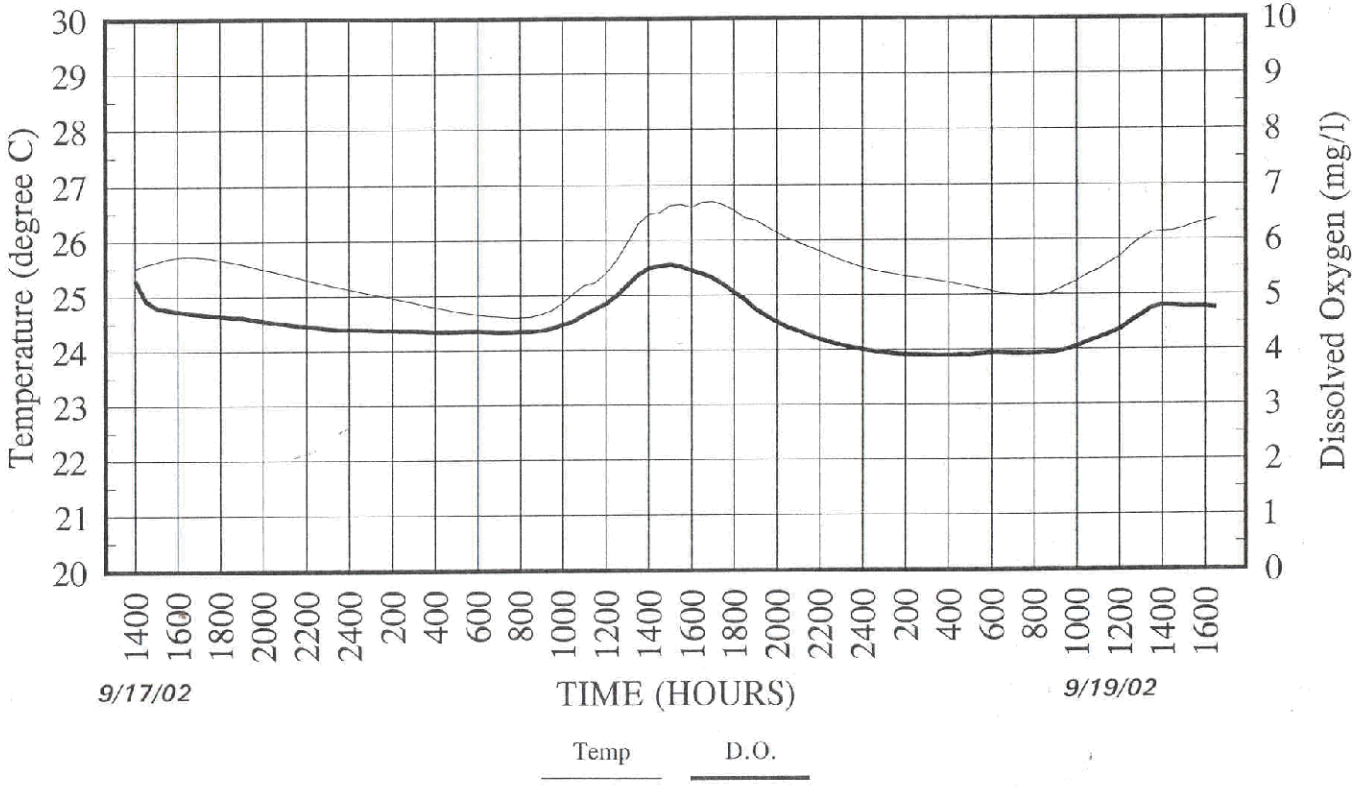


bogu21do.drw

Table
2002 Diel Water Quality Station Bogue - 21.1
Bogue Chitta Creek – Canton, Mississippi
September 16 – 20, 2002

Date m/d/y	Time hh:mm:ss	Temp C	SpCond uS/cm	TDS g/L	DOsat %	DO mg/L	DOcorr	Depth feet	pH	Turbid NTU	Battery volts
09/17/2002	13:30	24.75	560.00	0.58	30.00	3.23	25.2	3.43	7.2	36.8	12.60
09/17/2002	14:00	24.77	562.00	0.59	30.90	3.31	24.6	3.28	7.24	35.5	12.50
09/17/2002	14:30	24.88	613.00	0.40	39.80	3.29	24.6	3.23	7.24	34.1	12.60
09/17/2002	15:00	24.84	630.00	0.41	40.50	3.33	24.6	3.13	7.23	33.6	12.50
09/17/2002	15:30	24.97	630.00	0.41	40.50	3.34	24.6	3.16	7.23	34.1	12.50
09/17/2002	16:00	25.08	634.00	0.41	42.70	3.48	24.6	3.21	7.26	34.4	12.50
09/17/2002	16:30	25.09	633.00	0.41	42.00	3.46	24.6	3.24	7.23	33	12.50
09/17/2002	17:00	25.10	633.00	0.41	42.90	3.53	24.6	3.54	7.28	32.8	12.50
09/17/2002	17:30	24.99	638.00	0.42	44.00	3.63	24.6	3.67	7.27	32.7	12.50
09/17/2002	18:00	25.01	640.00	0.42	43.80	3.61	24.6	3.72	7.26	32.3	12.40
09/17/2002	18:30	24.78	645.00	0.42	41.90	3.47	24.6	3.89	7.24	32.8	12.50
09/17/2002	19:00	24.99	638.00	0.42	40.80	3.37	24.6	3.91	7.27	34.3	12.40
09/17/2002	19:30	24.92	634.00	0.41	42.70	3.53	24.6	3.64	7.28	33.6	12.40
09/17/2002	20:00	24.81	589.00	0.38	39.30	3.23	24.6	5.08	7.25	30.5	12.40
09/17/2002	20:30	24.72	587.00	0.38	38.50	3.19	23.4	5.02	7.26	30.3	12.40
09/17/2002	21:00	24.71	583.00	0.38	43.70	3.62	24.6	6.03	7.3	32	12.40
09/17/2002	21:30	24.65	583.00	0.38	42.50	3.53	24.6	6.08	7.3	33.2	12.40
09/17/2002	22:00	24.61	581.00	0.38	33.30	2.77	24.6	6.11	7.27	32.3	12.30
09/17/2002	22:30	24.56	581.00	0.38	37.70	3.13	24.6	6.13	7.27	26.9	12.30
09/17/2002	23:00	24.53	581.00	0.38	35.10	2.92	23.4	6.15	7.26	34.5	12.30
09/17/2002	23:30	24.49	579.00	0.38	34.70	2.89	23.4	6.16	7.26	37.9	12.30
09/18/2002	00:00	24.46	578.00	0.38	33.60	2.80	23.4	6.17	7.26	35.6	12.30
09/18/2002	00:30	24.43	577.00	0.38	34.90	2.91	23.4	6.17	7.27	32.5	12.30
09/18/2002	01:00	24.41	578.00	0.38	35.60	2.97	23.4	6.18	7.27	41.7	12.30
09/18/2002	01:30	24.35	577.00	0.38	35.10	2.93	23.4	6.21	7.27	36.4	12.30
09/18/2002	02:00	24.32	578.00	0.38	34.40	2.87	23.4	6.25	7.26	39	12.30
09/18/2002	02:30	24.31	583.00	0.38	34.90	2.91	23.4	6.27	7.27	38.6	12.30
09/18/2002	03:00	24.28	583.00	0.38	34.50	2.88	23.4	6.30	7.27	39.7	12.30
09/18/2002	03:30	24.24	581.00	0.38	34.70	2.87	23.4	6.31	7.27	40.7	12.30
09/18/2002	04:00	24.22	581.00	0.38	33.70	2.82	23.4	6.33	7.27	39.5	12.30
09/18/2002	04:30	24.19	582.00	0.38	33.70	2.83	23.4	6.35	7.27	43.3	12.30
09/18/2002	05:00	24.19	582.00	0.38	33.20	2.78	23.4	6.34	7.27	42.9	12.30
09/18/2002	05:30	24.16	582.00	0.38	32.80	2.73	23.4	6.34	7.27	38.8	12.30
09/18/2002	06:00	24.16	583.00	0.38	32.50	2.73	23.4	6.36	7.27	41.6	12.30
09/18/2002	06:30	24.13	583.00	0.38	31.90	2.68	23.4	6.36	7.27	34.1	12.30
09/18/2002	07:00	24.10	584.00	0.38	31.70	2.66	23.4	6.38	7.26	39.9	12.30
09/18/2002	07:30	24.10	585.00	0.38	31.30	2.63	23.4	6.38	7.26	41.1	12.30
09/18/2002	08:00	24.12	586.00	0.38	31.40	2.64	23.4	6.35	7.27	39.4	12.30
09/18/2002	08:30	24.12	587.00	0.38	31.40	2.63	23.4	6.29	7.27	42.7	12.30
09/18/2002	09:00	24.27	588.00	0.38	32.20	2.69	23.4	6.15	7.28	38.1	12.30
09/18/2002	09:30	24.32	588.00	0.38	31.50	2.63	23.4	6.03	7.27	44.6	12.30
09/18/2002	10:00	24.40	589.00	0.38	34.20	2.83	23.4	6.01	7.28	40.3	12.30
09/18/2002	10:30	24.61	596.00	0.39	33.20	2.91	23.4	5.90	7.31	38	12.30
09/18/2002	11:00	24.84	627.00	0.41	33.50	2.81	23.4	5.91	7.27	44.3	12.30
09/18/2002	11:30	24.93	631.00	0.41	34.00	2.84	23.4	5.80	7.25	24.4	12.20
09/18/2002	12:00	25.34	645.00	0.42	35.30	2.92	23.4	5.72	7.3	36.2	12.20
09/18/2002	12:30	24.96	635.00	0.41	32.80	2.71	23.4	5.66	7.23	37.8	12.20
09/18/2002	13:00	25.41	645.00	0.42	37.10	3.04	23.4	5.48	7.24	27.5	12.30
09/18/2002	13:30	25.38	670.00	0.44	36.30	2.98	23.4	5.37	7.23	35	12.20
09/18/2002	14:00	25.25	677.00	0.44	35.20	2.93	23.4	5.33	7.22	37.4	12.20
09/18/2002	14:30	24.88	632.00	0.41	34.80	2.88	23.4	5.33	7.24	40	12.30
09/18/2002	15:00	25.24	645.00	0.42	37.10	3.05	23.4	5.26	7.3	34.7	12.20
09/18/2002	15:30	24.92	639.00	0.42	34.50	2.86	23.4	5.48	7.23	39.2	12.20
09/18/2002	16:00	25.05	631.00	0.41	35.20	2.93	23.4	5.56	7.26	34.1	12.20
09/18/2002	16:30	25.18	632.00	0.42	37.60	3.09	23.4	5.61	7.25	32.7	12.20
09/18/2002	17:00	25.22	640.00	0.42	37.70	3.10	23.4	5.71	7.25	30.3	12.20
09/18/2002	17:30	25.22	602.00	0.39	35.40	2.91	23.4	5.73	7.25	34.1	12.20
09/18/2002	18:00	25.32	627.00	0.41	36.70	3.00	23.4	5.91	7.23	34.1	12.20
09/18/2002	18:30	25.25	591.00	0.38	37.60	3.08	23.4	6.04	7.29	38.2	12.20
09/18/2002	19:00	25.27	592.00	0.39	36.00	2.95	23.4	6.18	7.24	37.7	12.20
09/18/2002	19:30	25.25	592.00	0.39	35.90	2.95	23.4	6.31	7.29	31.8	12.20
09/18/2002	20:00	25.19	588.00	0.38	36.50	2.99	23.4	6.42	7.3	32.3	12.20
09/18/2002	20:30	25.22	590.00	0.38	38.00	3.12	23.4	6.50	7.31	31.2	12.20
09/18/2002	21:00	25.08	589.00	0.38	42.80	3.53	23.4	6.59	7.36	28.6	12.10
09/18/2002	21:30	24.96	575.00	0.37	37.10	3.06	23.4	6.63	7.32	28.8	12.10
09/18/2002	22:00	24.88	574.00	0.37	34.50	2.85	23.4	6.67	7.31	30.9	12.10
09/18/2002	22:30	24.83	575.00	0.37	32.90	2.73	23.4	6.68	7.3	27.7	12.10
09/18/2002	23:00	24.80	573.00	0.37	32.20	2.67	23.4	6.59	7.3	32.8	12.10
09/18/2002	23:30	24.74	572.00	0.37	32.20	2.67	23.4	6.46	7.3	43.1	12.10
09/19/2002	00:00	24.75	572.00	0.37	31.10	2.58	23.4	6.46	7.3	36.6	12.10
09/19/2002	00:30	24.68	571.00	0.37	32.60	2.71	23.4	6.48	7.29	40.2	12.10
09/19/2002	01:00	24.66	571.00	0.37	32.30	2.68	23.4	6.51	7.3	41.6	12.10
09/19/2002	01:30	24.63	571.00	0.37	31.80	2.64	23.4	6.53	7.3	47.1	12.10
09/19/2002	02:00	24.64	571.00	0.37	32.20	2.64	22.3	6.57	7.3	39.3	12.10
09/19/2002	02:30	24.63	571.00	0.37	31.70	2.64	22.3	6.60	7.3	36.4	12.10
09/19/2002	03:00	24.61	571.00	0.37	31.50	2.62	23.4	6.63	7.3	37.1	12.10
09/19/2002	03:30	24.61	571.00	0.37	30.70	2.55	23.4	6.69	7.3	38.3	12.10
09/19/2002	04:00	24.59	571.00	0.37	31.00	2.57	23.4	6.73	7.3	41.9	12.10
09/19/2002	04:30	24.57	571.00	0.37	30.90	2.57	23.4	6.77	7.31	39.2	12.10
09/19/2002	05:00	24.56	571.00	0.37	30.50	2.54	23.4	6.81	7.31	44.3	12.10
09/19/2002	05:30	24.56	571.00	0.37	30.70	2.55	23.4	6.84	7.3	45.7	12.10
09/19/2002	06:00	24.52	571.00	0.37	29.90	2.49	23.4	6.88	7.29	44.9	12.10
09/19/2002	06:30	24.51	572.00	0.37	28.40	2.36	22.3	6.89	7.29	45.4	12.00
09/19/2002	07:00	24.48	572.00	0.37	28.30	2.36	22.3	6.88	7.29	49.1	12.00
09/19/2002	07:30	24.46	572.00	0.37	28.10	2.34	22.3	6.85	7.29	38.3	12.10
09/19/2002	08:00	24.43	573.00	0.37	28.10	2.34	22.3	6.84	7.27	55.2	12.10
09/19/2002	08:30	24.47	573.00	0.37	27.40	2.28	22.3	6.72	7.28	51.3	12.10
09/19/2002	09:00	24.52	574.00	0.37	28.50	2.37	22.3	6.66	7.28	49.5	12.10
09/19/2002	09:30	24.62	575.00	0.37	28.80	2.36	22.3	6.56	7.28	53.4	12.10
09/19/2002	10:00	24.64	574.00	0.37	29.90	2.48	22.3	6.51	7.3	53.1	12.20
09/19/2002	10:30	24.70	574.00	0.37	31.10	2.58	22.3	6.44	7.24	53.3	12.20
09/19/2002	11:00	24.99	607.00	0.40	33.50	2.77	22.3	6.30	7.32	47.5	12.10
09/19/2002	11:30	25.14	619.00	0.40	36.20	3.02	23.4	6.31	7.31	41.4	12.10
09/19/2002	12:00	25.31	627.00	0.41	36.40	2.95	23.4	6.19	7.35	39.1	12.10
09/19/2002	12:30	25.35	634.00	0.41	34.00	2.73	23.4	6.07	7.33	40.2	12.10
09/19/2002	13:00	25.34	661.00	0.43	33.50	2.14	23.4	6.00	7.33	42.1	12.00
09/19/2002	13:30	25.58	658.00	0.43	37.10	2.03	23.4	5.96	7.32	43.3	12.10
09/19/2002	14:00	25.30	658.00	0.43	36.10	2.96	23.4	6.08	7.32	41.2	12.10
09/19/2002	14:30	25.43	660.00	0.43	38.20	3.12	23.4	6.10	7.31	39.6	12.10
09/19/2002	15:00	25.42	658.00	0.43	36.20	2.96	23.4	6.10	7.32	41.6	12.10
09/19/2002	15:30	25.54	661.00	0.43	36.70	3.00	23.4	6.11	7.33	41.9	12.10
09/19/2002	16:00	25.45	662.00	0.43	34.00	2.85	23.4	6.14	7.33	40.3	12.10
09/19/2002	16:30	25.60	663.00	0.43	33.00	2.93	23.4	6.18	7.35	36.5	12.10
	Max	25.60	677.00	0.44	44.00	3.63	25.20	6.89	7.36	85.50	12.60
	Avg	24.79	602.06	0.29	35.04	2.99	23.47	6.14	7.24	38.19	12.22
	Min	24.19	571.00	0.37	27.40	2.28	22.30	5.33	7.22	25.20	12.00

Fig ,DO & Temp@ Bogue Chitta Ck Sta, Bogue-11.0
Big Black River Low Flow Study, Sep 2002
Canton, Mississippi



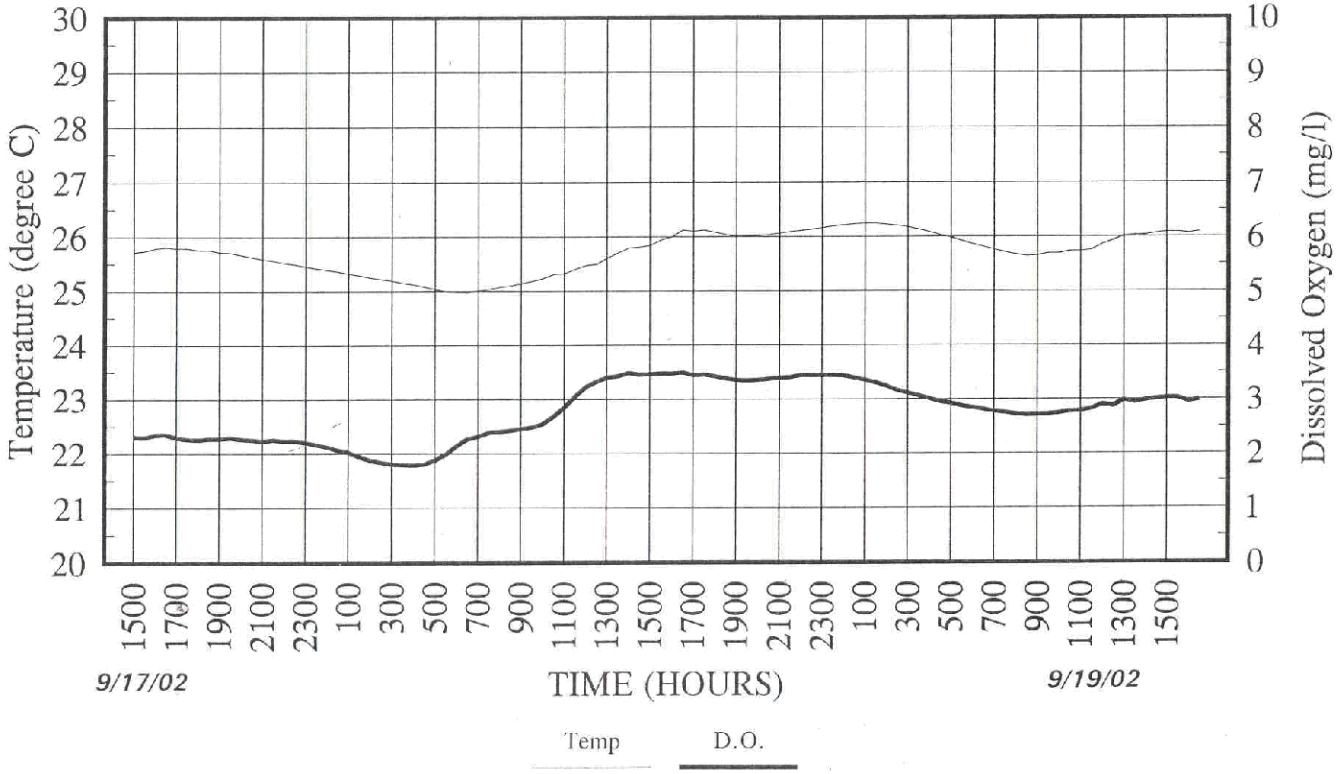
bogu11do.drw

boguel1.wk3

Table
2002 Diel Water Quality Station Bogue-11.0
Bogue Chitto Creek – Canton, Mississippi
September 16–20, 2002

Date m/d/y	Time hh:mm:ss	Temp C	SpCond uS/cm	TDS g/L	DOsat %	DO mg/L	DOchrg	Depth feet	pH	Turbid NTU	Battery volts	Time
09/17/2002	14:00	25.51	385.00	0.25	64.90	5.31	33.4	−0.58	7.69	29.4	11.90	1400
09/17/2002	14:30	25.58	386.00	0.25	60.30	4.93	33.4	−0.72	7.47	29.8	11.90	1430
09/17/2002	15:00	25.63	387.00	0.25	58.80	4.80	33.4	−0.81	7.45	28.9	11.90	1500
09/17/2002	15:30	25.69	388.00	0.25	58.40	4.76	33.4	−0.89	7.46	28.6	11.90	1530
09/17/2002	16:00	25.72	389.00	0.25	58.00	4.73	33.4	−0.91	7.45	28.4	11.80	1600
09/17/2002	16:30	25.73	389.00	0.25	57.70	4.70	33.4	−0.92	7.45	28.7	11.90	1630
09/17/2002	17:00	25.72	389.00	0.25	57.40	4.68	32.8	−0.88	7.45	28.4	11.90	1700
09/17/2002	17:30	25.70	389.00	0.25	57.10	4.66	32.8	−0.81	7.45	27.7	11.80	1730
09/17/2002	18:00	25.66	388.00	0.25	57.30	4.64	32.8	−0.73	7.45	27.2	11.80	1800
09/17/2002	18:30	25.63	387.00	0.25	56.50	4.62	32.8	−0.65	7.45	26.7	11.90	1830
09/17/2002	19:00	25.59	385.00	0.25	56.50	4.62	32.8	−0.59	7.45	27.1	11.90	1900
09/17/2002	19:30	25.54	384.00	0.25	56.10	4.58	32.8	−0.57	7.45	27.1	11.80	1930
09/17/2002	20:00	25.49	383.00	0.25	55.60	4.55	32.8	−0.55	7.44	27.4	11.90	2000
09/17/2002	20:30	25.45	381.00	0.25	55.20	4.52	32.8	−0.53	7.45	28.8	11.80	2030
09/17/2002	21:00	25.40	380.00	0.25	54.90	4.50	32.8	−0.51	7.45	27.4	11.80	2100
09/17/2002	21:30	25.35	379.00	0.25	54.50	4.47	32.8	−0.50	7.45	28	11.80	2130
09/17/2002	22:00	25.30	378.00	0.25	54.30	4.46	32.8	−0.49	7.45	29.7	11.80	2200
09/17/2002	22:30	25.25	376.00	0.25	53.90	4.43	32.8	−0.47	7.45	29.1	11.80	2230
09/17/2002	23:00	25.20	375.00	0.24	53.60	4.41	32.8	−0.47	7.44	28.9	11.80	2300
09/17/2002	23:30	25.16	374.00	0.24	53.40	4.39	32.8	−0.47	7.44	28.5	11.80	2330
09/18/2002	00:00	25.12	372.00	0.24	53.20	4.39	32.8	−0.47	7.44	28.5	11.80	2400
09/18/2002	00:30	25.08	371.00	0.24	53.20	4.39	32.8	−0.49	7.44	26.9	11.80	30
09/18/2002	01:00	25.04	370.00	0.24	53.10	4.38	32.8	−0.49	7.44	29.1	11.80	100
09/18/2002	01:30	25.01	368.00	0.24	52.90	4.37	32.8	−0.50	7.44	29.9	11.80	130
09/18/2002	02:00	24.96	367.00	0.24	52.80	4.37	32.8	−0.47	7.44	28.8	11.80	200
09/18/2002	02:30	24.92	366.00	0.24	52.70	4.36	32.8	−0.46	7.44	31.9	11.80	230
09/18/2002	03:00	24.88	365.00	0.24	52.70	4.36	32.8	−0.44	7.44	27.8	11.80	300
09/18/2002	03:30	24.83	364.00	0.24	52.50	4.35	32.8	−0.41	7.43	26.9	11.70	330
09/18/2002	04:00	24.79	363.00	0.24	52.30	4.34	32.8	−0.39	7.44	27.5	11.80	400
09/18/2002	04:30	24.75	362.00	0.24	52.30	4.34	31.6	−0.38	7.44	26.9	11.70	430
09/18/2002	05:00	24.71	361.00	0.24	52.30	4.34	32.8	−0.38	7.43	26.7	11.70	500
09/18/2002	05:30	24.68	361.00	0.24	52.30	4.35	32.8	−0.38	7.43	26.7	11.70	530
09/18/2002	06:00	24.65	360.00	0.23	52.30	4.35	31.6	−0.38	7.43	27.8	11.70	600
09/18/2002	06:30	24.63	361.00	0.23	52.20	4.34	32.8	−0.39	7.43	27.7	11.70	630
09/18/2002	07:00	24.62	361.00	0.23	52.10	4.33	31.6	−0.40	7.43	27.8	11.70	700
09/18/2002	07:30	24.60	361.00	0.23	52.00	4.33	31.6	−0.41	7.42	34	11.70	730
09/18/2002	08:00	24.60	361.00	0.23	52.10	4.34	31.6	−0.43	7.41	35.1	11.70	800
09/18/2002	08:30	24.61	361.00	0.24	52.20	4.34	31.6	−0.45	7.41	29.8	11.70	830
09/18/2002	09:00	24.66	361.00	0.24	52.50	4.36	31.6	−0.59	7.41	29.9	11.70	900
09/18/2002	09:30	24.73	362.00	0.24	53.10	4.40	32.8	−0.74	7.41	29.6	11.60	930
09/18/2002	10:00	24.87	362.00	0.24	54.00	4.47	32.8	−0.87	7.41	36	11.70	1000
09/18/2002	10:30	25.04	362.00	0.24	54.90	4.53	32.8	−1.00	7.4	109.9	11.70	1030
09/18/2002	11:00	25.18	363.00	0.24	56.50	4.65	32.8	−1.13	7.41	38.1	11.70	1100
09/18/2002	11:30	25.23	363.00	0.24	57.70	4.75	32.8	−1.20	7.4	34.7	11.70	1130
09/18/2002	12:00	25.40	363.00	0.24	59.20	4.85	32.8	−1.25	7.41	34	11.70	1200
09/18/2002	12:30	25.64	363.00	0.24	61.20	5.00	32.8	−1.32	7.43	31.4	11.70	1230
09/18/2002	13:00	25.95	333.00	0.22	63.80	5.18	33.4	−1.45	7.44	29.2	11.70	1300
09/18/2002	13:30	26.29	212.00	0.14	66.60	5.37	33.4	−1.53	7.47	35.7	11.70	1330
09/18/2002	14:00	26.47	194.00	0.13	68.30	5.49	33.4	−1.60	7.48	26.6	11.70	1400
09/18/2002	14:30	26.50	192.00	0.13	68.80	5.53	33.4	−1.68	7.47	26.4	11.70	1430
09/18/2002	15:00	26.63	194.00	0.13	69.30	5.56	33.4	−1.71	7.46	25	11.70	1500
09/18/2002	15:30	26.65	185.00	0.12	68.80	5.52	33.4	−1.75	7.46	25	11.70	1530
09/18/2002	16:00	26.60	39.00	0.03	67.80	5.45	33.4	−1.69	7.47	24.4	11.70	1600
09/18/2002	16:30	26.59	2.00	0.00	67.20	5.39	33.4	−1.69	7.47	25.8	11.70	1630
09/18/2002	17:00	26.70	0.00	0.00	66.20	5.31	33.4	−1.71	7.48	25.7	11.70	1700
09/18/2002	17:30	26.54	0.00	0.00	64.80	5.19	33.4	−1.70	7.47	24.9	11.70	1730
09/18/2002	18:00	26.54	0.00	0.00	62.90	5.05	33.4	−1.56	7.43	24.6	11.70	1800
09/18/2002	18:30	26.40	0.00	0.00	61.10	4.92	32.8	−1.39	7.43	25.3	11.70	1830
09/18/2002	19:00	26.36	356.00	0.23	58.80	4.74	32.8	−1.03	7.37	26.3	11.60	1900
09/18/2002	19:30	26.24	355.00	0.23	57.20	4.62	32.8	−0.88	7.39	26.9	11.60	1930
09/18/2002	20:00	26.13	353.00	0.23	55.70	4.51	32.8	−0.78	7.39	27.1	11.70	2000
09/18/2002	20:30	26.03	351.00	0.23	54.50	4.41	32.8	−0.69	7.39	26.4	11.70	2030
09/18/2002	21:00	25.95	349.00	0.23	53.40	4.34	32.8	−0.63	7.39	27.2	11.70	2100
09/18/2002	21:30	25.87	346.00	0.23	52.50	4.26	32.8	−0.58	7.38	28.6	11.70	2130
09/18/2002	22:00	25.80	344.00	0.22	51.50	4.19	31.6	−0.57	7.37	29.3	11.70	2200
09/18/2002	22:30	25.71	342.00	0.22	50.70	4.13	31.6	−0.54	7.37	30.3	11.70	2230
09/18/2002	23:00	25.63	339.00	0.22	50.00	4.08	31.6	−0.54	7.36	31	11.70	2300
09/18/2002	23:30	25.56	337.00	0.22	49.40	4.04	31.6	−0.55	7.36	31.4	11.70	2330
09/19/2002	00:00	25.49	334.00	0.22	48.90	4.00	31.6	−0.60	7.34	36	11.60	2400
09/19/2002	00:30	25.44	331.00	0.22	48.40	3.97	31.5	−0.63	7.35	31.8	11.60	30
09/19/2002	01:00	25.40	328.00	0.21	48.10	3.94	31.5	−0.64	7.34	31.8	11.70	100
09/19/2002	01:30	25.37	325.00	0.21	47.80	3.92	31.5	−0.63	7.34	34.1	11.60	130
09/19/2002	02:00	25.33	322.00	0.21	47.60	3.91	31.5	−0.60	7.33	32.5	11.70	200
09/19/2002	02:30	25.31	318.00	0.21	47.50	3.90	31.5	−0.57	7.33	41.9	11.60	230
09/19/2002	03:00	25.28	315.00	0.21	47.40	3.90	31.6	−0.53	7.33	32.4	11.60	300
09/19/2002	03:30	25.25	311.00	0.20	47.40	3.89	31.6	−0.50	7.32	34.6	11.60	330
09/19/2002	04:00	25.22	308.00	0.20	47.30	3.89	31.6	−0.48	7.32	34.7	11.60	400
09/19/2002	04:30	25.18	304.00	0.20	47.30	3.90	31.6	−0.46	7.32	35.5	11.60	430
09/19/2002	05:00	25.14	300.00	0.20	47.40	3.90	31.6	−0.43	7.31	35.1	11.60	500
09/19/2002	05:30	25.10	297.00	0.19	47.50	3.92	31.6	−0.41	7.3	34.3	11.60	530
09/19/2002	06:00	25.06	293.00	0.19	47.60	3.93	31.6	−0.38	7.29	34.9	11.50	600
09/19/2002	06:30	25.02	289.00	0.19	47.60	3.93	31.6	−0.37	7.28	33.6	11.50	630
09/19/2002	07:00	25.06	285.00	0.19	47.40	3.92	31.6	−0.37	7.27	34.5	11.50	700
09/19/2002	07:30	24.98	281.00	0.18	47.40	3.92	31.6	−0.38	7.27	36.3	11.50	730
09/19/2002	08:00	24.97	278.00	0.18	47.40	3.92	31.6	−0.40	7.26	35.8	11.50	800
09/19/2002	08:30	24.99	274.00	0.18	47.60	3.93	31.6	−0.45	7.26	35	11.60	830
09/19/2002	09:00	25.06	271.00	0.18	47.80	3.95	31.6	−0.53	7.26	34.6	11.60	900
09/19/2002	09:30	25.15	267.00	0.17	48.40	3.99	31.6	−0.63	7.27	33.8	11.60	930
09/19/2002	10:00	25.24	263.00	0.17	49.30	4.05	31.6	−0.73	7.26	34.1	11.60	1000
09/19/2002	10:30	25.36	262.00	0.17	50.40	4.13	31.6	−0.81	7.27	33.9	11.60	1030
09/19/2002	11:00	25.44	260.00	0.17	51.30	4.20	31.6	−0.89	7.27	33.8	11.60	1100
09/19/2002	11:30	25.57	259.00	0.17	52.30	4.27	31.6	−0.95	7.28	34.3	11.60	1130
09/19/2002	12:00	25.68	257.00	0.17	53.50	4.36	31.6	−1.03	7.28	33.8	11.60	1200
09/19/2002	12:30	25.87	257.00	0.17	55.40	4.50	31.6	−1.12	7.3	33.7	11.60	1230
09/19/2002	13:00	26.01	256.00	0.17	56.90	4.62	32.8	−1.22	7.3	33	11.60	1300
09/19/2002	13:30	26.12	256.00	0.17	58.70	4.75	32.8	−1.30	7.3	32.1	11.60	1330
09/19/2002	14:00	26.14	255.00	0.17	59.20	4.80	32.8	−1.34	7.29	32	11.60	1400
09/19/2002	14:30	26.15	255.00	0.17	59.20	4.79	32.80	−1.32	7.28	31.60	11.60	1430
09/19/2002	15:00	26.2	255	0.166	59.1	4.77	32.8	−1.236	7.27	34.7	11.6	1500
09/19/2002	15:30	26.27	255.00	0.17	59.10	4.77	32.80	−1.22	7.26	33.20	11.60	1530
09/19/2002	16:00	26.32	256.00	0.17	59.20	4.77	32.80	−1.26	7.26	34.30	11.60	1600
09/19/2002	16:30	26.37	257.00	0.17	59.00	4.75	32.80	−1.29	7.29	34.20	11.60	1630
09/19/2002	17:00	26.39	257	0.167	58.5	4.71	32.8	−1.314	7.26	33.2	11.6	1700
	Max	26.70	389.00	0.25	69.30	5.56	33.40	−0.37	7.69	109.90	11.90	
	Avg	25.51	308.40	0.20	54.78	4.48	32.46	−0.80	7.38	31.36	11.70	
	Min	24.63	0.00	0.00	47.30	3.89	31.60	−1.75	7.26	24.40	11.60	

Fig ,DO & Temp@ Bogue Chitta Ck Sta., Bogue-4.8
Big Black River Low Flow Study, Sep 2002
Canton, Mississippi



bogue4do.drw

Table
2002 Diel Water Quality Station Bogue-4.8
Bogue Chitta Creek – Canton, Mississippi
September 16–20, 2002

Date m/d/y	Time hh:mm:ss	Temp C	SpCond uS/cm	TDS g/L	DOsat %	DO mg/L	DOchrg	Depth feet	pH	Turbid NTU	Battery volts
09/17/2002	15:00	25.72	226.00	0.15	28.20	2.30	44.5	-6.51	7.06	25	12.00
09/17/2002	15:30	25.74	226.00	0.15	28.10	2.29	44.5	-6.69	7.04	25.1	12.00
09/17/2002	16:00	25.79	226.00	0.15	28.70	2.34	44.5	-6.69	7.04	25.1	12.00
09/17/2002	16:30	25.81	226.00	0.15	28.90	2.35	44.5	-6.63	7.05	24.6	12.00
09/17/2002	17:00	25.79	226.00	0.15	28.10	2.29	43.9	-6.41	7.04	25.2	12.00
09/17/2002	17:30	25.79	226.00	0.15	27.70	2.26	43.9	-6.27	7.04	25.8	12.00
09/17/2002	18:00	25.76	226.00	0.15	27.60	2.25	43.9	-6.12	7.05	26	12.00
09/17/2002	18:30	25.76	226.00	0.15	27.80	2.27	43.9	-5.93	7.05	25.3	12.00
09/17/2002	19:00	25.72	226.00	0.15	27.80	2.27	43.9	-5.81	7.05	26.5	12.00
09/17/2002	19:30	25.71	226.00	0.15	28.10	2.29	44.5	-5.77	7.06	25.2	12.00
09/17/2002	20:00	25.67	226.00	0.15	27.70	2.26	43.9	-5.73	7.05	25.7	12.00
09/17/2002	20:30	25.63	226.00	0.15	27.60	2.25	43.9	-5.67	7.06	25	12.00
09/17/2002	21:00	25.59	226.00	0.15	27.30	2.23	43.9	-5.63	7.05	24.9	12.00
09/17/2002	21:30	25.56	226.00	0.15	27.60	2.25	43.9	-5.61	7.05	25.2	12.00
09/17/2002	22:00	25.52	226.00	0.15	27.30	2.23	43.9	-5.58	7.05	25	11.90
09/17/2002	22:30	25.49	226.00	0.15	27.20	2.23	43.9	-5.57	7.05	25.2	12.00
09/17/2002	23:00	25.45	227.00	0.15	26.80	2.20	43.9	-5.57	7.05	25.2	11.90
09/17/2002	23:30	25.42	227.00	0.15	26.40	2.16	43.9	-5.57	7.05	24.9	11.90
09/18/2002	00:00	25.39	227.00	0.15	25.80	2.12	43.9	-5.53	7.05	26.3	11.90
09/18/2002	00:30	25.36	227.00	0.15	25.10	2.06	43.9	-5.53	7.04	25.7	11.90
09/18/2002	01:00	25.32	227.00	0.15	24.60	2.02	43.9	-5.50	7.03	26.7	11.90
09/18/2002	01:30	25.29	227.00	0.15	23.70	1.94	43.9	-5.47	7.03	34.5	11.90
09/18/2002	02:00	25.25	228.00	0.15	22.80	1.87	43.9	-5.40	7.03	31.4	11.90
09/18/2002	02:30	25.22	228.00	0.15	22.20	1.83	43.9	-5.34	7.03	32.1	11.90
09/18/2002	03:00	25.19	229.00	0.15	21.90	1.80	43.9	-5.28	7.03	32	11.90
09/18/2002	03:30	25.15	229.00	0.15	21.80	1.79	43.9	-5.24	7.03	30.1	11.90
09/18/2002	04:00	25.12	230.00	0.15	21.60	1.78	43.9	-5.22	7.02	28.2	11.90
09/18/2002	04:30	25.08	230.00	0.15	21.90	1.80	43.9	-5.19	7.03	29.1	11.80
09/18/2002	05:00	25.04	230.00	0.15	22.60	1.87	43.9	-5.19	7.03	28.7	11.80
09/18/2002	05:30	25.00	231.00	0.15	24.00	1.98	43.9	-5.18	7.04	28.6	11.80
09/18/2002	06:00	24.99	231.00	0.15	25.80	2.13	43.9	-5.18	7.04	28	11.80
09/18/2002	06:30	24.99	231.00	0.15	27.40	2.26	43.9	-5.19	7.05	30.7	11.80
09/18/2002	07:00	25.01	231.00	0.15	28.00	2.31	43.9	-5.19	7.06	31.6	11.80
09/18/2002	07:30	25.04	231.00	0.15	28.80	2.38	43.9	-5.21	7.07	28.6	11.80
09/18/2002	08:00	25.07	231.00	0.15	29.10	2.40	43.9	-5.26	7.07	28	11.80
09/18/2002	08:30	25.10	232.00	0.15	29.40	2.42	43.9	-5.31	7.08	28	11.80
09/18/2002	09:00	25.14	232.00	0.15	29.80	2.45	43.9	-5.47	7.08	28.5	11.80
09/18/2002	09:30	25.18	232.00	0.15	30.10	2.48	43.9	-5.63	7.08	30.9	11.80
09/18/2002	10:00	25.23	233.00	0.15	30.90	2.54	44.5	-5.70	7.08	30	11.80
09/18/2002	10:30	25.31	234.00	0.15	32.70	2.68	44.5	-5.86	7.09	28.5	11.80
09/18/2002	11:00	25.32	234.00	0.15	34.60	2.84	44.5	-6.07	7.1	30.3	11.80
09/18/2002	11:30	25.40	235.00	0.15	37.20	3.05	44.5	-6.52	7.11	30	11.80
09/18/2002	12:00	25.47	236.00	0.15	39.40	3.22	44.5	-6.57	7.14	29.4	11.80
09/18/2002	12:30	25.49	236.00	0.15	40.60	3.32	44.5	-6.51	7.15	28.4	11.80
09/18/2002	13:00	25.61	237.00	0.15	41.60	3.40	45.7	-7.14	7.15	29.6	11.80
09/18/2002	13:30	25.70	238.00	0.16	42.00	3.42	45.7	-7.00	7.16	28	11.80
09/18/2002	14:00	25.79	238.00	0.16	42.80	3.48	45.7	-6.84	7.16	27.9	11.80
09/18/2002	14:30	25.81	239.00	0.16	42.50	3.45	45.7	-6.80	7.16	30.6	11.80
09/18/2002	15:00	25.84	240.00	0.16	42.60	3.46	45.7	-6.72	7.17	27.7	11.80
09/18/2002	15:30	25.94	240.00	0.16	42.70	3.47	45.7	-7.15	7.17	29.1	11.80
09/18/2002	16:00	26.00	241.00	0.16	42.80	3.47	45.7	-6.80	7.16	28.1	11.80
09/18/2002	16:30	26.12	242.00	0.16	43.20	3.49	44.5	-6.73	7.17	28.9	11.80
09/18/2002	17:00	26.10	242.00	0.16	42.50	3.44	45.7	-6.46	7.16	27	11.80
09/18/2002	17:30	26.12	243.00	0.16	42.60	3.45	45.7	-6.13	7.16	25.8	11.80
09/18/2002	18:00	26.08	243.00	0.16	42.20	3.42	45.7	-5.84	7.16	25.5	11.80
09/18/2002	18:30	26.04	244.00	0.16	41.70	3.38	45.7	-5.72	7.16	25.8	11.80
09/18/2002	19:00	26.02	244.00	0.16	41.30	3.35	45.7	-5.52	7.16	28.8	11.80
09/18/2002	19:30	26.02	245.00	0.16	41.20	3.34	45.7	-5.37	7.16	25.1	11.70
09/18/2002	20:00	26.03	245.00	0.16	41.40	3.35	45.7	-5.27	7.16	24.3	11.80
09/18/2002	20:30	26.04	245.00	0.16	41.60	3.37	45.7	-5.20	7.15	24.5	11.70
09/18/2002	21:00	26.06	246.00	0.16	41.90	3.39	45.7	-5.13	7.15	24.5	11.70
09/18/2002	21:30	26.09	246.00	0.16	42.00	3.40	45.7	-5.12	7.17	26.5	11.70
09/18/2002	22:00	26.11	247.00	0.16	42.40	3.44	45.7	-5.11	7.15	23	11.70
09/18/2002	22:30	26.13	247.00	0.16	42.50	3.44	45.7	-5.10	7.16	23.5	11.70
09/18/2002	23:00	26.16	248.00	0.16	42.60	3.44	45.7	-5.12	7.18	23.8	11.70
09/18/2002	23:30	26.19	248.00	0.16	42.50	3.44	45.7	-5.20	7.18	22.8	11.70
09/19/2002	00:00	26.21	248.00	0.16	42.40	3.43	45.7	-5.26	7.18	24.2	11.70
09/19/2002	00:30	26.23	249.00	0.16	42.00	3.39	45.7	-5.26	7.17	24.1	11.70
09/19/2002	01:00	26.24	250.00	0.16	41.50	3.35	45.7	-5.28	7.18	24.7	11.70
09/19/2002	01:30	26.24	250.00	0.16	40.80	3.30	45.7	-5.25	7.18	26.4	11.70
09/19/2002	02:00	26.22	251.00	0.16	40.10	3.24	44.5	-5.21	7.17	22.6	11.70
09/19/2002	02:30	26.20	251.00	0.16	39.20	3.16	44.5	-5.18	7.17	379.7	11.70
09/19/2002	03:00	26.17	251.00	0.16	38.50	3.11	44.5	-5.12	7.16	23	11.70
09/19/2002	03:30	26.13	252.00	0.16	37.80	3.06	44.5	-5.09	7.16	22	11.70
09/19/2002	04:00	26.08	253.00	0.16	37.10	3.01	44.5	-5.06	7.15	23.6	11.70
09/19/2002	04:30	26.03	253.00	0.16	36.40	2.95	44.5	-5.04	7.15	21.9	11.70
09/19/2002	05:00	25.98	254.00	0.17	36.00	2.92	44.5	-5.02	7.15	21.6	11.70
09/19/2002	05:30	25.92	254.00	0.17	35.40	2.87	44.5	-4.99	7.15	22.8	11.70
09/19/2002	06:00	25.86	255.00	0.17	35.00	2.84	44.5	-4.95	7.15	21.6	11.70
09/19/2002	06:30	25.81	256.00	0.17	34.50	2.81	44.5	-4.94	7.15	21.7	11.70
09/19/2002	07:00	25.76	256.00	0.17	34.00	2.77	44.5	-4.96	7.15	22.5	11.70
09/19/2002	07:30	25.71	257.00	0.17	33.80	2.75	44.5	-5.01	7.15	22.4	11.60
09/19/2002	08:00	25.67	258.00	0.17	33.30	2.72	44.5	-5.02	7.15	23.5	11.60
09/19/2002	08:30	25.64	258.00	0.17	33.10	2.70	44.5	-5.12	7.15	23.4	11.60
09/19/2002	09:00	25.65	259.00	0.17	33.30	2.71	44.5	-5.33	7.15	23.6	11.60
09/19/2002	09:30	25.69	260.00	0.17	33.30	2.72	44.5	-5.54	7.13	23.6	11.60
09/19/2002	10:00	25.69	260.00	0.17	33.60	2.74	44.5	-5.64	7.14	24.2	11.60
09/19/2002	10:30	25.73	261.00	0.17	34.00	2.77	44.5	-5.74	7.16	24.1	11.60
09/19/2002	11:00	25.73	262.00	0.17	34.10	2.78	44.5	-5.81	7.16	22.7	11.70
09/19/2002	11:30	25.75	262.00	0.17	34.70	2.82	44.5	-6.00	7.16	23.2	11.70
09/19/2002	12:00	25.86	263.00	0.17	35.70	2.90	44.5	-6.28	7.17	22.7	11.70
09/19/2002	12:30	25.93	264.00	0.17	35.40	2.87	44.5	-6.35	7.17	22.7	11.70
09/19/2002	13:00	26.01	265.00	0.17	36.70	2.98	44.5	-6.60	7.17	22.5	11.70
09/19/2002	13:30	26.03	265.00	0.17	36.30	2.94	44.5	-6.19	7.17	21.7	11.70
09/19/2002	14:00	26.03	266.00	0.17	36.80	2.98	44.5	-6.10	7.17	21.7	11.70
09/19/2002	14:30	26.06	266.00	0.17	37.10	3.00	44.50	-6.13	7.17	22.00	11.70
09/19/2002	15:00	26.08	267	0.174	37.3	3.02	44.5	-6.027	7.18	21.4	11.7
09/19/2002	15:30	26.08	267.00	0.17	37.30	3.02	44.50	-6.03	7.18	21.10	11.70
09/19/2002	16:00	26.06	268.00	0.17	36.40	2.95	44.50	-5.98	7.17	21.10	11.70
09/19/2002	16:30	26.09	268.00	0.17	36.90	2.99	44.50	-6.00	7.18	20.80	11.70
09/19/2002	17:00	26.09	269	0.175	36.4	2.95	44.5	-5.914	7.17	21.6	11.7
09/19/2002	17:30	26.08	269	0.175	36.2	2.93	44.5	-5.782	7.17	20.6	11.6
	Max	26.24	269.00	0.18	43.20	3.49	45.70	-4.94	7.18	379.70	12.00
	Avg	25.72	242.68	0.16	34.00	2.77	44.60	-5.70	7.12	29.22	11.79
	Min	24.99	226.00	0.15	21.60	1.78	43.90	-7.15	7.02	20.60	11.60

Water Column Radient Energy & Chlorophyll a Profile Data
Station Bogue 21.1
Bogue Chitto Creek
Canton, MS
September 18-20, 2002

Station	Date	Time	Depth (feet)	Ambient Light (microeinstein)	Profile Light (microeinstein)	Light Transmission %	Light Extinction Coefficient (1/ft)	Chlorophyll a (ug/l)
Bogue 21.1	09/19/2002	955	0.1	36000	8500	23.6	14.43	
			0.5	14000	3200	22.9	2.95	2.6
			1	33000	2800	8.5	2.47	2.3
			1.5	37000	1700	4.6	2.05	2.1

Water Column Radient Energy & Chlorophyll a Profile Data
Station Bogue 11.0
Bogue Chitto Creek
Canton, MS
September 18-20, 2002

Station	Date	Time	Depth (feet)	Ambient Light (microeinstein)	Profile Light (microeinstein)	Light Transmission %	Light Extinction Coefficient (1/ft)	Chlorophyll a (ug/l)
Bogue 11.0	09/18/2002	1415	0.1	17000	13000	76.5	2.68	
			0.5	17000	5800	34.1	2.15	3
			0.75					

02BBR-lb.wk3

Big Black River
Canton, Mississippi
September 19, 2002

Station	Time	NH3 mg/l	NO2-NO3 mg/l	TKN mg/l	Total N mg/l	Total Dis P mg/l	Total P mg/l	TOC mg/l
Main Stem								
BBR 133.3	1030	0.05 u	0.05 u	0.59	0.64	0.030	0.050	3.7
BBR 123.1	1230	0.10	0.05 u	0.46	0.51	0.310	0.050	4
BBR 114.6	1325	0.05 u	0.05 u	0.66	0.71	0.070	0.140	4.1
BBR 108.0	1150	0.10	0.05 u	0.72	0.77	0.080	0.070	3.8
BBR 105.0	1218	0.10	0.05 u	0.64	0.69	0.140	0.080	3.8
BBR 96.0	1249	0.10	0.06	0.70	0.76	0.100	0.060	4.2
BBR 86.9	1330	0.07 u	0.05 u	0.58	0.63	0.120	0.070	4.2
Tributaries								
Pepper 2.9	955	0.05 u	0.05 u	0.46	0.51	0.060 0	0.060	3
Bear 4.8	1045	0.05 u	0.05	0.93	0.98	0.170	0.190	8.7
Panther 1.6	1125	0.66	0.24	1.54	1.78	0.260	0.040	11.3
Cypress 2.1	1245	0.10	0.05 u	0.90	0.95	0.140	0.190	9.1
Bogue Chitto 21.1	947	0.05 u	4.28	1.35	5.63	0.755	0.890	7.7
Bogue Chitto 11.0	1030	0.05 u	0.10	0.85	0.95	0.140	0.240	9.4
Bogue Chitto 4.8	1213	0.05 u	0.09	0.90	0.99	0.120	0.160	9

u denotes material was analyzed for but not detected. The number is the minimum quantitation limit

02BBRULT.wk3

Biochemical Oxygen Demand Results
Big Black River
Canton, Mississippi
September 18, 2002

Station	Measured TBOD mg/l	Regressed TBOD mg/l	Regressed NBOD mg/l	Nitrogenous decay rate 1/day	Regressed CBOD mg/l	Carbonaceous decay rate 1/day	f ratio CBODult:CBOD5
Main Stem							
BBR 133.3	6.24	6.40	0.80	0.15	5.60	0.06	3.65
BBR 123.1	7.12	7.20	1.00	0.12	6.20	0.06	3.63
BBR 114.6	7.61	7.80	1.00	0.09	6.80	0.06	3.38
BBR 108.0	8.07	8.30	1.20	0.16	7.10	0.06	3.87
BBR 105.0	7.62	7.70	1.20	0.14	6.50	0.06	4.33
BBR 96.0	9.80	9.80	1.60	0.18	8.20	0.06	3.98
BBR 86.9	8.50	8.70	1.20	0.16	7.50	0.06	3.85
Tributaries							
Pepper 2.9	4.78	4.90	0.50	0.08	4.40	0.07	3.07
Bear 4.8	10.44	10.70	1.30	0.13	9.40	0.04	6.69
Panther 1.6	15.69	16.60	2.60	0.30	14.00	0.03	6.82
Cypress 2.1	6.54	7.50	0.70	0.06	6.80	0.02	8.17
Bogue Chitto 21.1	12.88	13.30	2.30	0.18	11.00	0.05	5.27
Bogue Chitto 11.0	7.49	8.70	0.80	0.06	7.90	0.02	8.41
Bogue Chitto 4.8	8.33	9.70	0.90	0.06	8.80	0.02	9.24
Point Sources							
West Madison WWTP3		128.30	70.00		58.30		
Flora WWTP5		36.60	8.60		28.00		
Bentonia WWTP4		95.60	65.50		30.10		
Presidential Hills WWTP1		36.00	10.00		26.00		
Clinton Briars WWTP2		8.40	0.00		8.40		

BODCALC2.wk3

Long Term Bod Calculation
Big Black River NPDES Discharges
Canton, Mississippi
September 2002

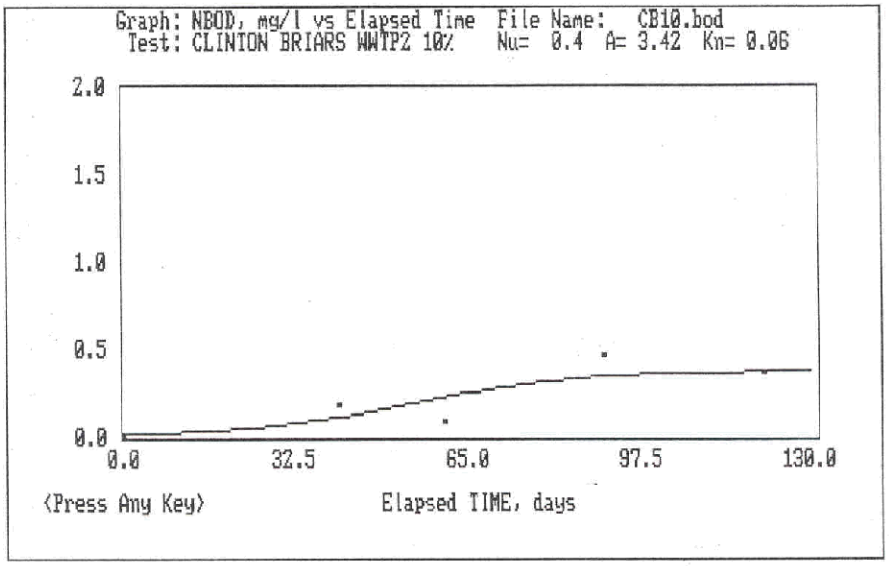
Station	Description	Dillution	Regressed CBOD ult mg/l	Corrected for dillution CBOD ult mg/l	Regressed NBOD ult mg/l	Corrected for dillution NBOD ult mg/l	Corrected for dillution TBOD ult mg/l
WWTP-1	Jackson POTW - Presedential Hills	0.10	7.6	25.6	1.8	10.8	36.4
WWTP-1	Jackson POTW - Presedential Hills	0.25	10.8	26.4	2.9	9.2	35.6
WWTP-2	Clinton Briars Biolac	0.10	6.0	9.6	0.4	0.0	9.6
WWTP-2	Clinton Briars Biolac	0.25	6.0	7.2	0.4	0.0	7.2
WWTP-3	West Madison Utilities District	0.10	10.9	56.6	7.6	68.8	127.4
WWTP-3	West Madison Utilities District	0.25	18.7	58.0	18.4	71.2	129.2
WWTP-4	Bentonia POTW	0.10	7.9	28.6	7.3	65.8	94.4
WWTP-4	Bentonia POTW	0.25	12.1	31.6	16.9	65.2	96.8
WWTP-5	Flora POTW	0.10	7.6	25.6	1.6	8.8	34.4
WWTP-5	Flora POTW	0.25	11.8	30.4	2.7	8.4	38.8

CBOD Ultimate demand of Dilution H2O was 5.6 mg/l
NBOD Ultimate demand of Dilution H2O was 0.8 mg/l

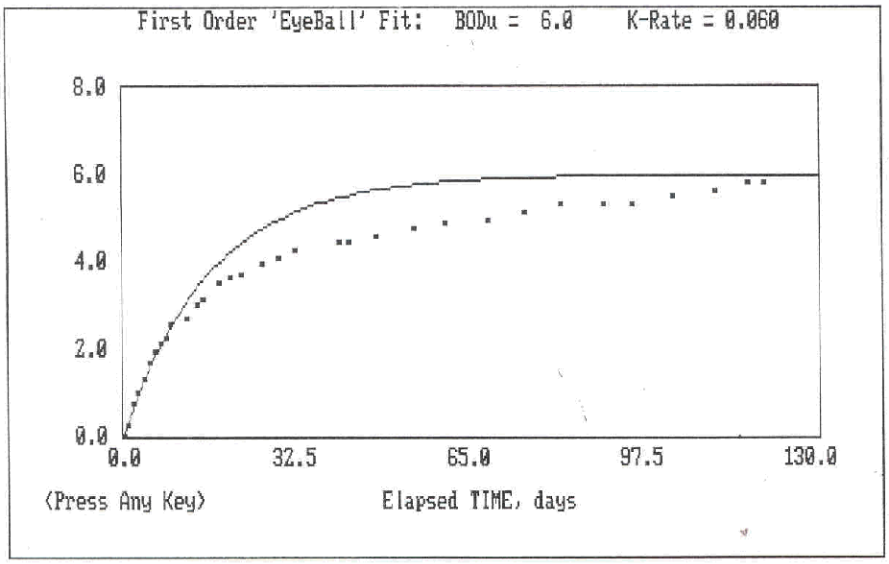
Nutrient, Carbon and Ultimate BOD Loading Results
Big Black River
Canton, Mississippi
September 18, 2002

Station		Flow cfs	Time	CDOD mg/l	CDOD lb/day	NH3 mg/l	NH3 lb/day	NO2-NO3 mg/l	NO2-NO3 lb/day	TKN mg/l	TKN lb/day	Total N mg/l	Total N lb/day	Total Dis P mg/l	Total Dis P lb/day	Total P mg/l	Total P lb/day	TOC mg/l	TOC lb/day
Main Stem																			
BBR 133.3	b	112	1230	5.6	3381	0.05 u	30 u	0.05 u	30 u	0.48	290	0.53	320	0.040	24	0.050	30	4.2	2534
BBR 123.1	c	121	1445	6.2	4044	0.07	46	0.05 u	33 u	0.52	339	0.57	372	0.060	39	0.060	39	4	2608
BBR 114.6	c	121	1550	6.8	4436	0.05 u	33 u	0.05 u	33 u	0.56	365	0.61	398	0.050	33	0.080	52	4.2	2738
BBR 109.0	c	121	1307	7.1	4631	0.05 u	33 u	0.05 u	33 u	0.56	365	0.61	398	0.040	26	0.070	46	4	2608
BBR 105.0	b	121	1344	6.5	4240	0.21	137	0.05 u	33 u	0.45	293	0.50	326	0.080	52	0.030	20	4.3	2803
BBR 96.0	a	134	1443	8.2	5923	0.05 u	36 u	0.12	87	0.82	592	0.94	679	0.030	22	0.040	29	4.6	3321
BBR 86.9	c	148	1538	7.5	5903	0.05 u	39 u	0.05 u	39 u	0.56	440	0.61	480	0.100	79	0.100	79	4.1	3225
Tributaries																			
Pepper 2.9	a	0.01	1130	4.4	0	0.05 u	0 u	0.05 u	0 u	0.37	0	0.42	0	0.040	0	0.050	0	3.2	0
Bear 4.8	c	0.19	1330	9.4	10	0.05 u	0 u	0.05	0 u	0.89	1	0.94	1	0.090	0	0.170	0	9.1	9
Panther 1.6	a	0.01	1410	14	1	0.47 u	0 u	0.11	0	1.53	0	1.64	0	0.060	0	0.060	0	4	0
Cypress 2.1	a	0.01	1525	6.6	0	0.07 u	0 u	0.05 u	0 u	0.83	0	0.88	0	0.180	0	0.170	0	9.2	0
Bogue Chitto 21.1	a	0.33	1054	11	20	0.05 u	0 u	6.01	11	1.59	3	7.60	14	0.950	2	1.080	2	7.5	13
Bogue Chitto 11.0	a	3.34	1148	7.9	142	0.05 u	1 u	0.05 u	1 u	0.72	13	0.77	14	0.090	2	0.200	4	8.1	146
Bogue Chitto 4.8	c	5.4	1213	8.8	256	0.05 u	1 u	0.07	2	0.91	26	0.98	29	0.050	1	0.030	1	8.8	256
Point Sources																			
West Madison WWTP3	e	0.0945	1145-1145	58.3	30	16.10	8	0.05 u	0 u	21.20	11	21.25	11	2.060	1	2.060	1	25.1	13
Flora WWTP4	e	0.0543	1145-1145	28.0	8	0.66	0	1.96	1	4.38	1	6.34	2	3.470	1	3.500	1	22.8	7
Bentonia WWTP5	e	0.0093	1230-1230	30.1	2	16.40	1	6.90	0	1.60	0	8.50	0	1.900	0	2.100	0	8.9	0
Presidential Hills WWTP1	e	0.0124	1315-1315	26.0	2	1.32	0	2.63	0	3.82	0	6.85	0	1.110	0	1.220	0	15.6	1
Clinton Briars WWTP2	e	0.3224	1135-1135	8.4	15	0.05 u	0 u	18.7	32	0.33	1	19.03	33	2.650	5	2.810	5	8.5	11

a = Flow was estimated by field personnel
b = Instantaneous flow was measured at USGS gage
c = Flow was measured by field personnel
e = Flow was measured by facility flow device
u denotes material was analyzed for but not detected. The number is the minimum quantitation limit



NBODU – Logistics Fit by LTBOD Program



CBODU – 1st Order Fit

BIG BLACK RIVER
SEPT 2002
10% SAMPLE
SAMPLE ID: 8901

* * * PROCESSED LAB DATA * * *

10-15-2003 1:16 pm

DATA No.	DATE	TIME 24hr	DO mg/l	DOr mg/l	eTIME days	DO(t) mg/l	BOD(t) mg/l
1	19 Sep 2002	1732	8.45	-	0.00	8.45	0.00
2	20 Sep 2002	1417	8.22	-	0.86	8.22	0.23
3	21 Sep 2002	1307	7.71	-	1.82	7.71	0.74
4	22 Sep 2002	1239	7.48	-	2.80	7.48	0.97
5	23 Sep 2002	1602	7.15	-	3.94	7.15	1.30
6	24 Sep 2002	1726	6.76	-	5.00	6.76	1.69
7	25 Sep 2002	1704	6.52	-	5.98	6.52	1.93
8	26 Sep 2002	1540	6.32	-	6.92	6.32	2.13
9	27 Sep 2002	1728	6.21	-	8.00	6.21	2.24
10	28 Sep 2002	1030	5.89	-	8.71	5.89	2.56
11	01 Oct 2002	1527	5.72	-	11.91	5.72	2.73
12	03 Oct 2002	1627	5.42	-	13.95	5.42	3.03
13	04 Oct 2002	1604	5.29	-	14.94	5.29	3.16
14	07 Oct 2002	1415	4.93	-	17.86	4.93	3.52
15	09 Oct 2002	1523	4.82	-	19.91	4.82	3.63
16	11 Oct 2002	1604	4.72	-	21.94	4.72	3.73
17	15 Oct 2002	1423	4.45	-	25.87	4.45	4.00
18	18 Oct 2002	1511	4.30	-	28.90	4.30	4.15
19	21 Oct 2002	1634	4.12	-	31.96	4.12	4.33
20	29 Oct 2002	1615	3.90	-	39.95	3.90	4.55
21	31 Oct 2002	1430	3.92	-	41.87	3.92+	4.53
22	05 Nov 2002	1444	3.75	-	46.88	3.75	4.70
23	12 Nov 2002	1601	3.53	-	53.94	3.53	4.92
24	18 Nov 2002	1602	3.34	-	59.94	3.34	5.11
25	26 Nov 2002	1628	3.23	-	67.96	3.23	5.22
26	03 Dec 2002	1600	3.03	8.06	74.94	3.03	5.42
27	10 Dec 2002	1505	7.85	-	81.90	2.82	5.63
28	18 Dec 2002	1550	7.79	-	89.93	2.76	5.69
29	24 Dec 2002	0000	7.80	-	95.27	2.77+	5.68
30	31 Dec 2002	1412	7.59	-	102.86	2.56	5.89
31	08 Jan 2003	1346	7.46	-	110.84	2.43	6.02
32	14 Jan 2003	1533	7.31	-	116.92	2.28	6.17
33	17 Jan 2003	1500	7.26	-	119.89	2.23	6.22

(+) Observe DO Increases?? 2 Cases
NOTE: 5-Day BOD = 1.69 mg/l. Approx f-Ratio = 3.678
Test Name: CLINTON BRIARS WWTP2 10%
File Name: CB10

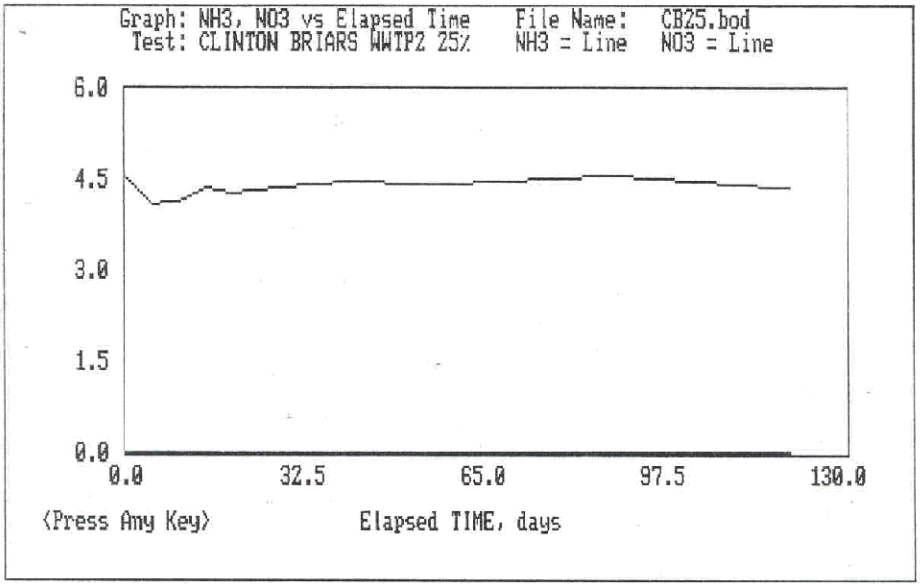
BIC BLACK RIVER
SEPT 2002
10% SAMPLE
SAMPLE ID: 8901

* * * NITROGEN SERIES DATA * * *

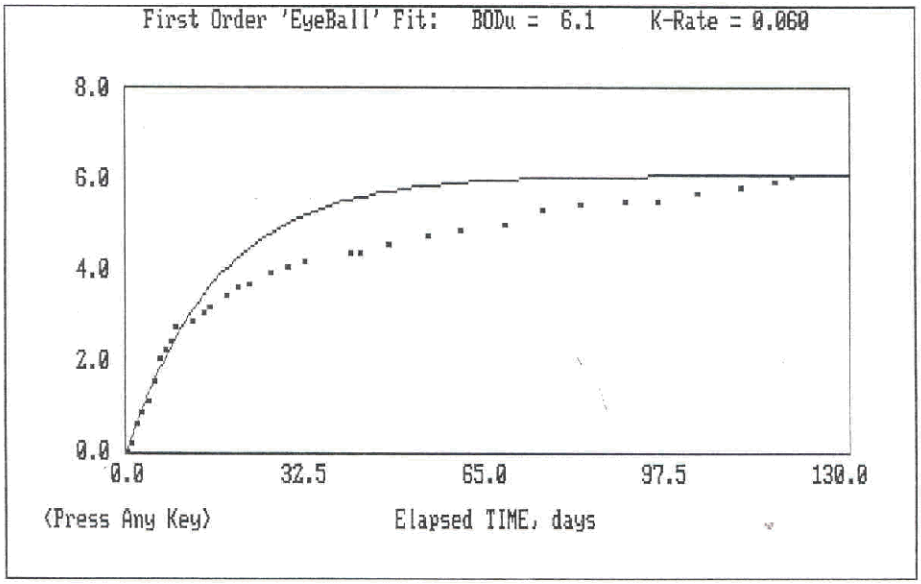
03-31-2003 9:58 am

DATA No.	MONTH	DAY	YEAR	TIME 24hr	eTIME days	TKN mg/l	NH3 mg/l	NO3 mg/l	NBODu (est)
1	09	19	2002	1732	0.00	0.00	0.00	1.82	0.000
2	09	24	2002	1726	5.00	0.00	0.00	1.63	-0.868
3	09	29	2002	1527	9.91	0.00	0.00	1.63	-0.868
4	10	04	2002	1604	14.94	0.00	0.00	1.70	-0.548
5	10	09	2002	1523	19.91	0.00	0.00	1.77	-0.229
6	10	18	2002	1511	28.90	0.00	0.00	1.81	-0.046
7	10	29	2002	1615	39.95	0.00	0.00	1.86	0.183
8	11	18	2002	1602	59.94	0.00	0.00	1.84	0.091
9	12	18	2002	1550	89.93	0.00	0.00	1.92	0.457
10	01	17	2003	1500	119.89	0.00	0.00	1.90	0.366

NOTE: Nitrogen Series Expressed as Nitrogen (N), mg/l.
Current Nitrogen to NBOD Conversion = 4.570
NBODu (est) = (NO3 - initial NO3) x 4.570
Test Name: CLINTON BRIARS WWTP2 10%
File Name: CB10



NO3/NH3 Data –
NBODU approx. 1 – 1.5 mg/l based on this data and CB10 NBODU



Total BODU – 1st Order Fit

BIG BLACK RIVER
SEPT 2002
25% SAMPLE
SAMPLE ID: 8901

* * * PROCESSED LAB DATA * * *

03-31-2003 10:11 am

DATA No.	DATE	TIME 24hr	DO mg/l	DOr mg/l	eTIME days	DO(t) mg/l	BOD(t) mg/l
1	19 Sep 2002	1737	8.13	-	0.00	8.13	0.00
2	20 Sep 2002	1421	7.95	-	0.86	7.95	0.18
3	21 Sep 2002	1309	7.52	-	1.81	7.52	0.61
4	22 Sep 2002	1241	7.25	-	2.79	7.25	0.88
5	23 Sep 2002	1604	7.03	-	3.94	7.03	1.10
6	24 Sep 2002	1725	6.58	-	4.99	6.58	1.55
7	25 Sep 2002	1706	6.06	-	5.98	6.06	2.07
8	26 Sep 2002	1542	5.88	-	6.92	5.88	2.25
9	27 Sep 2002	1729	5.70	-	7.99	5.70	2.43
10	28 Sep 2002	1032	5.39	-	8.70	5.39	2.74
11	01 Oct 2002	1529	5.27	-	11.91	5.27	2.86
12	03 Oct 2002	1629	5.05	-	13.95	5.05	3.08
13	04 Oct 2002	1606	4.95	-	14.94	4.95	3.18
14	07 Oct 2002	1417	4.68	-	17.86	4.68	3.45
15	09 Oct 2002	1525	4.52	-	19.91	4.52	3.61
16	11 Oct 2002	1605	4.44	-	21.94	4.44	3.69
17	15 Oct 2002	1426	4.21	-	25.87	4.21	3.92
18	18 Oct 2002	1514	4.07	-	28.90	4.07	4.06
19	21 Oct 2002	1635	3.93	-	31.96	3.93	4.20
20	29 Oct 2002	1617	3.73	-	39.94	3.73	4.40
21	31 Oct 2002	1432	3.75	-	41.87	3.75+	4.38
22	05 Nov 2002	1446	3.58	-	46.88	3.58	4.55
23	12 Nov 2002	1605	3.40	-	53.94	3.40	4.73
24	18 Nov 2002	1604	3.23	-	59.94	3.23	4.90
25	26 Nov 2002	1630	3.10	8.31	67.95	3.10	5.03
26	03 Dec 2002	1607	8.04	-	74.94	2.83	5.30
27	10 Dec 2002	1507	7.90	-	81.90	2.69	5.44
28	18 Dec 2002	1552	7.83	-	89.93	2.62	5.51
29	24 Dec 2002	1328	7.84	-	95.83	2.63+	5.50
30	31 Dec 2002	1414	7.65	-	102.86	2.44	5.69
31	08 Jan 2003	1348	7.52	-	110.84	2.31	5.82
32	14 Jan 2003	1535	7.38	-	116.92	2.17	5.96
33	17 Jan 2003	1503	7.27	-	119.89	2.06	6.07

(+) Observe DO Increases?? 2 Cases
NOTE: 5-Day BOD = 1.55 mg/l. Approx f-Ratio = 3.905
Test Name: CLINTON BRIARS WWTP2 25%
File Name: CB25

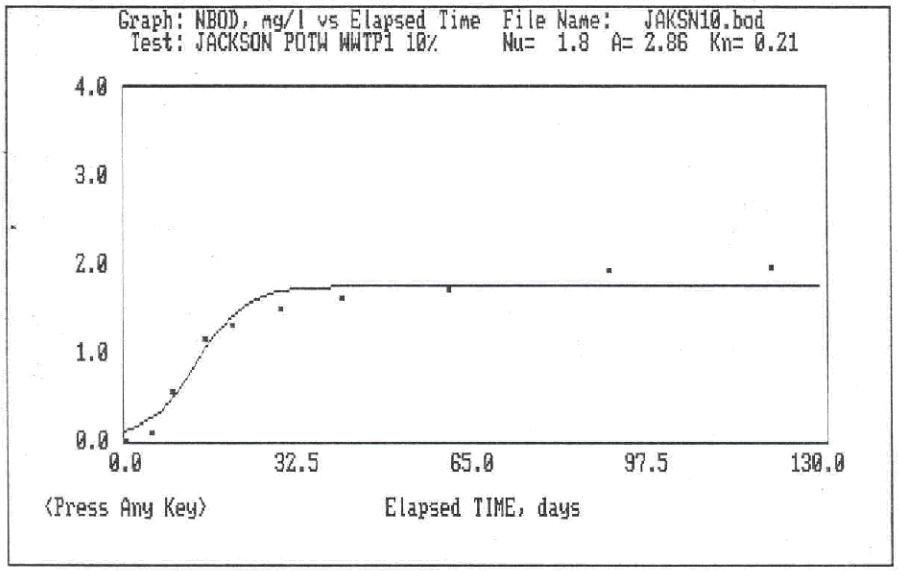
BIG BLACK RIVER
SEPT 2002
25% SAMPLE
SAMPLE ID: 8901

* * * NITROGEN SERIES DATA * * *

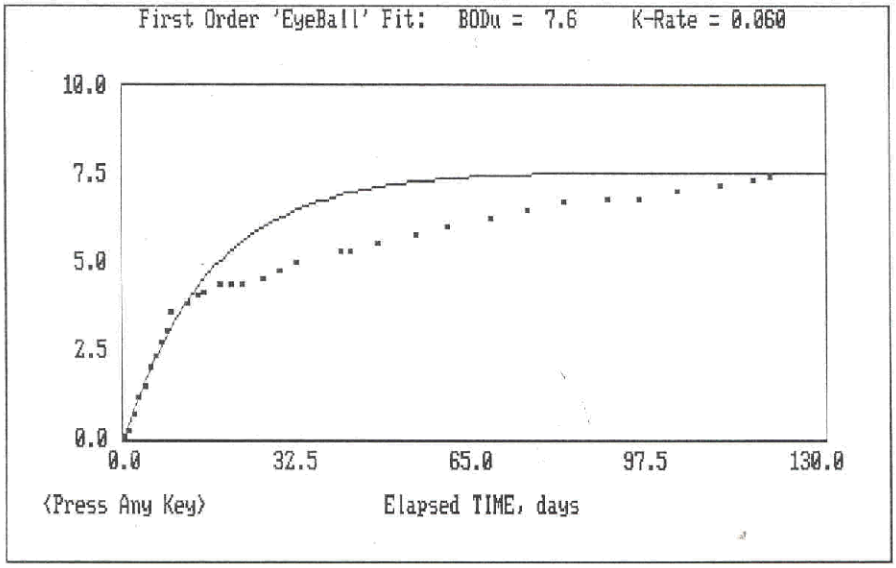
03-31-2003 10:11 am

DATA No.	MONTH	DAY	YEAR	TIME 24hr	eTIME days	TKN mg/l	NH3 mg/l	NO3 mg/l	NBODu (est)
1	09	19	2002	1737	0.00	0.00	0.00	4.60	0.000
2	09	24	2002	1725	4.99	0.00	0.00	4.12	-2.194
3	09	29	2002	1529	9.91	0.00	0.00	4.16	-2.011
4	10	04	2002	1606	14.94	0.00	0.00	4.39	-0.960
5	10	09	2002	1525	19.91	0.00	0.00	4.28	-1.462
6	10	18	2002	1514	28.90	0.00	0.00	4.39	-0.960
7	10	31	2002	1432	41.87	0.00	0.00	4.48	-0.548
8	11	18	2002	1604	59.94	0.00	0.00	4.45	-0.686
9	12	18	2002	1507	89.90	0.00	0.00	4.58	-0.091
10	01	17	2003	1503	119.89	0.00	0.00	4.40	-0.914

NOTE: Nitrogen Series Expressed as Nitrogen (N), mg/l.
Current Nitrogen to NBOD Conversion = 4.570
NBODu (est) = (NO3 - initial NO3) x 4.570
Test Name: CLINTON BRIARS WWTP2 25%
File Name: CB25



NBODU – Logistics Fit by LTBOD Program



CBODU – 1st Order Fit

BIG BLACK RIVER
SEPT 2002
10% SAMPLE
SAMPLE ID: 8902

* * * PROCESSED LAB DATA * * *

10-15-2003 1:36 pm

DATA No.	DATE	TIME 24hr	DO mg/l	DOr mg/l	eTIME days	DO(t) mg/l	BOD(t) mg/l
1	19 Sep 2002	1740	8.50	-	0.00	8.50	0.00
2	20 Sep 2002	1427	8.20	-	0.87	8.20	0.30
3	21 Sep 2002	1311	7.66	-	1.81	7.66	0.84
4	22 Sep 2002	1242	7.23	-	2.79	7.23	1.27
5	23 Sep 2002	1606	6.81	-	3.93	6.81	1.69
6	24 Sep 2002	1731	6.27	-	4.99	6.27	2.23
7	25 Sep 2002	1708	5.88	-	5.98	5.88	2.62
8	26 Sep 2002	1545	5.41	-	6.92	5.41	3.09
9	27 Sep 2002	1730	5.03	-	7.99	5.03	3.47
10	28 Sep 2002	1034	4.41	-	8.70	4.41	4.09
11	01 Oct 2002	1552	3.94	-	11.93	3.94	4.56
12	03 Oct 2002	1631	3.52	-	13.95	3.52	4.98
13	04 Oct 2002	1609	3.35	7.84	14.94	3.35	5.15
14	07 Oct 2002	1412	7.38	-	17.86	2.89	5.61
15	09 Oct 2002	1527	7.24	-	19.91	2.75	5.75
16	11 Oct 2002	1607	7.07	-	21.94	2.58	5.92
17	15 Oct 2002	1429	6.79	-	25.87	2.30	6.20
18	18 Oct 2002	1516	6.54	-	28.90	2.05	6.45
19	21 Oct 2002	1638	6.27	-	31.96	1.78	6.72
20	29 Oct 2002	1621	5.95	-	39.95	1.46	7.04
21	31 Oct 2002	1434	5.91	-	41.87	1.42	7.08
22	05 Nov 2002	1447	5.68	-	46.88	1.19	7.31
23	12 Nov 2002	1607	5.44	-	53.94	0.95	7.55
24	18 Nov 2002	1605	5.19	-	59.93	0.70	7.80
25	26 Nov 2002	1625	4.95	-	67.95	0.46	8.04
26	03 Dec 2002	1609	4.72	-	74.94	0.23	8.27
27	10 Dec 2002	1511	4.54	-	81.90	0.05	8.45
28	18 Dec 2002	1554	4.40	-	89.93	-0.09	8.59
29	24 Dec 2002	1330	4.39	-	95.83	-0.10	8.60
30	31 Dec 2002	1417	4.19	-	102.86	-0.30	8.80
31	08 Jan 2003	1350	4.03	-	110.84	-0.46	8.96
32	14 Jan 2003	1538	3.90	-	116.92	-0.59	9.09
33	17 Jan 2003	1506	3.83	-	119.89	-0.66	9.16

NOTE: 5-Day BOD = 2.23 mg/l. Approx f-Ratio = 4.103
Test Name: JACKSON POTW WWTP1 10%
File Name: JAKSN10

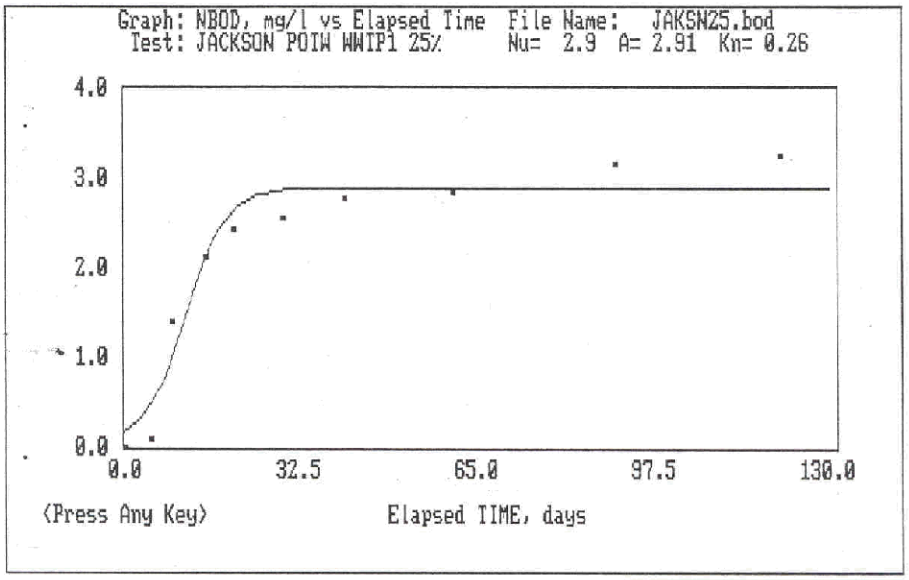
BIG BLACK RIVER
SEPT 2002
10% SAMPLE
SAMPLE ID: 8902

* * * NITROGEN SERIES DATA * * *

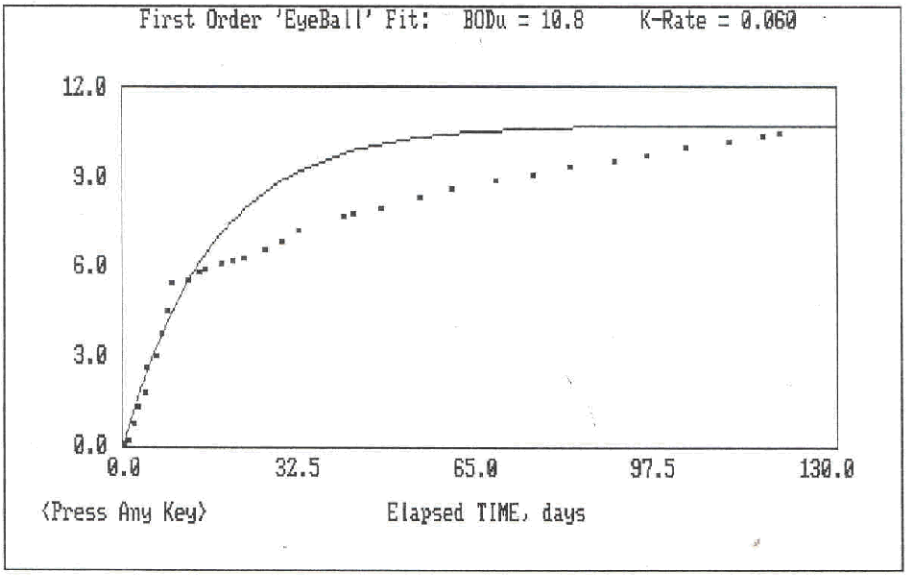
03-31-2003 1:10 pm

DATA No.	MONTH	DAY	YEAR	TIME 24hr	eTIME days	TKN mg/l	NH3 mg/l	NO3 mg/l	NBODu (est)
1	09	19	2002	1740	0.00	0.00	0.00	0.22	0.000
2	09	24	2002	1731	4.99	0.00	0.00	0.23	0.069
3	09	28	2002	1034	8.70	0.00	0.00	0.34	0.567
4	10	04	2002	1609	14.94	0.00	0.00	0.47	1.161
5	10	09	2002	1527	19.91	0.00	0.00	0.50	1.307
6	10	18	2002	1516	28.90	0.00	0.00	0.55	1.504
7	10	29	2002	1621	39.95	0.00	0.00	0.57	1.613
8	11	18	2002	1605	59.93	0.00	0.00	0.59	1.709
9	12	18	2002	1554	89.93	0.00	0.00	0.64	1.938
10	01	17	2003	1506	119.89	0.00	0.00	0.64	1.956

NOTE: Nitrogen Series Expressed as Nitrogen (N), mg/l.
Current Nitrogen to NBOD Conversion = 4.570
NBODu (est) = (NO3 - initial NO3) x 4.570
Test Name: JACKSON POTW WWTP1 10%
File Name: JAKSN10



NBODU – Logistics Fit by LTBOD Program



CBODU – 1st Order Fit

BIG BLACK RIVER
SEPT 2002
25% SAMPLE
SAMPLE ID: 8902

* * * PROCESSED LAB DATA * * *

10-15-2003 1:29 pm

DATA No.	DATE	TIME 24hr	DO mg/l	DOr mg/l	eTIME days	DO(t) mg/l	BOD(t) mg/l
1	19 Sep 2002	1742	8.68	-	0.00	8.68	0.00
2	20 Sep 2002	1430	8.34	-	0.87	8.34	0.34
3	21 Sep 2002	1313	7.69	-	1.81	7.69	0.99
4	22 Sep 2002	1245	7.10	-	2.79	7.10	1.58
5	23 Sep 2002	1608	6.51	-	3.93	6.51	2.17
6	24 Sep 2002	0000	5.71	-	4.26	5.71	2.97
7	25 Sep 2002	1709	5.09	-	5.98	5.09	3.59
8	26 Sep 2002	1747	4.22	-	7.00	4.22	4.46
9	27 Sep 2002	1732	3.31	7.63	7.99	3.31	5.37
10	28 Sep 2002	1036	6.58	-	8.70	2.26	6.42
11	01 Oct 2002	1534	5.86	-	11.91	1.54	7.14
12	03 Oct 2002	1633	5.20	-	13.95	0.88	7.80
13	04 Oct 2002	1614	4.96	-	14.94	0.64	8.04
14	07 Oct 2002	1422	4.38	-	17.86	0.06	8.62
15	09 Oct 2002	1529	4.13	-	19.91	-0.19	8.87
16	11 Oct 2002	1610	3.93	-	21.94	-0.39	9.07
17	15 Oct 2002	1432	3.54	7.84	25.87	-0.78	9.46
18	18 Oct 2002	1518	7.56	-	28.90	-1.06	9.74
19	21 Oct 2002	1639	7.21	-	31.96	-1.41	10.09
20	29 Oct 2002	1623	6.69	-	39.95	-1.93	10.61
21	31 Oct 2002	1435	6.64	-	41.87	-1.98	10.66
22	05 Nov 2002	1449	6.37	-	46.88	-2.25	10.93
23	12 Nov 2002	1608	6.04	-	53.93	-2.58	11.26
24	18 Nov 2002	1607	5.77	-	59.93	-2.85	11.53
25	26 Nov 2002	1627	5.51	-	67.95	-3.11	11.79
26	03 Dec 2002	1611	5.24	-	74.94	-3.38	12.06
27	10 Dec 2002	1513	5.00	-	81.90	-3.62	12.30
28	18 Dec 2002	1557	4.77	-	89.93	-3.85	12.53
29	24 Dec 2002	1334	4.65	-	95.83	-3.97	12.65
30	31 Dec 2002	1418	4.34	-	102.86	-4.28	12.96
31	08 Jan 2003	1352	4.10	-	110.84	-4.52	13.20
32	14 Jan 2003	1540	3.92	-	116.92	-4.70	13.38
33	17 Jan 2003	1508	3.82	-	119.89	-4.80	13.48

NOTE: 5-Day BOD = 3.24 mg/l. Approx f-Ratio = 4.165
Test Name: JACKSON POTW WWTP1 25%
File Name: JAKSN25

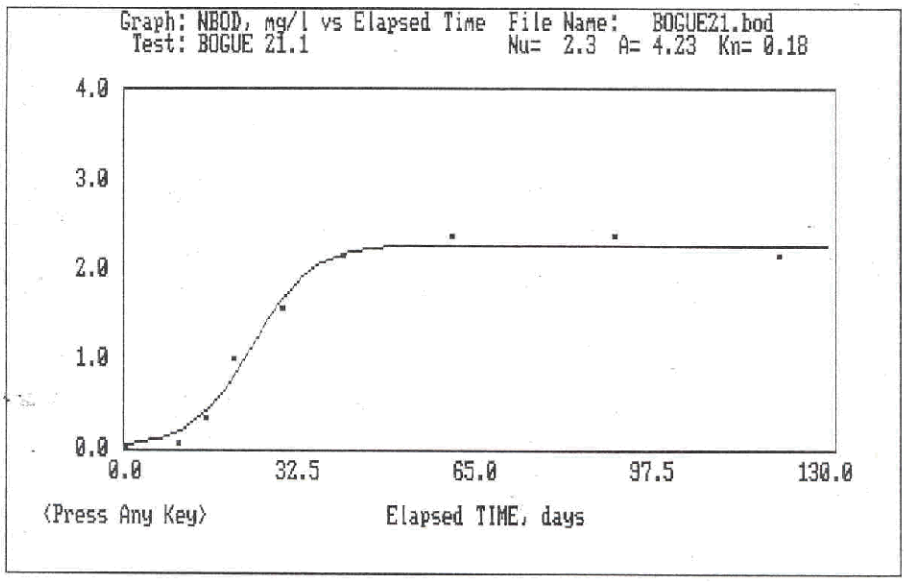
BIG BLACK RIVER
SEPT 2002
25% SAMPLE
SAMPLE ID: 8902

* * * NITROGEN SERIES DATA * * *

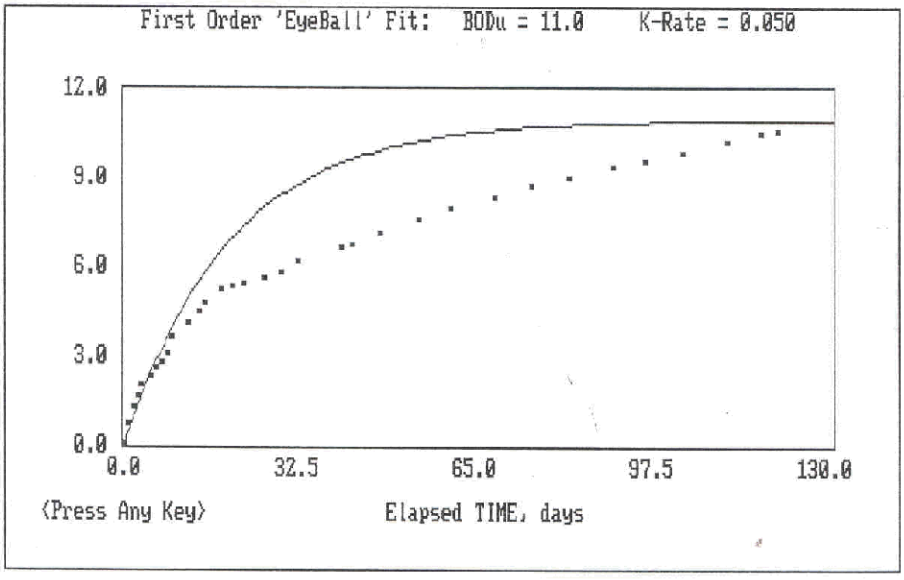
03-31-2003 1:26 pm

DATA No.	MONTH	DAY	YEAR	TIME 24hr	eTIME days	TKN mg/l	NH3 mg/l	NO3 mg/l	NBODu (est)
1	09	19	2002	1742	0.00	0.00	0.00	0.55	0.000
2	09	24	2002	1734	4.99	0.00	0.00	0.57	0.087
3	09	28	2002	1036	8.70	0.00	0.00	0.85	1.403
4	10	04	2002	1614	14.94	0.00	0.00	1.01	2.116
5	10	09	2002	1529	19.91	0.00	0.00	1.08	2.436
6	10	18	2002	1518	28.90	0.00	0.00	1.11	2.573
7	10	29	2002	1623	39.95	0.00	0.00	1.16	2.801
8	11	18	2002	1607	59.93	0.00	0.00	1.17	2.847
9	12	18	2002	1557	89.93	0.00	0.00	1.24	3.167
10	01	17	2003	1508	119.89	0.00	0.00	1.26	3.258

NOTE: Nitrogen Series Expressed as Nitrogen (N), mg/l.
Current Nitrogen to NBOD Conversion = 4.570
NBODu (est) = (NO3 - initial NO3) x 4.570
Test Name: JACKSON POTW WWTP1 25%
File Name: JAKSN25



NBODU – Logistics Fit by LTBOD Program



CBODU – 1st Order Fit

BIG BLACK RIVER
SEPT 2002
100% SAMPLE
SAMPLE ID: 8907

* * * PROCESSED LAB DATA * * *

10-15-2003 1:41 pm

DATA No.	DATE	TIME 24hr	DO mg/l	DOr mg/l	eTIME days	DO(t) mg/l	BOD(t) mg/l
1	19 Sep 2002	1638	6.99	-	0.00	6.99	0.00
2	20 Sep 2002	1448	6.27	-	0.92	6.27	0.72
3	21 Sep 2002	1216	5.68	-	1.82	5.68	1.31
4	22 Sep 2002	1144	5.26	-	2.80	5.26	1.73
5	23 Sep 2002	0000	4.92	-	3.31	4.92	2.07
6	24 Sep 2002	1636	4.55	-	5.00	4.55	2.44
7	25 Sep 2002	1552	4.33	-	5.97	4.33	2.66
8	26 Sep 2002	1435	4.06	-	6.91	4.06	2.93
9	27 Sep 2002	1636	3.76	-	8.00	3.76	3.23
10	28 Sep 2002	0917	3.18	7.03	8.69	3.18	3.81
11	01 Oct 2002	1412	6.45	-	11.90	2.60	4.39
12	03 Oct 2002	1514	5.96	-	13.94	2.11	4.88
13	04 Oct 2002	1506	5.68	-	14.94	1.83	5.16
14	07 Oct 2002	1256	4.99	-	17.85	1.14	5.85
15	09 Oct 2002	1426	4.70	-	19.91	0.85	6.14
16	11 Oct 2002	1515	4.45	-	21.94	0.60	6.39
17	15 Oct 2002	1323	3.82	-	25.86	-0.03	7.02
18	18 Oct 2002	1400	3.36	7.49	28.89	-0.49	7.48
19	21 Oct 2002	1531	6.94	-	31.95	-1.04	8.03
20	29 Oct 2002	1458	6.11	-	39.93	-1.87	8.86
21	31 Oct 2002	1328	6.02	-	41.87	-1.96	8.95
22	05 Nov 2002	1359	5.62	-	46.89	-2.36	9.35
23	12 Nov 2002	1516	5.10	-	53.94	-2.88	9.87
24	18 Nov 2002	1513	4.70	-	59.94	-3.28	10.27
25	26 Nov 2002	1538	4.34	-	67.96	-3.64	10.63
26	03 Dec 2002	1455	3.97	-	74.93	-4.01	11.00
27	10 Dec 2002	1358	3.67	-	81.89	-4.31	11.30
28	18 Dec 2002	1457	3.33	8.16	89.93	-4.65	11.64
29	24 Dec 2002	1216	7.93	-	95.82	-4.88	11.87
30	31 Dec 2002	1053	7.61	-	102.76	-5.20	12.19
31	08 Jan 2003	1037	7.27	-	110.75	-5.54	12.53
32	14 Jan 2003	1440	7.00	-	116.92	-5.81	12.80
33	17 Jan 2003	1409	6.92	-	119.90	-5.89	12.88

NOTE: 5-Day BOD = 2.44 mg/l. Approx f-Ratio = 5.278
Test Name: BOGUE 21.1
File Name: BOGUE21

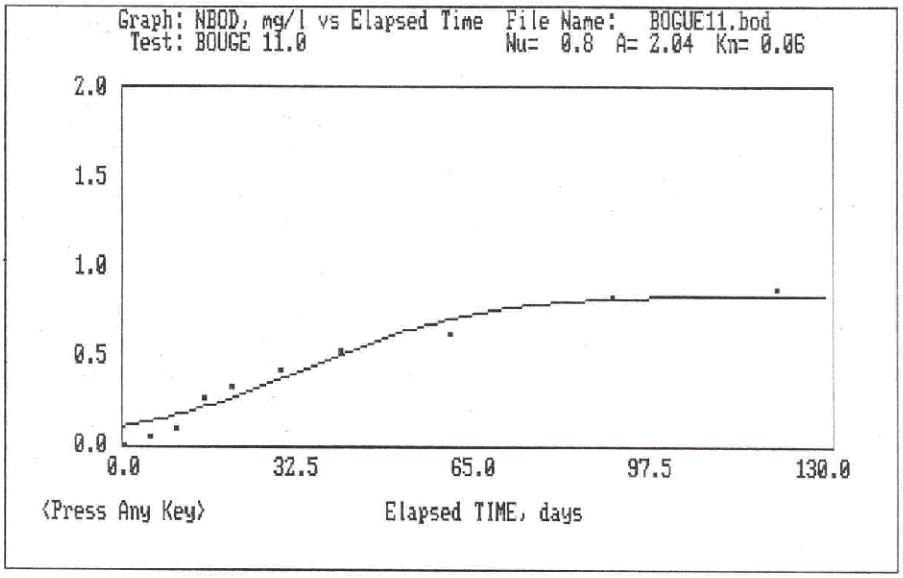
BIG BLACK RIVER
SEPT 2002
100% SAMPLE
SAMPLE ID: 8907

* * * NITROGEN SERIES DATA * * *

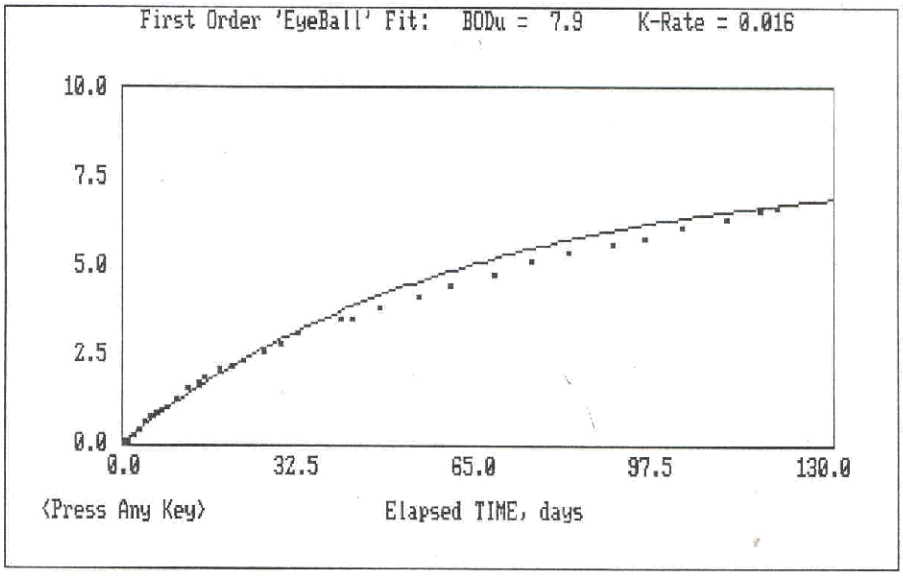
03-31-2003 9:28 am

DATA No.	MONTH	DAY	YEAR	TIME 24hr	eTIME days	TKN mg/l	NH3 mg/l	NO3 mg/l	NBODu (est)
1	09	19	2002	1638	0.00	0.00	0.00	5.88	0.000
2	09	24	2002	1636	5.00	0.00	0.00	5.86	-0.091
3	09	29	2002	1412	9.90	0.00	0.00	5.89	0.046
4	10	04	2002	1506	14.94	0.00	0.00	5.95	0.320
5	10	09	2002	1426	19.91	0.00	0.00	6.10	1.005
6	10	18	2002	1400	28.89	0.00	0.00	6.22	1.554
7	10	29	2002	1458	39.93	0.00	0.00	6.35	2.148
8	11	18	2002	1513	59.94	0.00	0.00	6.40	2.376
9	12	18	2002	1457	89.93	0.00	0.00	6.40	2.376
10	01	17	2003	1409	119.90	0.00	0.00	6.35	2.148

NOTE: Nitrogen Series Expressed as Nitrogen (N), mg/l.
Current Nitrogen to NBOD Conversion = 4.570
NBODu (est) = (NO3 - initial NO3) x 4.570
Test Name: BOGUE 21.1
File Name: BOGUE21



NBODU – Logistics Fit by LTBOD Program



CBODU – 1st Order Fit

BIG BLACK RIVER
SEPTEMBER 2002
100% SAMPLE
SAMPLE ID: 8903

* * * PROCESSED LAB DATA * * *

03-31-2003 8:47 am

DATA No.	DATE	TIME 24hr	DO mg/l	DOr mg/l	eTIME days	DO(t) mg/l	BOD(t) mg/l
1	19 Sep 2002	1612	6.67	-	0.00	6.67	0.08
2	20 Sep 2002	1433	6.57	-	0.93	6.57	0.10
3	21 Sep 2002	1203	6.35	-	1.83	6.35	0.32
4	22 Sep 2002	1131	6.20	-	2.80	6.20	0.47
5	23 Sep 2002	1433	5.99	-	3.93	5.99	0.68
6	24 Sep 2002	1558	5.78	-	4.99	5.78	0.89
7	25 Sep 2002	1537	5.72	-	5.98	5.72	0.95
8	26 Sep 2002	1345	5.63	-	6.90	5.63	1.04
9	27 Sep 2002	1537	5.55	-	7.98	5.55	1.12
10	29 Sep 2002	0903	5.28	-	9.70	5.28	1.39
11	01 Oct 2002	1353	4.98	-	11.90	4.98	1.69
12	03 Oct 2002	1459	4.75	-	13.95	4.75	1.92
13	04 Oct 2002	1448	4.62	-	14.94	4.62	2.05
14	07 Oct 2002	1029	4.37	-	17.76	4.37	2.30
15	09 Oct 2002	1408	4.21	-	19.91	4.21	2.46
16	11 Oct 2002	1453	4.09	-	21.95	4.09	2.58
17	15 Oct 2002	1308	3.77	-	25.87	3.77	2.90
18	18 Oct 2002	1336	3.54	7.96	28.89	3.54	3.13
19	21 Oct 2002	1517	7.61	-	31.96	3.19	3.48
20	29 Oct 2002	1012	7.08	-	39.75	2.66	4.01
21	31 Oct 2002	1310	7.02	-	41.87	2.60	4.07
22	05 Nov 2002	1339	6.72	-	46.89	2.30	4.37
23	12 Nov 2002	1502	6.32	-	53.95	1.90	4.77
24	18 Nov 2002	1500	5.93	-	59.95	1.51	5.16
25	26 Nov 2002	1525	5.56	-	67.97	1.14	5.53
26	03 Dec 2002	1443	5.18	-	74.94	0.76	5.91
27	10 Dec 2002	1345	4.90	-	81.90	0.48	6.19
28	18 Dec 2002	1445	4.61	-	89.94	0.19	6.48
29	24 Dec 2002	1200	4.48	-	95.82	0.06	6.61
30	31 Dec 2002	1039	4.16	-	102.77	-0.26	6.93
31	08 Jan 2003	1018	3.89	-	110.75	-0.53	7.20
32	14 Jan 2003	1426	3.68	-	116.93	-0.74	7.41
33	17 Jan 2003	1354	3.60	-	119.90	-0.82	7.49

NOTE: 5-Day BOD = 0.89 mg/l. Approx f-Ratio = 8.410
Test Name: BOUGE 11.0
File Name: BOGUE11

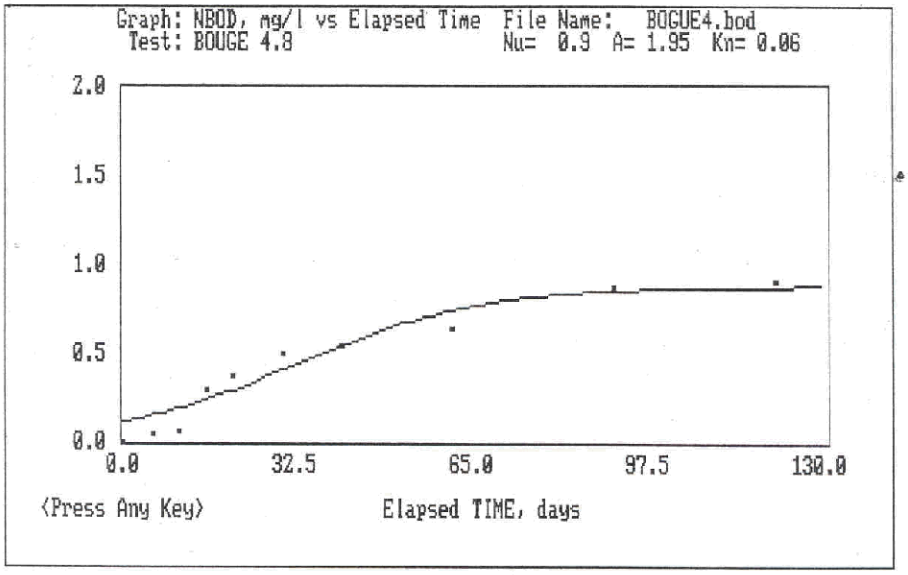
BIG BLACK RIVER
SEPTEMBER 2002
100% SAMPLE
SAMPLE ID: 8903

* * * NITROGEN SERIES DATA * * *

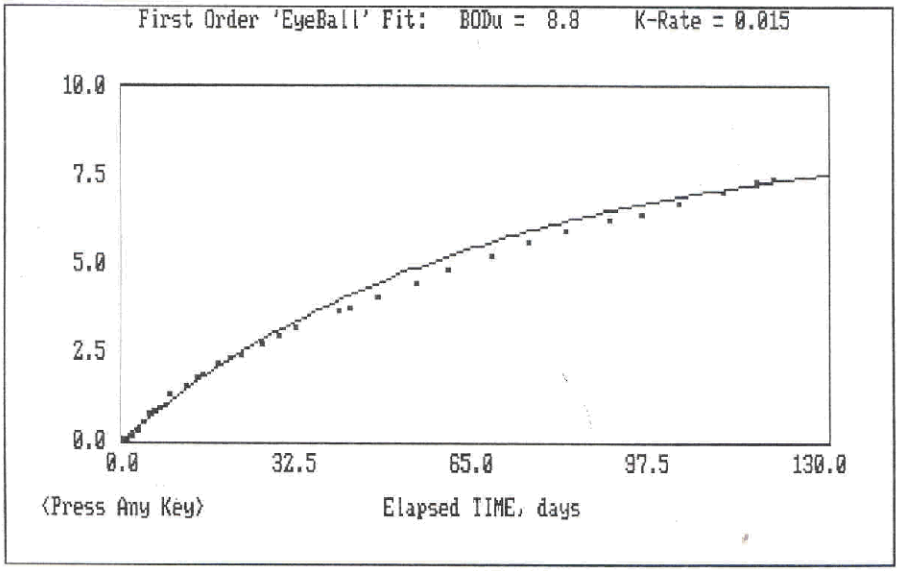
10-15-2003 3:18 pm

DATA No.	MONTH	DAY	YEAR	TIME 24hr	eTIME days	TKN mg/l	NH3 mg/l	NO3 mg/l	NBODu (est)
1	09	19	2002	1612	0.00	0.00	0.00	0.09	0.000
2	09	24	2002	1558	4.99	0.00	0.00	0.10	0.041
3	09	29	2002	0903	9.70	0.00	0.00	0.11	0.082
4	10	04	2002	1448	14.94	0.00	0.00	0.15	0.265
5	10	09	2002	1408	19.91	0.00	0.00	0.16	0.324
6	10	18	2002	1339	28.89	0.00	0.00	0.18	0.420
7	10	29	2002	1012	39.75	0.00	0.00	0.20	0.526
8	11	18	2002	1500	59.95	0.00	0.00	0.23	0.626
9	12	18	2002	1445	89.94	0.00	0.00	0.27	0.827
10	01	17	2003	1354	119.90	0.00	0.00	0.28	0.873

NOTE: Nitrogen Series Expressed as Nitrogen (N), mg/l.
Current Nitrogen to NBOD Conversion = 4.570
NBODu (est) = (NO3 - initial NO3) x 4.570
Test Name: BOUGE 11.0
File Name: BOGUE11



NBODU – Logistics Fit by LTBOD Program



CBODU – 1st Order Fit

BIG BLACK RIVER
SEPTEMBER 2002
100% SAMPLE
SAMPLE ID: 8904

* * * PROCESSED LAB DATA * * *

10-15-2003 1:50 pm

DATA No.	DATE	TIME 24hr	DO mg/l	DOr mg/l	eTIME days	DO(t) mg/l	BOD(t) mg/l
1	19 Sep 2002	1620	6.10	-	0.00	6.10	0.00
2	20 Sep 2002	1436	6.03	-	0.93	6.03	0.07
3	21 Sep 2002	1205	5.87	-	1.82	5.87	0.23
4	22 Sep 2002	1133	5.66	-	2.80	5.66	0.44
5	23 Sep 2002	1436	5.47	-	3.93	5.47	0.63
6	24 Sep 2002	1601	5.20	-	4.99	5.20	0.90
7	25 Sep 2002	1538	5.12	-	5.97	5.12	0.98
8	26 Sep 2002	1347	5.04	-	6.89	5.04	1.06
9	27 Sep 2002	1539	4.93	-	7.97	4.93	1.17
10	28 Sep 2002	0905	4.67	-	8.70	4.67	1.43
11	01 Oct 2002	1356	4.39	-	11.90	4.39	1.71
12	03 Oct 2002	1501	4.11	-	13.95	4.11	1.99
13	04 Oct 2002	1449	3.99	-	14.94	3.99	2.11
14	07 Oct 2002	1031	3.70	-	17.76	3.70	2.40
15	09 Oct 2002	1410	3.49	-	19.91	3.49	2.61
16	11 Oct 2002	1455	3.39	8.18	21.94	3.39	2.71
17	15 Oct 2002	1311	7.82	-	25.87	3.03	3.07
18	18 Oct 2002	1345	7.58	-	28.89	2.79	3.31
19	21 Oct 2002	1519	7.24	-	31.96	2.45	3.65
20	29 Oct 2002	1015	6.67	-	39.75	1.88	4.22
21	31 Oct 2002	1314	6.58	-	41.87	1.79	4.31
22	05 Nov 2002	1343	6.20	-	46.89	1.41	4.69
23	12 Nov 2002	1504	5.72	-	53.95	0.93	5.17
24	18 Nov 2002	1503	5.28	-	59.95	0.49	5.61
25	26 Nov 2002	1527	4.84	-	67.96	0.05	6.05
26	03 Dec 2002	1444	4.43	-	74.93	-0.36	6.46
27	10 Dec 2002	1347	4.09	-	81.89	-0.70	6.80
28	18 Dec 2002	1447	3.74	-	89.94	-1.05	7.15
29	24 Dec 2002	1202	3.60	-	95.82	-1.19	7.29
30	31 Dec 2002	1042	3.27	-	102.77	-1.52	7.62
31	08 Jan 2003	1022	2.97	8.34	110.75	-1.82	7.92
32	14 Jan 2003	1430	8.06	-	116.92	-2.10	8.20
33	17 Jan 2003	1357	7.93	-	119.90	-2.23	8.33

NOTE: 5-Day BOD = 0.90 mg/l. Approx f-Ratio = 9.245
Test Name: BOUGE 4.8
File Name: BOGUE4

BIG BLACK RIVER
SEPTEMBER 2002
100% SAMPLE
SAMPLE ID: 8904

* * * NITROGEN SERIES DATA * * *

03-31-2003 8:29 am

DATA No.	MONTH	DAY	YEAR	TIME 24hr	eTIME days	TKN mg/l	NH3 mg/l	NO3 mg/l	NBODu (est)
1	09	19	2002	0000	0.00	0.00	0.00	0.06	0.000
2	09	24	2002	1601	5.67	0.00	0.00	0.07	0.046
3	09	29	2002	1356	10.58	0.00	0.00	0.07	0.050
4	10	04	2002	1449	15.62	0.00	0.00	0.12	0.292
5	10	09	2002	1410	20.59	0.00	0.00	0.14	0.370
6	10	18	2002	1345	29.57	0.00	0.00	0.17	0.498
7	10	29	2002	1015	40.43	0.00	0.00	0.18	0.548
8	11	18	2002	1503	60.63	0.00	0.00	0.20	0.644
9	12	18	2002	1447	90.62	0.00	0.00	0.25	0.868
10	01	17	2003	1357	120.58	0.00	0.00	0.26	0.909

NOTE: Nitrogen Series Expressed as Nitrogen (N), mg/l.
Current Nitrogen to NBOD Conversion = 4.570
NBODu (est) = (NO3 - initial NO3) x 4.570
Test Name: BOUGE 4.8
File Name: BOGUE4

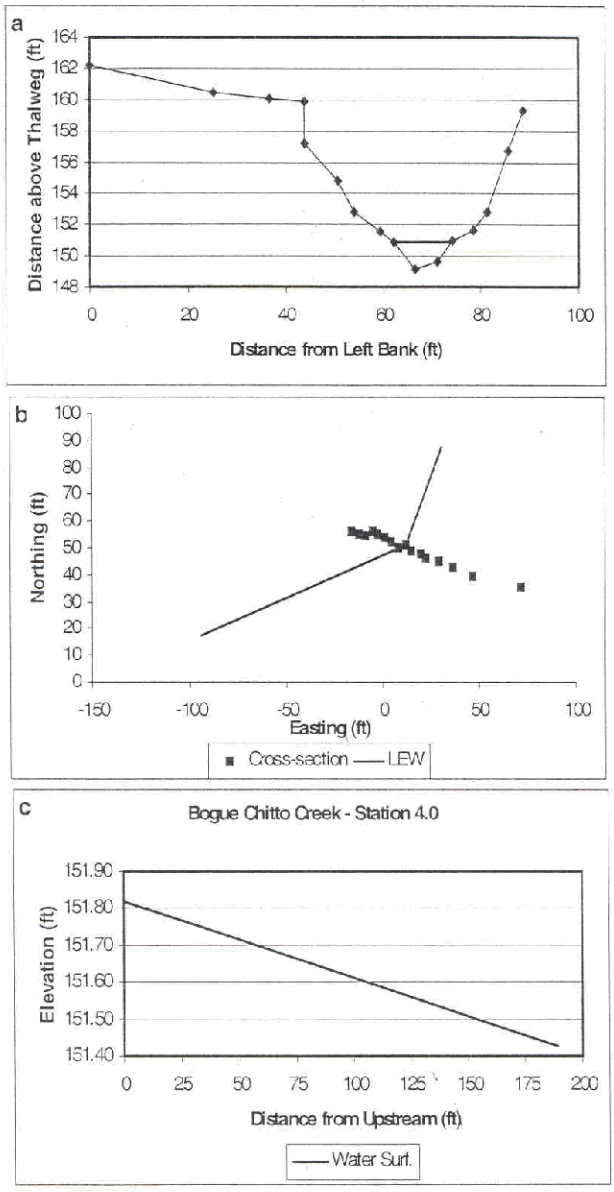


Figure 5. Hydraulic geometry at Bogue Chitto Creek Station ~~BBS~~ 4.0, located at Cox Ferry Rd. Latitude: 32° 32' 41.5"; Longitude: 90° 23' 48.2": a. cross-section; b.planform; and c. longitudinal water-surface profile, water surface slope = 0.013%. Surveyed on 09/18/02.

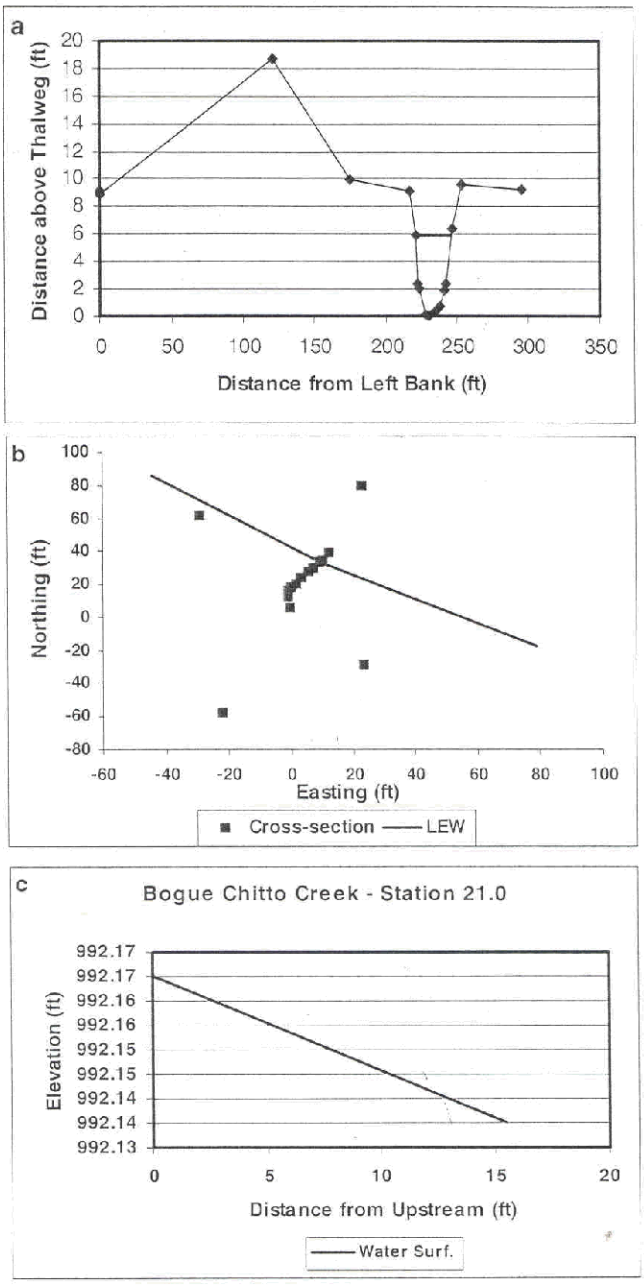


Figure 4. Hydraulic geometry at Bogue Chitto Creek Station [redacted] 21.0, located at Pine Haven Rd. downstream of bridge, Latitude: 32° 24' 38.6"; Longitude: 90° 17' 50.5": a. cross-section; b.planform; and c. longitudinal water-surface profile, water surface slope = 0.017%. Surveyed on 09/20/02.

APPENDIX B

Natural Heritage Inventory Species of Special Concern for Hinds and Madison Counties

Scientific Name	Common Name	Habitat
Accipiters cooperii	Cooper's Hawk	Riparian, forest - conifer, forest - hardwood, forest - mixed, suburban/orchard, woodland - conifer, woodland - hardwood, woodland - mixed Generally is an inhabitant of deep woods, utilizing thick cover both for nesting and hunting. Openings, especially where hedgerows or windbreaks offer shelter for prey species, may also be used when foraging. Johnsgard (1990) states that Cooper's are less fussy about the forest type than sharp-shins, and are more often "associated with deciduous and mixed forests and open woodland habitats such as woodlots, riparian woodlands, semiarid woodlands of the southwest, and other areas where the woodlands tend to occur in patches and groves or as spaced trees."
Alosa alabamae	Alabama Shad	big river, low gradient, medium river, moderate gradient Anadromous; adults live in saltwater and migrate into medium to large coastal rivers to spawn.
Ammocrypta clara	Western Sand Darter	Usually in medium and large rivers; most common in slight to moderate current over sandy bottom, though also known from areas of gravel or silt. Recorded from quiet margins of drainage canals and shallow backwaters. Buries in sand.
Graptemys pseudogeographica kohni	Mississippi Map Turtle	big river, low gradient, medium river, moderate gradient, pool Rivers, lakes, and sloughs with soft bottom and abundant aquatic vegetation. Eggs are laid probably in shallow nest on land near water.
Lampsilis cardium	Plain Pocketbook	
Laterallus jamaicensis	Black Rail	Herbaceous wetland, Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy "swamps.". Nests in or along edge of marsh, in area with saturated or shallowly flooded soils and dense vegetation, usually in site hidden in marsh grass or at base of Salicornia; on damp ground, on mat of previous year's dead grasses (Terres 1980), or over very shallow water.
Obovaria jacksoniana	Southern Hickory Nut	low gradient, moderate gradient streams
Obovaria subrotunda	Round Hickory Nut	Found in medium-sized streams in sand and gravel in areas with moderate flow (Cummings and Mayer, 1992).
Pandion haliaetus	Osprey	Primarily along rivers, lakes, reservoirs, and seacoasts, occurring widely in migration, often crossing land between bodies of water (AOU 1983). Nests in dead snags, living trees, cliffs, utility poles, wooden platforms on poles, channel buoys, chimneys, windmills, etc.; usually near or above water. Nests often used in successive years.

Scientific Name	Common Name	Habitat
Rana areolata	Crawfish Frog	Moist meadows, pasturelands, river flood plains, pine scrub, golf courses. Hides in burrows of crayfish or rodents when inactive; also under logs and in sewers. Eggs are laid and larvae develop in flooded fields, ditches, farm ponds, and small lakes; usually in fishless, temporary water.
Thryomanes bewickii	Bewicks's Wren	For breeding uses brushy areas, thickets and scrub in open country, open and riparian woodland, and chaparral. Typically nests in natural tree cavities or among crannies formed by exposed roots. May use small cavities in human-made objects including fence posts, buildings, or bird houses. During non-breeding season move into weedy open country, especially around old farm buildings, brushpiles, and fencerows.
Arcidens confragosus	Rock Pocketbook	Found in mud and sand bottom pools in medium to large rivers in standing or slow flowing water. A species typical of large lowland streams with little or no flow.
Cycleptus elongatus	Blue Sucker	Largest rivers and lower parts of major tributaries. Usually in channels and flowing pools with moderate current (1.0-2.6 m/sec). Also in some impoundments. Adults probably winter in deep pools. Young in shallower and less swift water than adults.Migrates upstream to spawn on riffles.
Cyprinella whipplei	Steelcolor Shiner	Runs, pools, and backwaters of warm, moderate- to somewhat low-gradient, large creeks and medium-sized to large rivers that typically are clear; also tolerates streams that generally are turbid (Burkhead and Jenkins 1991). In clear, gravelly, large creeks and small rivers in Illinois; generally not in small creeks or large rivers; most often over gravel in large riffles and pools just below them or eddies beside raceways, especially in relatively unmodified, tree-margined streams. Also occurs over silt bottoms. Schools near the top or middle of the water column. Spawns around logs, brush, and other obstructions, usually near riffles. Eggs are attached to the undersides of obstructions or placed above the bottom under loose bark, in crevices or furrows on logs, or among tree roots. Males maintain territories around spawning surfaces. creek, low gradient, medium river, moderate gradient, pool, riffle
Ellipsaria lineolata	Butterfly	
Hemidactylium scutatum	Four-Toed Salamander	Adults live under objects or among mosses in swamps, boggy streams, and wet, wooded or open areas near ponds or quiet, mossy or grassy/sedgy pools (the larval habitat). Sphagnum moss is commonly abundant in suiTable habitat.
Lampropeltis calligaster rhombomaculata	Mole Kingsnake	
Lasionycteris noctivagans	Silver-Haired Bat	Prefers forested (frequently coniferous) areas adjacent to lakes, ponds, and streams.
Lasiurus cinereus	Hoary Bat	Prefers deciduous and coniferous forests and woodlands. Roosts usually in tree foliage 3-5 m above ground, with dense foliage above and open flying room below, often at the edge of a clearing and commonly in hedgerow trees. Sometimes roosts in rock crevices, rarely uses caves in most of range. Hibernating individuals have been found on tree trunks, in a tree cavity, in a squirrel's nest, and in a clump of Spanish-moss. Solitary females with young roost among tree foliage; female may use same site in successive years. Riparian woodlands

Scientific Name	Common Name	Habitat
Lithasia hubrichti	Big Black Rocksnail	Freshwater
Nycticorax nycticorax	Black-Crowned Night-Heron	Marshes, swamps, wooded streams, mangroves, shores of lakes, ponds, lagoons; salt water, brackish, and freshwater situations. Roosts by day in mangroves or swampy woodland. Eggs are laid in a platform nest in groves of trees near coastal marshes or on marine islands, swamps, marsh vegetation, clumps of grass on dry ground, orchards, and in many other situations. Nests usually with other heron species.
Obovaria unicolor	Alabama Hickory Nut	Moderate gradient, sand/gravel substrates in moderately flowing water
Petrochelidon pyrrhonota	Cliff Swallow	Open to semiwooded habitat, cliffs, canyons, farms; near meadows, marshes, and water. Builds bottle shaped mud nest in colonies on cliffs, eaves of buildings, under bridges, etc. Prefers sites with overhang. Use of natural sites is greatest in the west. Many return to same nesting area in successive years, but colonies tend to switch nesting sites between season, evidently due to a buildup of insect parasites in the nests. Commonly repairs and uses old nests
Plethodon websteri	Webster's Salamander	Mesophytic forest (maple, hickory, oak, poplar, and elm) bordering rocky feeder streams; under logs, bark, and leaflitter on forest floor and along rocky stream beds. Moist forest on steep north-facing slopes with rock outcrops. Terrestrial breeder.
Pleurobema rubrum	Pyramid Pigtoe	This mussel typically inhabits large rivers but may occur in medium-sized lotic environments. It tends to occupy riffles or shoals in relatively shallow water and coarse-particle substrates, along sand bars, or in deep water (>4 m) with mud and sand bottoms. Moderate to swift currents usually are associated with these habitats (Gordon and Layzer, 1989).
Polyodon spathula	Paddlefish	Slow-flowing water of large and medium-sized rivers, river-margin lakes, channels, oxbows, backwaters, impoundments with access to spawning areas. Prefers depths greater than 1.5 m; seeks deeper water in late fall and winter (Burkhead and Jenkins 1991).
Potamilus ohiensis	Pink Papershell	
Quadrula cylindrica	Rabbitsfoot	According to Gordon and Layzer (1989) the typical habitat for this species is small to medium rivers with moderate to swift currents, and in smaller streams it inhabits bars or gravel and cobble close to the fast current. Found in medium to large rivers in sand and gravel (Cummings and Mayer, 1992). It has been found in depths up to 3 m (Parmalee, 1967).
Quadrula nodulata	Wartyback	
Truncilla truncata	Deertoe	
Uniomerus declivis	Tapered Pondhorn	creek, low gradient, medium river, pool, forested wetland, temporary pool, "In fine gravel in moderate current" (Heard, 1979)
Adiantum capillusveneris	Southern Maidenhair-Fern	
Asarum canadense	Canada Wild-Ginger	This species is found in upland rich woods, typically higher pH soils and associated with calcareous rock outcrops or rich soils (Rock pers. Comm., Ode pers. comm., Schafale pers. comm). Associate species often include sugar maple or basswood or rarely white or red oak (Young pers. comm.). This species is occasionally found in regenerating deciduous woodlands.

Scientific Name	Common Name	Habitat
Athyrium thelypterioides	Silvery Spleenwort	
Camassia scilloides	Wild Hyacinth	
Celastrus scandens	Climbing Bittersweet	
Crataegus calpodendron	Pear Hawthorn	
Echinacea purpurea	Eastern Purple Coneflower	
Lilium superbum	Turk's-Cap Lily	
Magnolia tripetala	Umbrella Magnolia	
Panax quinquefolius	American Ginseng	Occurs primarily in rich, mesic woods, often on slopes, over a limestone or marble parent material. It requires adequate moisture (but not wet hollows or swamps) and a closed canopy.
Platanthera peramoena	Purple Fringeless Orchid	
Schisandra glabra	ScarletWoodbine	
Silene ovata	Ovate Catchfly	In rich woods
Spiranthes ovalis	Lesser Ladies'-Tresses	
Swertia caroliniensis	American Colombo	
Trillium ludovicianum	Louisiana Trillium	
Utricularia olivacea	Piedmont Bladderwort	
Asclepias hirtella	Prairie Milkweed	
Hexalectris spicata	Crested Coralroot	
Staphylea trifolia	American Bladdernut	

APPENDIX C

Stressors

DESCRIPTION OF STRESSORS (MISSISSIPPI)

Status	Description
Stressor:	Runoff from croplands
Justification:	Water quality sampling of cropland stormwater runoff during the Bogue Chitto Creek Watershed Nonpoint Source Project showed that runoff from croplands does contain high concentrations of suspended solids and phosphorus concentrations approximately an order of magnitude greater than those measured in Bogue Chitto Creek in 1999. TKN and nitrite + nitrate concentrations in the cropland runoff are also a little higher than the concentrations measured in Bogue Chitto Creek
Location:	See Figure 2.3 for the locations of croplands along streams.
Extent:	There were approximately 845 acres of cropland with low plant residues in 2001. The majority were in the unnamed tributary subbasin 0201, and Bogue Chitto Creek subbasin upstream of Limekiln Creek (see Figure 2.3).
Stressor:	Runoff from pastures
Justification:	Runoff from pastures has the potential to contain nutrients and organic matter from animal waste deposited by grazing animals and fertilizers, as well as sediment. Allowing livestock into streams can result in increased suspended sediments and nutrients and habitat alteration. Poor quality pasture has the potential to contribute sediments to surface waters.
Location:	See Figure 2.3 for the locations of pastures adjacent to streams, and Figures 3.2 and 3.3 for sites where livestock have access to streams.
Extent:	There are approximately 4,000 acres of heavily overgrazed pasture in the watershed, and 46 sites where livestock have access to streams (TVA unpublished).
Stressor:	Runoff from livestock operations
Justification:	No studies of confined livestock operations were conducted in Bogue Chitto Creek watershed. However confined livestock operations in other areas have been shown to have the potential to contribute nutrients and organic matter to surface waters.
Location:	Livestock operations near streams that do not have facilities to control runoff
Extent:	There are no confined animal operations in the watershed.
Stressor:	Runoff from silvaculture
Justification:	Silviculture operations have the potential to contribute sediment and nutrients to surface waters.
Location:	Silvaculture operations that do not utilize erosion control BMPs. See Figure 2.3 for the locations of forest lands adjacent to streams.
Extent:	There were approximately 4,000 acres of silviculture operations in the watershed in 2001, approximately 1,400 acres of which were harvested (TVA unpublished).
Stressor:	Runoff from lawns
Justification:	Runoff from fertilized lawns have the potential to contribute nutrients to surface and ground waters.
Location:	Residential areas where lawns are heavily fertilized, without stormwater control or located in aquifer recharge areas. See Figure 2.3 for locations of residential areas adjacent to streams.
Extent:	There are approximately 7,000 acres of residential land use in the watershed (TVA unpublished).
Stressor:	Runoff from golf courses
Justification:	Runoff from golf courses has the potential to contribute nutrients to surface and ground waters.
Location:	Golf courses without stormwater management system, or located in aquifer recharge areas. Golf courses are located in Limekiln Creek basin near Annadale, and in Bogue Chitto Creek basin on

Status	Description
	Highway 49 near Green Crossing (see Figure 2.3).
Extent:	Three golf courses are located near Annadale and one on Highway 49.
Stressor:	Runoff form construction sites
Justification:	Construction site runoff has the potential to contribute sediment to surface water.
Location:	Construction sites without runoff and erosion controls, or with poorly functioning controls. Several new construction projects are proposed in North Clinton, in the Bogue Chitto basin (www.clintonms.org/index.php3?section=edd&page=growth).
Extent:	The number of construction sites in Bogue Chitto Creek watershed without runoff and erosion controls, or poorly functioning controls is constantly changing.
Stressor:	Runoff from urban areas
Justification:	Urban runoff has the potential to contribute nutrients, organic matter, sediment, and pesticides to surface and ground waters. These materials can reduce dissolved oxygen in receiving streams and cause biological impairment.
Location:	North Clinton and eastern Jackson
Extent:	Approximately 9,000 acres of urban land use were reported in the watershed as of 2001 (TVA unpublished).
Stressor	NPDES point source discharges
Justification	NPDES point source discharges contribute organic matter and nutrients to streams in Bogue Chitto Creek watershed.
Location	NPDES point source discharges are located primarily in the upper watershed near Clinton, Cynthia and Pocahontas.
Extent:	There are nine NPDES permitted point source discharges in the Bogue Chitto Creek watershed.
Stressor:	Mining operations
Justification:	No studies of the water quality effects of mining operations in Bogue Chitto Creek watershed were found. However, mining operations in other areas have been shown to have the potential to contribute sediment to surface waters.
Location:	Those operations located near surface waters that do not have runoff controls, or have poorly functioning runoff controls, or operation located in streambeds. Mining operations are located primarily in headwaters (Figure C.1).
Extent:	There are seven borrow areas, two sand mines and one unclassified mine that are active in the watershed (see Figure C.1). There is also an inactive brick clay mine in the watershed.
Stressor:	Hazardous waste operations
Justification:	No studies of the water quality effects of hazardous waste operations in Bogue Chitto Creek watershed were found. However, operations in other areas have been shown to have to potential to contribute nutrients and toxic substances to surface and groundwaters. No toxic releases to surface waters were reported in 2001 (EnviroMapper).
Location:	Hazardous waste sites are located primarily in the upper watershed in northeastern Jackson, northern Clinton, and near Cynthia (EnviroMapper, maps.epa.gov/enviromapper).
Extent:	There are approximately 20 hazardous waste sites in the watershed (EnviroMapper, maps.epa.gov/enviromapper).
Stressor:	Loss or alteration of wetlands
Justification:	Wetlands can absorb excess nutrients and filter sediment (with attached pollutants) from surface water runoff. They also attenuate flooding which can help control erosion.
Location:	Wetland areas that have converted to other uses, including agriculture and residential, that don't support beneficial wetland processes.
Extent:	There is a difference of approximately 2,000 acres in wetland estimates for 1993 and 2001.

Status	Description
Stressor:	Malfunctioning on-site wastewater treatment units
Justification:	No study of the water quality effects of malfunctioning on-site wastewater treatment units in Bogue Chitto Creek watershed was found. However, malfunctioning units in other area have been shown to have the potential to contribute nutrients and organic matter to surface and ground water.
Location:	Location of malfunctioning on-site wastewater treatment units in Bogue Chitto Creek watershed are shown in Figure 3.1.
Extent:	There are approximately 108 suspected failing on-site wastewater treatment units in the watershed (TVA unpublished).
Stressor:	Hydrologic modification
Justification:	Channelized stream segments are straighter and shallower, reducing riffle area and associated rearation thus potentially reducing the assimilative capacity of the stream for oxygen demanding materials.
Location:	On Bogue Chitto Creek, at North Ratliff Road, PinehavenDrive, and upstream of Cynthia Road. On Limekiln Creek there are a couple sections downstream of Highway 49 and at Joe Cocker Road. On Straight Fence Creek there are sections at Williamson Road and on a tributary upstream of M°Guffee Road (Delorme 1998).
Extent:	Approximately 4 miles on Bogue Chitto, approximately 2 miles on Limekiln Creek, approximately 2 miles on Straight Fence Creek, and approximately 2 miles on the Straight Fence Creek tributary (DeLorme 1998).

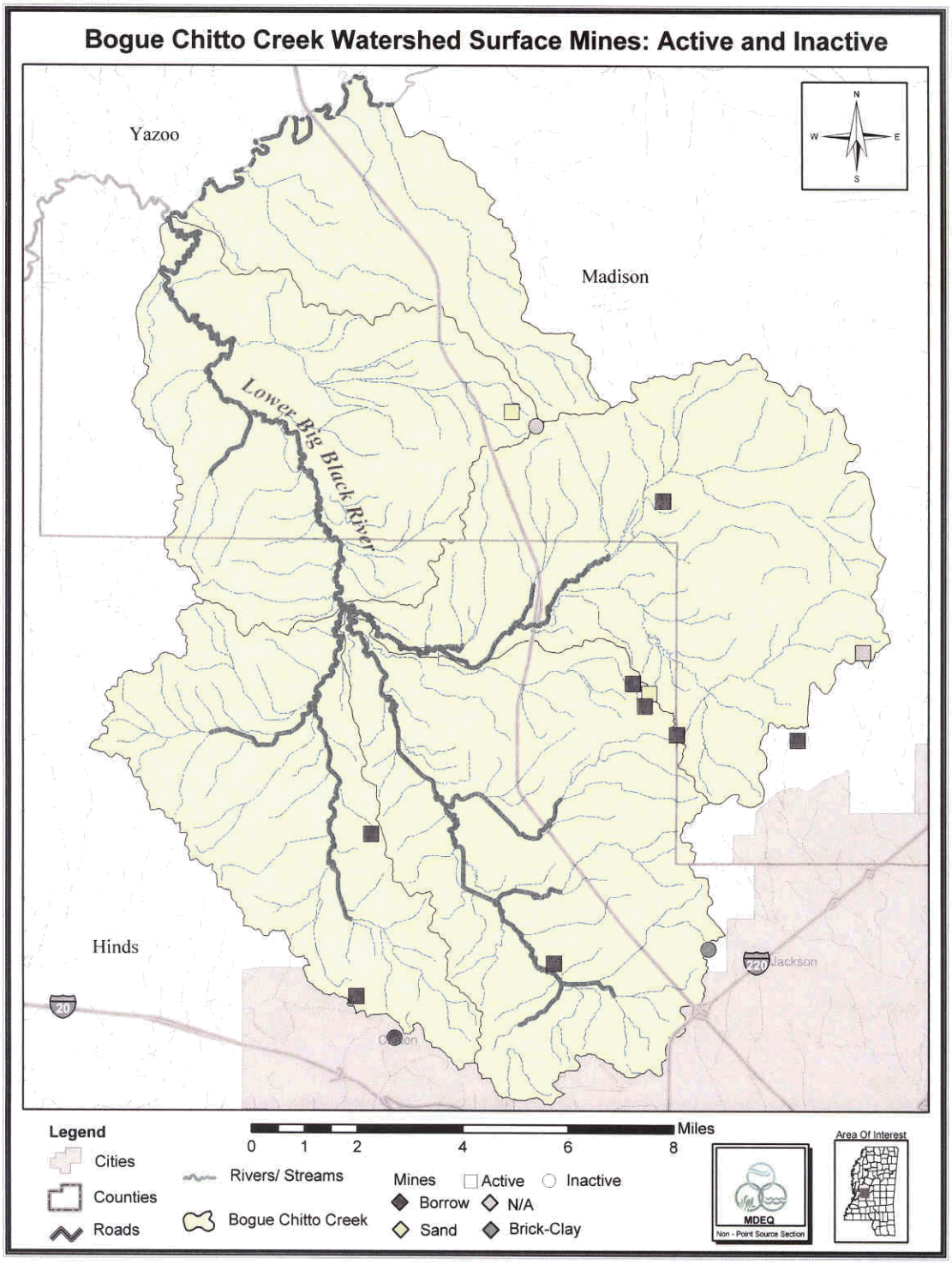


Figure C.1. Bogue Chitto Creek watershed surface mines.

APPENDIX D

History Of The Bogue Chitto Watershed Implementation Plan

HISTORY OF THE BOGUE CHITTO WATERSHED IMPLEMENTATION PLAN

In 1998 the Mississippi Department of Environmental Quality (MDEQ) implemented the Basin Management Approach (BMA) to Water Quality to carry out the mandates of the Clean Water Act. This approach brings together state, federal, and local agencies to improve and maintain the quality of Mississippi's water resources on a basin wide scale through comprehensive long range water quality planning and management strategies.

The BMA is based on a repeating, five-year management cycle, with each year dedicated to a different management activity (Figure D.1). This document is an implementation plan from year five.

The BMA is implemented on a basin scale. The nine major watershed basins in Mississippi were combined into five basin groups (Figure D.2). Bogue Chitto is located in basin group I, which consists of the Big Black, Tombigbee, and Tennessee River Basins in Mississippi. Each basin group is managed by a Basin Team. The agencies on the Basin Group I Basin Team are listed in Table D.1. The goal of this team is to develop and implement management plans for its Basin Group.

Table D.1. Basin Group 1 members.

MS Department Agriculture and Commerce	U.S. Environmental Protection Agency Region 4
MS Development Authority	U.S. Fish and Wildlife Services
MS Department of Environmental Quality	U.S. Forest Service
MS Forestry Commission	U.S. Geological Survey
MS Department of Health	U.S. Natural Resource Conservation Service
MSU Cooperative Extension Services	Alabama-Tombigbee River Basins Clean Water Partnership
MS Soil & Water Conservation Commission	Tennessee Valley Authority
MS Department of Wildlife, fisheries and Parks	Tenn-Tom Waterway Development District
U.S. Army Corps of Engineers Vicksburg and Mobile Districts	Tombigbee River Valley Water Management District

In 2003, Basin Group I is in year 5 of its management cycle. The basin management plan has been developed, and in this plan, Bogue Chitto Creek watershed was selected for

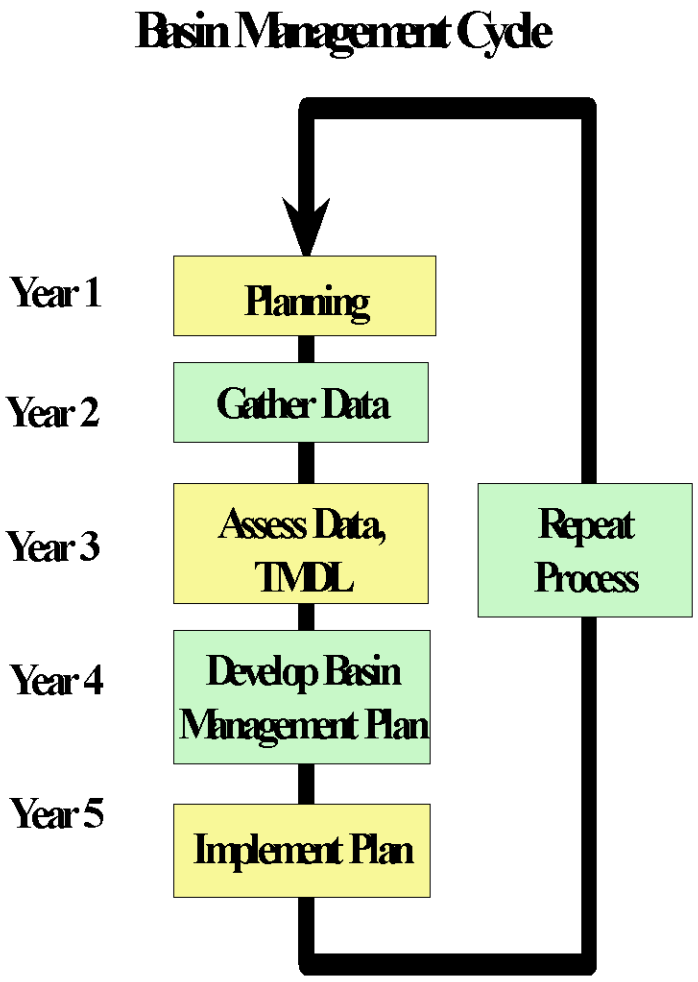
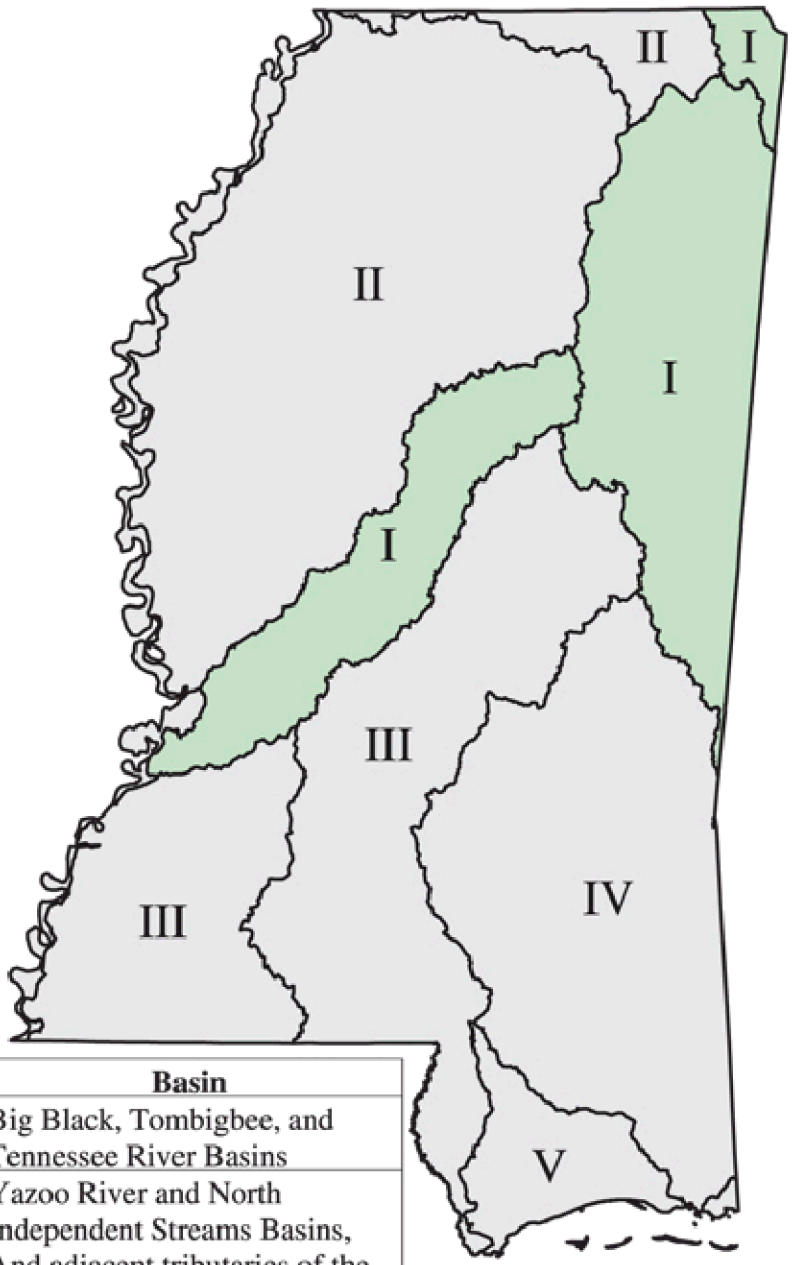


Figure D.1. Basin management cycle.



Group	Basin
I	Big Black, Tombigbee, and Tennessee River Basins
II	Yazoo River and North Independent Streams Basins, And adjacent tributaries of the Mississippi River
III	Pearl River and South Independent Streams Basins, And adjacent tributaries of the Mississippi River
IV	Pascagoula River Basin
V	Coastal Streams Basin

Figure D.2. Basin groups in Mississippi Basin Management Program.

implementation of restoration activities. Bogue Chitto Creek watershed was one of several areas in Basin Group I identified by the Basin Team as having water quality issues. During the planning phase (year 1) the Basin Team identified water quality issues in Basin Group I. These issues were then prioritized by five work groups with different perspectives; 1) point sources, 2) agriculture, 3) on-site wastewater systems, 4) silviculture, and 5) hydrologic modification/wetlands protection. Each work group prioritized the issues based on six criteria: 1) extent of the problem, 2) value of the resource, 3) risk or seriousness of the threat, 4) level of local support for addressing the problem, 5) probability for success, and 6) the quality of the Total Maximum Daily Load study (if available). Bogue Chitto Creek was ranked as a high priority (See MDEQ Priority Action Plan 2002).

In August 2003 the Basin Team met at a workshop and selected three high priority issues. These three issues were selected based on additional criteria: 1) number of agencies interested in working in the watershed, 2) value of the resources, 3) high probability of success with minimal effort/funding, 4) degree/intensity of impairment, 5) availability of funding, 6) urgency for action, and 7) source of impairment. Bogue Chitto Creek was one of the water bodies selected for implementation. At the workshop agencies also committed to participating in addressing the issues in the Bogue Chitto Creek Watershed (Table D.2) as members of the Bogue Chitto Creek Watershed Implementation Team.

Table D.2. Bogue Chitto Creek Watershed Implementation Team members.

Natural Resources Conservation Service	Mississippi Soil & Water Conservation Commission
U.S. Fish & Wildlife Service	Mississippi Department of Health
MDEQ Field Services Division	Mississippi Department of Agriculture & Commerce
MDEQ Water Quality Assessment	U.S. Army Corps of Engineers, Vicksburg District
MDEQ SRF and DWI Loan Programs	U.S. Geological Survey
MDEQ TMDL Section	USDA Cooperative Extension Service
MDEQ NPS Program	Mississippi Forestry Commission
MDEQ Surface Water Division	City of Clinton

APPENDIX E

Checklist Of Watershed Implementation Plan Elements

FY03/04 319 Watershed-Based Plans Guide

Name of Watershed-Based Plan: Bogue Chitto Watershed Implementation Plan

Required Watershed Elements	Location
a. An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in this watershed-based plan (and to achieve any other watershed goals identified in the watershed-based plan), as discussed in item (b) immediately below. Sources that need to be controlled should be identified at the significant subcategory level with estimates of the extent to which they are present in the watershed (e.g., X numbers of dairy cattle feedlots needing upgrading, including a rough estimate of the number of cattle per facility; Y acres of row crops needing improved nutrient management or sediment control; or Z linear miles of eroded streambank needing remediation).	Table 2.7, Appendix C
b. An estimate of the load reductions expected for the management measures described under paragraph (c) below (recognizing the natural variability and the difficulty in precisely predicting the performance of management measures over time). Estimates should be provided at the same level as in item (a) above (e.g., the total load reduction expected for dairy cattle feedlots; row crops; or eroded streambanks).	Chapter 3, Sections 3.2.1.1, 3.2.3.1, 3.2.4.1
c. A description of the NPS management measures that will need to be implemented to achieve the load reductions estimated under paragraph (b) above (as well as to achieve other watershed goals identified in this watershed-based plan), and an identification (using a map or a description) of the critical areas in which those measures will be needed to implement this plan.	Chapter 3, sections 3.2.1.2, 3.2.2.2, 3.2.3.2, 3.2.4.2, 3.2.5.2, 3.2.6.2
d. An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon, to implement this plan. As sources of funding, States should consider the use of their Section 319 programs, State Revolving Funds, USDA's Environmental Quality Incentives Program and Conservation Reserve Program, and other relevant Federal, State, local and private funds that may be available to assist in implementing this plan.	Chapter 3, Sections 3.2.1.4, 3.2.2.4, 3.2.3.4, 3.2.4.4, 3.2.5.4

Required Watershed Elements	Location
e. An information/education component that will be used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the NPS management measures that will be implemented.	Chapter 4
f. A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious.	Chapter 3, sections 3.2.1.3, 3.2.2.3, 3.2.3.3, 3.2.4.3, 3.2.5.3
g. A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented.	Same as above
h. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made towards attaining water quality standards and, if not, the criteria for determining whether this watershed-based plan needs to be revised or, if a NPS TMDL has been established, whether the NPS TMDL needs to be revised.	Chapter 5, Section 5.2, pg 5-2
i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item (h) immediately above.	Chapter 5, Section 5.1, pg 5-1

APPENDIX F

Section 319 Funded Projects

Best Management Practice Implementation Monitoring in the Big Black, Tombigbee, and Tennessee River Basin

Michael Sampson
Water Quality Coordinator

A proposal submitted to

Mississippi Department of Environmental Quality
Office of Pollution Control
Water Quality Management Branch
Box 10385
Jackson, MS. 39289-0385

January 13, 2003

Accepted

PROJECT TITLE: Best Management Practice Implementation Monitoring in the Big Black, Tombigbee, and Tennessee River Basins.

PROJECT ABSTRACT: The Mississippi Forestry Commission plans to evaluate the implementation of Forestry Best Management Practice throughout the Big Black, Tombigbee, and Tennessee River Basins. The guidelines set forth in "Silviculture Best Management Practices Implementation Monitoring: A Framework for State Forestry Agencies" will be used to develop the survey (see Attachment 1). The total cost of the Best Management Practice Monitoring Project cost is **$95,440.00.**

In 2003, the Mississippi Forestry Commission conducted a statewide assessment of the use of voluntary Best Management Practices in Forestry. The assessment showed that BMP's are being utilized on 89% of locations where they are applicable. The statewide assessment, however, is not statistically accurate at the Basin or MFC district level and therefore, is of only limited value at the local level. It is the intent of this project to increase the sampling intensity in the Big Black, Tombigbee and Tennessee River Basins in order to provide accurate statistical information on the implementation of Forestry Practices for these basins.

An assessment of forest harvesting activity in the basins will be conducted in order to determine how many sites to evaluate in each watershed. The basis for this assessment will be the 2000 Resource Assessment conducted by the Mississippi Forestry Commission in cooperation with MARIS Technical Center.

LEAD ORGANIZATON: The Mississippi Forestry Commission will serve as the lead organization. The Project Manager will be

Michael Sampson, Water Quality Coordinator
Mississippi Forestry Commission
301 N. Lamar St., Suite 300
Jackson, MS 39201
Phone: 601-359-1812
Fax: 601-359-1349
E-mail: msampson@mfc.state.ms.us

COOPERATIVE ORGANIZATIONS: Mississippi Forestry Association, Mississippi Automated Resource Information System and Southern Group of State Foresters

FINANCIAL OFFICER: Lezlin Proctor will serve as the chief financial officer on the project. She can be reached at the following:

Lezlin Proctor, Chief Financial Officer
301 N. Lamar St., Suite 300
Jackson, MS 39201

Phone: 601-359-2834
FAX: 601-359-4063
E-mail: lproctor@mfc.state.ms.us

PROJECT LOCATION: Big Black, Tombigbee and Tennessee River Basins.

HUCs included for the Big Black River Basins are as follow:

- 08060201
- 08060202

HUCs included for the Tombigbee and Tennessee River Basins are as follow:

- 03160201 03160106 03160103 06030006
- 03160202 03160105 03160102 06030005
- 03160108 03160104 03160101 06040001

(Attached is two maps of the Big Black, Tombigbee and Tennessee River Basins with 8-Digit HUCs).

PROJECT OBJECTIVE: The objective of this project is to evaluate the use of voluntary best management practices (BMP's) in the Big Black, Tombigbee and Tennessee River Basins.

PROJECT DESCRIPTION: Best Management Practice monitoring will be conducted in the Big Black, Tombigbee and Tennessee River Basins. The Bogue Chitto Creek, Buttahatchee Creek, and Luxapallila Creek are priority watersheds where BMP monitoring activities will begin first.

A. Purpose

The purpose of the BMP monitoring is to evaluate the use of voluntary BMPs by the forestry community in the Big Black, Tombigbee, and Tennessee River Basins. The Bogue Chitto Creek, Buttahatchee Creek, and Luxapallila Creek are priority watershed where silvicultural activities are not noted for impairing water quality on the TMDL 303d list.

Best management practice monitoring provides useful information on where problem areas are geographically. By knowing this information we can determine areas to provide training and education efforts. By monitoring silvicultral activities the overall integrity of water quality will improve as well as the restoration and protection of all watersheds.

B. Statistical sample

The number of sites to be evaluated will be determined by a random stratified sample of forest removals identified in the 2000 Mississippi Forestry Commission Resource Assessment. The Resource Assessment identified the forest removals and other cover changes in each county by classifying TM satellite imagery for the periods 93/94 and 96/97

To maximize the validity and credibility of the monitoring results, the number of sites evaluated for BMP implementation will be calculated to provide minimum error (+/- 5%) and high confidence (95%).

C. Selecting sites

Once the number of sites to be evaluated per county is determined, an aerial reconnaissance will be used to identify the specific sites to be evaluated on the ground. The following criteria will be used in identifying sites to be evaluated on the ground.

- Forested harvesting activity must have occurred within 24 months.
- Sites must be 10 acre or greater.
- Sites will be selected for monitoring without regard to ownership.

Note: Mississippi Forestry Commission decided that ten-acre site with silvicultural activity would be the minimum acre to monitor, because it is easier to determine the activity from air and locate a candidate site. However, for the purpose of this study we will consider smaller sites.

D. Collecting data

Data will be collected by members of the MFC water quality team. This will help to insure consistency and credibility. Applicable BMP practices will be evaluated on each site. Each member of the water quality team is trained specifically on BMPs and water quality monitoring. Water quality team members are local specialists for there area.

E. Results

A BMP Implementation Monitoring Report will be prepared summarizing the data collected for each basin. This report will be provided to the Department of Environmental Quality.

If a significant risk to water quality is noted during monitoring, the landowner will be contacted and recommendations provided for repairing the problem. If landowner does not comply with corrective measures in a timely matter, landowner name and site location will be forward to state regulatory agency (MSDEQ).

MILESTONES: The project will begin when funds are available by the Department Of Environmental Quality. Estimated time to complete BMP monitoring for the Big Black, Tombigbee, and Tennessee River Basins is 18 months. The 18-month time cycle will be divided as needed by Basin and priority watersheds. Each milestone listed will take approximately three months to complete.

- Site selection
- Ground truth for accessibility
- Site evaluation

- Statistical Analysis
- Final report
- Aerial reconnaissance

EVALUATION CRITERIA: After the best management practice implementation survey is complete, the Mississippi Forestry Commission will work with the Mississippi Forestry Association and other partners to evaluate and determine what issues to address. The best management practices monitoring survey will be available for the MFC, MDEQ and others to implement strategies to address problem areas. Once the problems are detected, the MFC will work with MSU Extension to provide education, training, and awareness in the problem area to limit the impact on water quality.

PROJECT PERIOD: Project period will be for 18 months.

BUDGET: See Attachments

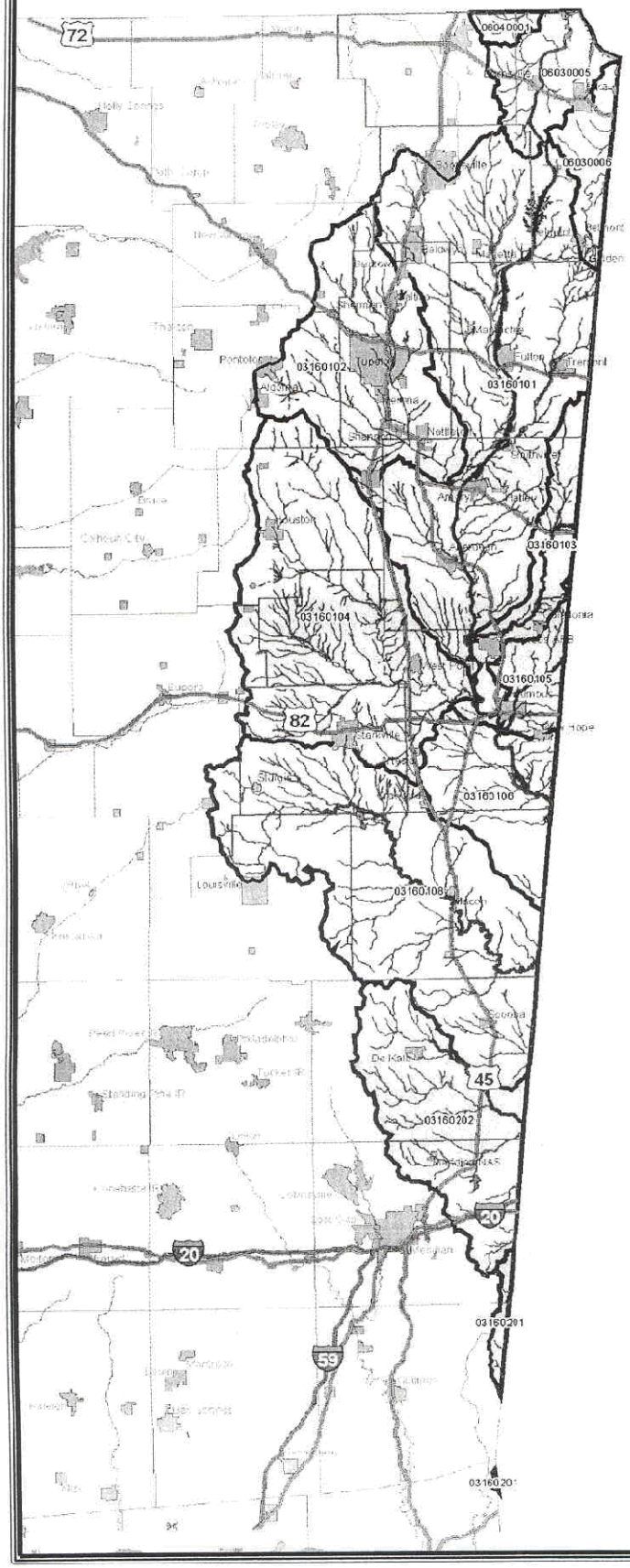
Mississippi Forestry Commission Grant Proposal Budget

Budget Categories	Federal Funds	Non - Federal Funds	Total
Personnel (Salary + Fringe)	$48,864.00	$32,576.00	**$95,440.00**
Travel	$4,000.00		
Equipment	$0.00		
Supplies	$1,500.00		
Contractural	$2,000.00		
Other	$6,500.00		
Indirect Charges	$0.00		
Total	**$62,864.00**	**$32,576.00**	**$95,440.00**

MFC water quality team members salaries is the source of matching funds.

Contractual Expense covers Maris Technical Center fee for developing the statical analysis and sample points.

Other expense covers aircraft cost, and construction of data base.



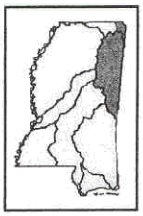
Tennessee and Tombigbee Basins

8-Digit HUCs

5 0 5 10 15 Miles

Legend

- Perennial Stream
- Major River with Labels
- Waterbody
- Interstate
- Highway
- Basin
- Basin County
- City
- 8-Digit HUC



Mississippi Basins

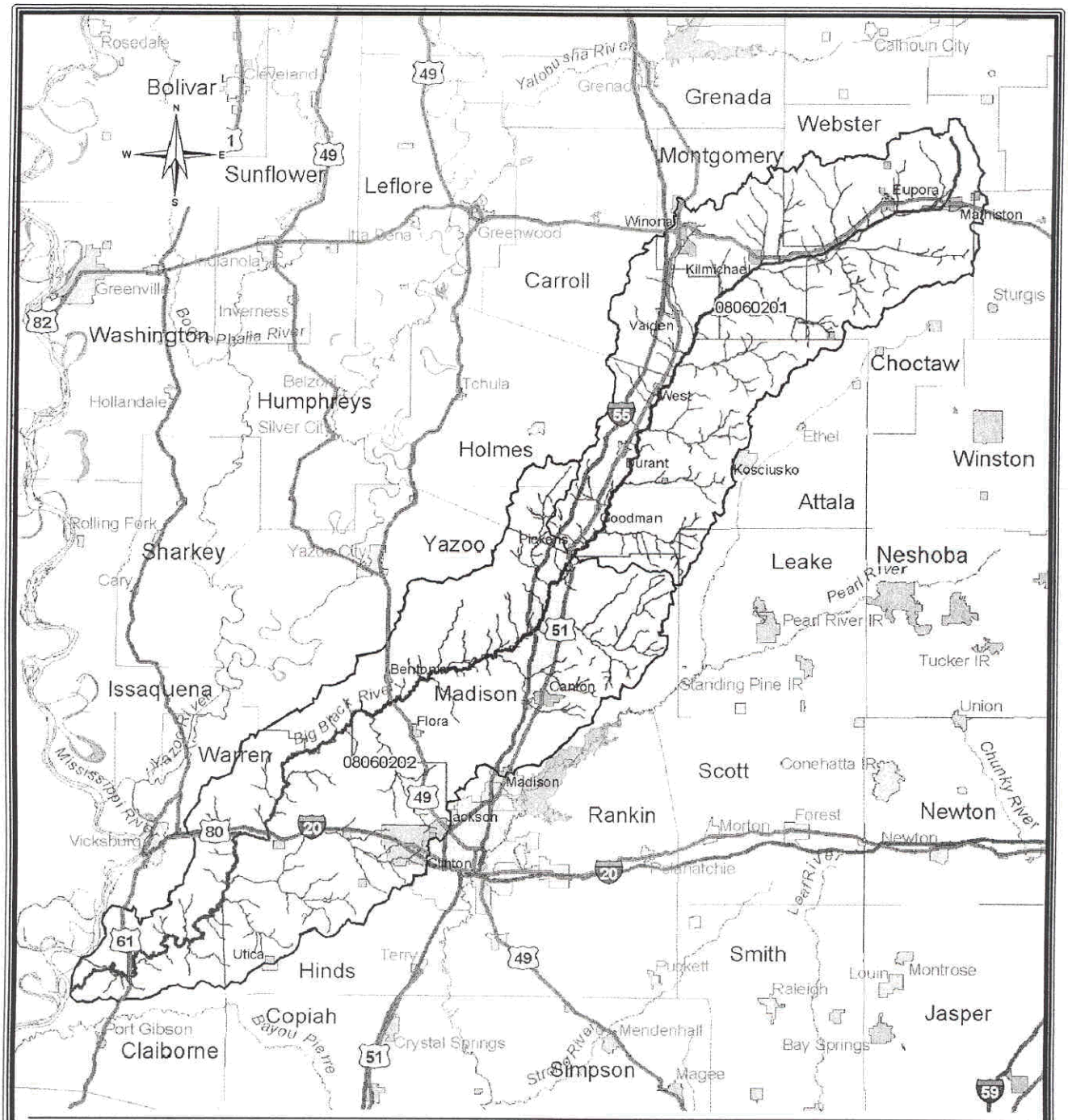
This map produced by the Department of Environmental Quality (MDEQ), Office of Pollution Control, Surface Water Division, Water Quality Assessment Branch, Data Management Section on 12 January 2004.

Map data are from the Mississippi Automated Resource Information System (MARIS). 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.

MDEQ

N:\Y:\wqa\projects\basins\tomtig\tombig_huc_sm



Big Black River Basin

8-Digit HUCs

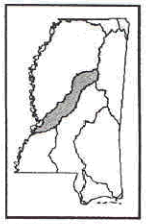
This map produced by the Department of Environmental Quality (MDEQ), Office of Pollution Control, Surface Water Division, Water Quality Assessment Branch, Data Management Section on 12 January 2004.

The map data are from the Mississippi Automated Resource Information System (MARIS).
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.

MDEQ

N:\Y:\wqa\projects\basins\bigblack\bigblack_huc_sm



Mississippi Basins

5 0 5 10 15 20 Miles

Legend

- Perennial Stream
- Major River with Labels
- Interstate
- Highway
- Big Black Basin
- Basin County
- City
- Waterbody
- 8-Digit HUC

DEVELOPMENT OF GIS LAYERS FOR INDIVIDUAL ONSITE WASTEWATER DISPOSAL SYSTEMS AND OTHER NONPOINT POLLUTION SOURCES

Project Abstract:

The Mississippi State Department of Health (MSDH) is submitting this FY 2003 Grant Proposal to develop GIS layers for Tennessee- Tombigbee and Big Black basin areas within the state to locate individual onsite wastewater disposal systems (IOWDS) and other nonpoint pollution sources. Public health environmentalists located in county health departments will use geographic positioning systems (GPS) to draw polygons including unsewered communities. Within those unsewered areas, further identification and location will be made of both new and existing IOWDS, dairy farms, recreational vehicle campgrounds, and food facilities using IOWDS and/or having NPDES permits. Staff will evaluate unsewered areas for functionality of wastewater systems by visual observation and/or comparison with NRCS soil maps. Following location and evaluation of onsite systems, staff will make recommendations for reducing inputs from identified nonpoint pollution sources. This proposal encompasses a one year project, as indicated by the objectives set forth below.

Objective 1 – During the time frame of the grant project, create GIS layer(s) with delineated polygons encompassing all unsewered communities or significant clusters of unsewered dwellings/businesses in the state; compare with PSC maps for percent coverage of the state.

Objective 2 – During the first six months of the grant project, create GIS layer(s) locate existing IOWDS, dairy farms, recreational vehicle campgrounds, and food facilities using IOWDS and/or having NPDES permits. Make recommendations for reducing inputs from identified nonpoint pollution sources.

Objective 3 – Map new IOWDS statewide over the complete time frame of the grant project.

Objective 4 – During the time frame of the grant project, provide data analysis to include estimated percent failure rates for IOWDS; comparison of GIS layers for IOWDS with NRCS soil maps; and make recommendations for corrections to enhance surface water quality in the basin management areas.

This grant application requests $130,500 in Federal grant money, with $70,0000.00 being supplied as state match. Total cost of this one year project is $200,500.00.

Lead Organization:

Mississippi State Department of Health
Bureau of General Environmental Services
Annex Rm. 102
Greg Burgess, P. E.
Ralph Turnbo, Division Director, Onsite Wastewater
Eugene Herring, Wastewater Program Specialist

570 E. Woodrow Wilson Ave.
P. O. Box 1700
Jackson, MS 39216

Voice 576-7690
FAX 576-7632
e-mail greg.burgess@msdh.state.ms.us

MSDH Financial Officer:

Mitchell Adcock, Director
Bureau of Finance and Accounts
Mississippi State Department of Health

Voice 576-7542
FAX 576-7655
e-mail mitchell.adcock@msdh.state.ms.us

Proposed Project Location

For the Big Black River Basin, these efforts will be concentrated in the Lower Big Black, which lies within 08060202, and the Bogue Chitto Creek Watershed, which lies within HUC 08060202. For the Tennessee-Tombigbee River Basin, these efforts will be focused in the Noxubee Refuge/Noxubee River area and also the Buttahatchie River area, which lies within HUC 03160103. Included in these targeted areas of interest are the following areas:

Buttahatchie Creek and Tenn Tom Waterway

Gattman	Individual Onsite Wastewater Disposal Systems
Caledonia	Central & Individual Onsite Wastewater Disposal Systems
Columbus AFB	Central & Individual Onsite Wastewater Disposal Systems

Big Black

Bentonia	Central & Individual Onsite Wastewater Disposal Systems
Flora	Central & Individual Onsite Wastewater Disposal Systems
Edwards	Central & Individual Onsite Wastewater Disposal Systems
Pickens	Central & Individual Onsite Wastewater Disposal Systems
Goodman	Individual Onsite Wastewater Disposal Systems
Durant	Central & Individual Onsite Wastewater Disposal Systems
West	Central & Individual Onsite Wastewater Disposal Systems
Vaiden	Central & Individual Onsite Wastewater Disposal Systems
Kilmicheal	Central & Individual Onsite Wastewater Disposal Systems
Sallis	Individual Onsite Wastewater Disposal Systems

Project Objectives:

The general goal of this project is the development of GIS layers of the basin management areas statewide to locate nonpoint pollution sources, e.g. IOWDS.

Objective 1 – During the time frame of the grant project, create GIS layer(s) with delineated polygons encompassing all unsewered communities or significant clusters of unsewered dwellings/businesses in the state; compare with PSC maps for percent coverage of the state.

Objective 2 – During the time frame of the grant project, create GIS layer(s) locate existing IOWDS, dairy farms, recreational vehicle campgrounds, and food facilities using IOWDS and/or having NPDES permits. Make recommendations for reducing inputs from identified nonpoint pollution sources.

Objective 3 – Map new IOWDS statewide over the complete time frame of the grant project.

Objective 4 – During one year of the grant project, provide data analysis to include estimated percent failure rates for IOWDS; comparison of GIS layers for IOWDS with NRCS soil maps; and make recommendations for corrections to enhance surface water quality in the basin management areas.

Project Description:

Nonpoint source water pollution is a significant cause of water quality problems in Mississippi, having an adverse impact on the state's water resources. Individual onsite wastewater disposal systems (IOWDS) are included in the category of "urban runoff", one of the seven major categories of nonpoint source land uses. The Mississippi State Department of Health (MSDH) is delegated authority by state statute to regulate IOWDS, including making recommendations for proper system installation, approving systems upon request, and mandating appropriate repairs when needed. Another major nonpoint source land use is "agricultural", a category which

includes Grade A dairy farms regulated by the MSDH.

According to the 1990 U. S. Census, 42% of individual residences in Mississippi have no access to public sewage disposal and rely instead on IOWDS. While these systems can be very effective, factors at a particular site such as a high seasonal water table in the soil, flood hazard, presence of any impermeable subsurface layer, and low soil permeability can cause this type system to fail. Failed sewage effluent drain field systems become a health hazard when the effluent breaks through the surface of the ground, or contaminates groundwater or surface waters. The discharge from improperly functioning systems, via rainwater runoff or percolation, can be a direct cause of impairment of water bodies.

In recent years, the potential for groundwater and surface water pollution from onsite wastewater disposal systems has emerged as a serious concern. Domestic wastewater is known to contain many elements that are capable of causing illness and even mortality in man, through either direct or indirect contact. More than one hundred different virus types may be found in raw sewage. A number of bacterial pathogens are also present in sewage, the most common of which are members of the genus *Salmonella*, which is responsible for an estimated one to two million human disease cases in the United States, annually. Although little attention has been given to the presence of protozoa in sewage, waterborne outbreaks of parasitic agents are known to have occurred from contaminated surface water. Raw sewage or improperly treated wastewater can be a contributing factor to nearly every listed "cause" of water-body impairment: pathogens, nutrients, organic enrichment, low dissolved oxygen, turbidity, suspended solids, and general biological impairment.

This FY 2003 grant application titled "Development of GIS Layers for Individual Onsite Wastewater Disposal Systems and Other Nonpoint Pollution Sources" seeks funding to develop GIS layers of the basin management areas statewide to locate nonpoint pollution sources that include entities regulated by the MSDH, such as IOWDS (both newly installed and existing), dairy farms, recreational vehicle parks, and other facilities such as food facilities utilizing IOWDS. Unsewered areas will be delineated first. Then county health department environmental staff will locate, using GPS, the above-mentioned sources. With assistance from state-level wastewater program specialists, they will evaluate for functionality of the IOWDS in unsewered areas by visual observation and/or comparison with NRCS soil maps. Data collected from the project will create GIS layers for the basin management areas statewide. MSDH staff will make recommendations for reducing inputs from identified nonpoint pollution sources. This information should be helpful to DEQ staff in developing TMDL's for targeted waterbodies and in prioritizing drainage areas.

Using federal grant funds, the MSDH will purchase a GPS unit and handheld computing device (such as Palm Pilot) for each of 80 county health departments. The GPS unit will be connected to the handheld unit allowing a data entry program to be developed for the Palm/GPS combination to simplify data collection. The information collected using the Palm/GPS combination will then be downloaded through the agency LAN system to a central database. Utilizing this format will improve the accuracy of the collected data. The palm devices will allow the elimination of a paper form for gathering data, such as system type and condition, for

each IOWDS site, and will also eliminate the need for contractual monies for data entry personnel each year. Grant funds will also be used for software (including ArcView), plotters, and computer support personnel. There will also be a need for a contract administrator (25% time). MSDH will provide training during the first year to at least 100 district and county health department Environmentalists on use of the palm devices and GPS units.

The first mapping activities of the project will encompass locating every new IOWDS where the MSDH participates in its recommendation/approval, every existing system requested to be approved, and every wastewater complaint investigated. This encompasses approximately 20,000 sites annually. Over the course of four years of the project, approximately 80,000 individual systems or potential building sites statewide would be located and mapped. Far fewer in number, but nonetheless significant, are the locations of approximately 350 dairy farms and 80 recreational vehicle campgrounds.

Health department staff will begin by mapping polygons of unsewered areas as they travel in the county assigned to each. When converted to GIS layers, the MSDH will provide this information in preliminary form to DEQ, with comparison to maps from the Public Service Commission (PSC) in order to begin estimating the percent of the state (or of certain basin management areas) that has the heaviest clustering of unsewered dwellings and the relationships with targeted waterbodies. As the project progresses, information will continue to be added. Following the initial location of unsewered areas, existing IOWDS will be mapped through the remainder of the grant period during the course of travel for regular MSDH environmental health activities.

The year for this project will emphasize data analysis: estimated percent failure rate for the existing IOWDS visually inspected; comparison of all systems and unsewered communities with soil maps published by USDA's Natural Resource Conservation Service (NRCS) to estimate the percent land area with unsewered communities located in soils identified as unsuitable for IOWDS. The MSDH will make recommendations for the most viable corrections of identified problems.

The in-kind match (40% of total project or greater) will consist of salary/fringe for county public health environmentalists for the time to utilize their GPS units to locate sites and to input information relating to the sites. Travel costs at $0.36 per mile for county environmentalists will also be part of the MSDH match.

This project will be sustained in future years by continued utilization of the GPS units, palm computing devices, software and plotters to provide location and data to DEQ on all new IOWDS recommended or approved, existing systems requested for approval, as well as sites of wastewater complaints investigated during the regular course of health department work.

Milestones:

Month 1

Contract with Grant Administrator (1/4 time)
Develop specifications on Palm devices, GPS units, and software
Solicit bids on equipment

Conduct training sessions for four (4) districts on use of hardware and software
Begin use of Palm/GPS units to capture "way points" for new IOWDS, existing sites requesting approval, and complaint sites in at least two (2) districts

Conduct training sessions for five (5) districts on use of hardware and software
Continue use of Palm/GPS units to capture site locations in at least four (4) additional districts
Begin to draw polygons of unsewered communities in at least one (1) basin management area

Month 2

Continue use of Palm/GPS units to capture site locations in remaining three (3) districts, thus bringing all nine (9) districts on line
Acquire maps as needed from MARIS, Tax Assessors, PSC, and DEQ

Ongoing use of Palm/GPS units to capture all site locations during regular inspectional activities
Create GIS map layers from points collected to date
Make recommendations for reducing non-point pollution from identified sources

Months 3 - 9

Continue to capture locations of wastewater sources throughout the state
Locate dairy farms, recreational vehicle parks, and food facilities on IOWDS
Create GIS map layers from points collected to date
Overlay collected data in basin areas as determined by DEQ
Continue to make recommendations for reducing non-point pollution

Months 9 - 12

Continue to map new and existing IOWDS, and complaints, statewide
Overlay data points on basin maps and provide to DEQ
Provide data analysis to include estimated failure rates for IOWDS

Compare GIS layers for IOWDS with NRCS maps; estimate percent land area with unsewered communities located in soils identified as unsuitable for IOWDS
Make recommendations for corrections to enhance surface water quality in the basin management areas

Evaluation

The evaluation and quality assurance plan includes strategies that are both process and outcome focused. Process evaluation used to monitor and improve the quality, effectiveness, and efficiency of the project include:

Purchase of Hardware and Software

An accounting will be made through the MSDH Property Office of all Palm devices, GPS units, and software. Equipment items will be inventoried. Receipts for purchase of both hardware and software will be documented through the MSDH Bureau of Finance and Accounts.

Environmentalist Training

The agency has a system which monitors all employee training. Reports from this system will document all training received by environmentalists over the project period.

Number of "Way Points" Captured for Sites/Facilities

100% of permitted dairy farms and recreation vehicle parks, and food facilities on IOWDS will be mapped. The universe is currently 314 dairies and 65 RV parks. Food facilities with IOWDS are unknown statewide, and must be determined from each county's files.
100% of proposed sites for new IOWDS will be mapped for a minimum of 3 calendar years. The number of site evaluations in FY 2001 was 13,407. Additional sites will be located during the initial training phases and continue on through the latter data-analysis phase. A target of 90% of existing approval IOWDS sites and wastewater complaint sites will be mapped. For FY2001, there were 1,974 existing approvals and 3,947 wastewater complaint sites.

A plan will be developed for quality assurance and outcome evaluation in both data collection and data analysis, as well as recommendations for corrections to improve surface water quality in the basin management areas affected by IOWDS:

Monitoring by Contract Grant Project Administrator

Contract administrator will visit each public health district on an as-needed basis for quality assurance audits. Grant project administrator will submit reports as required to DEQ.

Quality Assurance in Map Overlays, Data Analysis, and Recommend

MSDH technical and program management staff, together with the project will review all map layers that are developed, as well as all calculations for areas, failure rates, etc. Recommendations will be consistent with the state Law, the Federal Clean Water Act, MSDH Regulations, and Best Managen for IOWDS.

Project Period

The project period is one year from date of contract with DEQ.

Proposed Budget for DEQ Grant Project

Budget Categories	Federal	State Match	Total $$
Personnel			
PHE's (15)		70,000	70,000
Travel	25,000		25,000
Equipment			
Plotter (1)	10,000		37,400
PDA's (23)	4,900		
Computers (15)	15,000		
Printers (15)	7,500		
Commodities			
GPS's(20)	3,000		3,000
Contractual	65,100		65,100
ArcView (4)			
Data Collectors(2)			
Contract Admin			
Software			
Total	130,500	70,000	200,500

PROJECT TITLE:
Bogue Chitto-Lime Kiln Creek Watershed Nonpoint Source Pollution Project

PROJECT ABSTRACT:
This project will be located in the northeastern portion of Hinds County and the southwestern portion of Madison 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 runoff, sedimentation and cattle access to streams.

To properly manage animals and animal waste.

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

The project cost is $532,800. Of this amount, $319,680 in 319 funds are requested with the balance of $312,120 to be supplied as match.

LEAD ORGANIZATION:

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

Phone: (601) 354-7645
Fax: (601) 354-6628
e-mail: gspears@mswcc.state.ms.us

COOPERATING AGENCIES:

Hinds County Soil and Water Conservation District; Madison County Soil and Water Conservation District; USDA Natural Resources Conservation Service; Mississippi Department of Environmental Quality, MS Cooperative Extension Service; United States Geological Survey

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:

Bogue Chitto-Lime Kiln Creek Watershed (08060202-100)
(see attachment 1 for a map depicting the targeted demonstration areas of the project)

PROJECT DESCRIPTION:

The water quality impairment to be addressed by this project is organic enrichment due to reduced levels of dissolved oxygen. The Mississippi Department of Environmental Quality has identified Bogue Chitto Creek and portions of Limekiln and Straight Fence Creeks as being impaired for a length of 14 miles as reported in the Mississippi 1998 Section 303(d) List of Waterbodies. The impairment was detected based on water quality sampling and screening-level biological monitoring. The biological monitoring was conducted in conjunction with a nonpoint source monitoring project that began in 1991. Following assessment of the data collected through this project, Bogue Chitto Creek was placed on the 303(d) List for organic enrichment/low dissolved oxygen and biological impairment. Additional field study was conducted on Bogue Chitto Creek in August, 1999. This study confirmed that the creek was impaired due to organic enrichment/low dissolved oxygen. A TMDL has been developed for the impairment by MDEQ and it has been targeted for implementation by the Big Black – Tombigbee – Tennessee Basins Group management team.

PROJECT OBJECTIVE:

The Primary objective of this project will be to implement selected Best Management Practices (BMPs) on targeted areas in the Bogue Chitto-Lime Kiln Creek Watershed that will result in reduced pollutant loadings from agricultural nonpoint sources. The main water quality problems to be addressed by this project are sediment and animal waste nutrients from agricultural nonpoint sources. Of primary concern is sedimentation and animal waste runoff from animal operations in the watershed. Soils in the watershed are very erosive, with sheet and gully erosion occurring on sloping cropland and pastureland. Erosion is occurring from cropland in the project area at the rate of 12 tons per acre per year and from pasture land at the rate of 5 tons per acre per year. Nutrients and pathogens from animal waste as well as sediment contained in runoff are entering Bogue Chitto Creek and it's 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 current land uses in the Bogue Chitto-Lime Kiln Creek Watershed include 16,250 acres of cropland, 48,750 acres of pasture land, 35,750 acres of timber land, and 9,500 acres of other land. A visual assessment of the watershed was conducted by NRCS and the MSWCC on October 21st and 22nd, 2003 to confirm land uses. Very few, if any, best management practices are scheduled to be installed in the watershed under the Environmental Quality Incentives Program (EQIP).

This project will be implemented in three phases. Phase I will consist of analyzing existing assessment data, identifying target areas within the watershed where stressors are causing the greatest damage and if the application of needed Best Management Practices will yield a beneficial reduction in pollutant loadings. The Natural Resources Conservation Service (NRCS) will be asked to assist in making an assessment of sediment loadings from eroding streambanks in the watershed. 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 will cooperate with the MS Department of Environmental Quality, United States Geological Survey, Mississippi Cooperative Extension Service, MS Department of Health, the NRCS and the Hinds and Madison 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 findings of phase 1) the application of Best Management Practices (BMPs) on targeted areas in the watershed that will result in desired pollutant load reductions. The MSWCC will accomplish this through it's 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. Since the pesticides or fertilizer/plant nutrients are transported to the waters as attachments to the sediment, 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 conducted during this phase to inform and educate the public about Best Management Practices that benefit water quality. This will be accomplished by the following:
Establishing 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 which 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:
50 acres of critical area planting
15 grade stabilization structures
200 acres of pasture & hayland planting
20 water and sediment control basins
1,850 acres of nutrient management/grazing land improvement
15 livestock watering ponds
85,000 feet of fencing
8 stream crossings
450 acres of tree planting
350 acres of filter strips

Phase 3 will consist of post BMP evaluation to determine the pollutant load reductions achieved by the application of Best Management Practices. The MSWCC will coordinate with the USGS (who will develop a monitoring plan) in conducting these activities.

MILESTONES:

1. Sign grant contract with MS Department of Environmental Quality. (Month 0)
2. Issue policies and procedures for implementing the project to the SWCD office. (Month 1)
3. Meet with the board of SWCD commissioners to get their understanding of their responsibilities and participation. (Month 2)
4. In conjunction with the local SWCD, establish a locally led watershed advisory group to assist with implementation activities. (Month 2-3)
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. Assemble data on the amount of soil saved. (Month 0-36)
17. Erect project roadside signs which designate where water quality practices are in progress or have been completed. (Month 4-36)
18. Provide continued conservation planning and application assistance to participants. (Month 25-36)
19. Review the status of applying best management practices to reach the objectives of the project. (Month 25)
20. Based upon the needs and finding of milestone 18, assistance in planning and/or application will be redirected and/or accelerated. (Month 25-36)
21. Publish at least 4 articles about the project. (Month 0-36)
22. 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)
23. Bi-annual reports will be made to MSDEQ. (Month 0-36)
24. Make Final report to MSDEQ. (Month 36)

CRITERIA FOR EVALUATION

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

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 the Bogue Chitto Creek along with it's tributaries. Since pesticides and fertilizer/plant nutrients are transported to the waters as attachments to the sediment, any reduction in sediment loadings will result in a reduction of pesticide and nutrient loadings thereby enhancing the effectiveness and success of 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.

PROJECT PERIOD

The length of this project will be 3 years.

PROJECT BUDGET

BUDGET CATEGORY	FEDERAL FUNDS	NON-FEDERAL FUNDS	TOTAL
Technical Assistance/ Travel	$ 15,000	$ 10,000 *	$ 25,000
Installation of BMPs	$ 289,680	$ 193,120 **	$ 482,800
Contractual	$ 10,000	$ 6,667 **	$ 16,667
Information/Education	$ 5,000	$ 3,333 *	$ 8,333
TOTAL	$ 319,380	$ 213,120	$ 532,800

* 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.