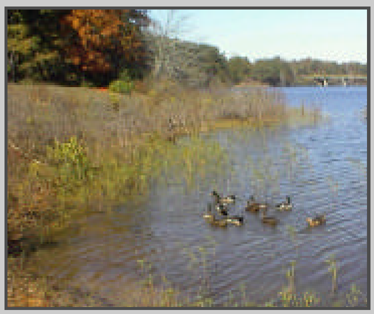
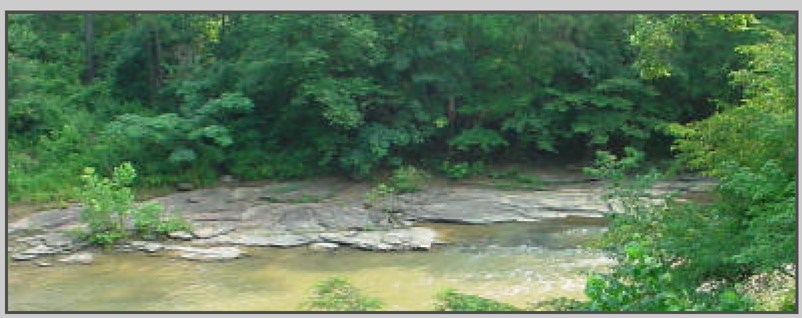
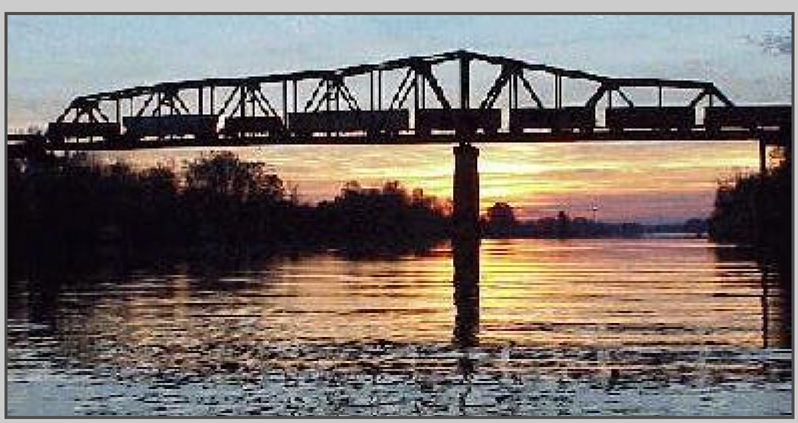
Black Warrior River

Watershed Management Plan







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Acronyms and Abbreviations

A&I	Agriculture and Industry (water supply use classification)
AAES	Alabama Agricultural Experiment Station
ACA	Alabama Cattleman's Association
ACES	Alabama Cooperative Extension System
ADAI	Alabama Department of Agriculture and Industries
ADCNR	Alabama Department of Conservation and Natural Resources
ADE	Alabama Department of Education
ADECA	Alabama Department of Economic and Community Affairs
ADEM	Alabama Department of Environmental Management
ADIR	Alabama Department of Industrial Relations
ADOT	Alabama Department of Transportation
ADPH	Alabama Department of Public Health
AEC	Alabama Environmental Council
AEMC	Alabama Environmental Management Commission
AEPA	Alabama Egg and Poultry Association
AFA	Alabama Forestry Association
AFC	Alabama Forestry Commission
AFO	Animal Feeding Operation
AGCA	Associated General Contractors of Alabama
AHBA	Alabama Home Builders Association

ALFA	Alabama Farmers Federation
ANHP	Alabama Natural Heritage Program
APC	Alabama Power Company
ARA	Alabama Rivers Alliance
ARS	Agricultural Research Service
ASG	Alabama Sea Grant Extension Program
ASMC	Alabama Surface Mining Commission
ASSESS	ADEM Strategy for Sampling Environmental Indicators of Surface Water Quality Status
ASWCC	Alabama Soil and Water Conservation Committee
ASWCD	Alabama Soil and Water Conservation Districts
AWF	Alabama Wildlife Federation
AWPCA	Alabama Water Pollution Control Act
AWRI	Alabama Water Resources Institute
AWW	Alabama Water Watch
AWWA	Alabama Water Watch Association
BMP	Best Management Practices
BSA/GSA	Boy and/or Girl Scouts of America
CAC	Citizen Advisory Committee
CAFO	Confined Animal Feeding Operation
CAWV	Certified Animal Waste Vendor
CBEP	Community Based Environmental Protection
CERS	Center for Environmental Research and Service - Troy State University
CLP	Clean Lakes Program
CNPCP	Coastal Nonpoint Pollution Control Program
Co-Ag (AU)	College of Agriculture - Auburn University
COE	United States Army Corps of Engineers
CPESC	Certified Professional in Erosion and Sediment Control
CPYRWMA	Choctawhatchee Pea Yellow River Water Management Authority
CRP	Conservation Reserve Program
CSGWPP	Comprehensive State Groundwater Protection Plan
CVA	Clean Vessel Act
CWA	Clean Water Act
CWAP	Clean Water Action Plan
CZARA	Coastal Zone Act Reauthorization Amendments

CZMA	Coastal Zone Management Act
DO	Dissolved Oxygen
EMAP	Environmental Monitoring Assessment Program
EPA	U.S. Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
EWP	Emergency Watershed Protection Program
F&W	Fish and Wildlife (water supply use classification)
FIP	Forestry Incentives Program
FSA	Farm Services Agency
FWPCA	Federal Water Pollution Control Act
GIS	Geographical Information System
GOMP	Gulf of Mexico Program
GPS	Global Positioning System
GSA	Geological Survey of Alabama
HBAA	Home Builders Association of Alabama
Hobos	Homeowners and Boat Owners Association
ICFAA	International Center for Fisheries and Allied Aquaculture - Auburn University
IECA	International Erosion Control Association
IPM	Integrated Pest Management
MERC-AU	Marine Extension and Research Center - Auburn University
MESC	Marine Environmental Sciences Consortium
MOA	Memorandum of Agreement
NEP	National Estuary Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory of the USFWS
OAW	Outstanding Alabama Water (water use classification)
ONRW	Outstanding National Resource Water (water use classification)
OSM	United State Bureau of Mines - Office of Surface Mining
PALS	People Against A Littered State
PS	Point Source
PWS	Public Water Supply (water use classification)

RC&D	Resource Conservation and Development
RWC	Receiving Water Concentration
S	Swimming and Other Whole Body Water Contact Sports (water use classification)
SH	Shellfish Harvesting (water use classification)
SMZ	Streamside Management Zone
SNA	Southern Nurserymen's Association
SOP	Standard Operating Procedures
SRF	State Revolving Fund of Alabama
SWCC&D	Soil and Water Conservation Commission and Districts
SWCD	Soil and Water Conservation District
SWCP	State Wetland Conservation Plan
SWCS	Soil and Water Conservation Society
TMDL	Total Maximum Daily Loads
TNC	The Nature Conservancy of Alabama
TSI	Trophic State Index
TVA	Tennessee Valley Authority
USACE	U.S. Army Corps of Engineers (a.k.a. COE)
USCOE	United States Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDA-FS	United States Department of Agriculture - Forest Service
USDA-NRCS	Natural Resources Conservation Service
USDI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service (Department of the Interior)
USGS	United States Geological Survey
UWA	University of West Alabama
VOC	Volatile Organic Compound
WBNEC	Weeks Bay National Estuarine Center
WBNERR	Weeks Bay National Estuary Research Reserve
WCAMI	Wetlands Conservation and Management Initiative
WHIP	Wildlife Habitat Incentives Program
WMA	Watershed Management Authorities
WRP	Wetlands Reserve Program

1 Introduction

INTRODUCTION

The Black Warrior River Watershed Management Plan is based on the results of existing research and reporting by various public agencies, industries and private interest groups and was compiled by the Black Warrior Clean Water Partnership. The Partnership began in 2002 to determine the extent of existing data, identify areas of concern not covered by existing data or research, and to recommend possible strategies to improve and protect the Black Warrior River Watershed. (Also see Initiatives, Nonprofits, Black Warrior Clean Water Partnership.) The general approach of the Plan was derived from the *Management Plan for the Weeks Bay Watershed* and the *Middle Coosa River Basin Watershed Management Plan*.

The Partnership will provide resources to holistically define water quality issues and identify regulatory and voluntary incentive-based solutions to the Black Warrior River Basin's most pressing water quality problems. These voluntary efforts, along with existing regulatory measures, will attain the goal of all waters meeting the criteria designated by their use classification. Emphasis is placed on the use of best management practices (BMPs), environmental education and awareness, and cooperative decision-making processes to attain the partnership's objectives.

Although a substantial amount of data has been obtained, more research and data is needed for a complete understanding of the Watershed and its processes. This plan identifies known problems and possible remedies, as well as potential problems and accompanying preventive actions. Many studies conducted in the past should be revisited in order to develop trend data to obtain a more accurate view of the Watershed and its condition.

A. PURPOSE OF PLAN

Watershed management fosters the coordinated implementation of programs to control point source discharges, reduce polluted runoff, and protect drinking water and identified sensitive natural resources. The g***oal of the Black Warrior River Watershed Management Plan is to improve and protect water quality within the Watershed, in order to meet or exceed Alabama water quality standards***. The Plan supports this goal by recommending educational strategies, supporting existing programs that serve to reduce non-point source pollution, and identifying areas where additional research and monitoring are needed.

In addition, the plan describes objectives that will serve as a foundation for further improvements within the watershed. Specific strategies that focus on cooperative action are presented for each objective. Plan objectives and strategies have been developed with assistance from technical experts and the Sub-Basin Action Committees comprised of government officials, citizens, environmental groups, and industry. Emphasis is placed on public education and cooperative agreements or partnerships. Existing programs that reduce pollutants are recognized and fully supported.

B. MANAGEMENT PLAN OVERVIEW

The Plan is designed for ease of use and review. Section 1 provides an explanation of the purpose of the plan and overview. Section 2 provides a description of the watershed that includes its geographic location, watersheds, cities and towns, locks and dams, environmental importance, climate, soils, mineral resources, ecoregions, land use, population, and economic importance. Section 3 provides a general description of the sources of impairment within the Watershed that have been identified by Partnership sub-basin committee members. Section 4 includes documented impairments within the Watershed. Section 5 describes the actual and potential effects of impairments. Section 6 defines the process by which stream segments are determined to be impaired, a summary of TMDLs (total maximum daily loads) to be addressed, and Tier 1 waterbodies within the Watershed. Section 7 provides a list of current water quality initiatives currently being performed by federal and state agencies, non-state agencies, industry, forestry, non-profits, and citizen groups. Section 8 provides a list of current federal and state regulatory programs that address water quality issues, as well as voluntary programs currently being offered. Section 9 recommends strategies for protection, i.e., the specific actions that have been locally identified to achieve the goals of the management plan. Section 10 lists current research efforts within the Watershed and provides recommendations for future research needs.

2 Description of Watershed

As a significant portion of the Mobile River Basin, the Black Warrior River flows southward through Alabama from the confluence of the Locust, Mulberry and Sipsey Forks in North Alabama, joining the Tombigbee River flowing to the Gulf of Mexico. Hundreds of miles of tributaries feed it along the way. In the last 200 years, the river basin has seen great changes in the area's population, land use, and even in the look and flow of the river. Throughout the watershed, the land has been used and managed for different purposes, and the waterways are as varied as the surrounding landscapes: from pristine wetlands to beautiful waterbodies within national forestland, to reservoirs to some of the state's most polluted creeks. Understanding, restoring, and preserving a healthy watershed is crucial not only to being able to use the waters as a robust natural resource, but also to maintaining the communities within the watershed, which depend on the waters of the Black Warrior River.

Figure 1: Railroad bridge crossing Mulberry Fork near Hanceville, Alabama. March 2002

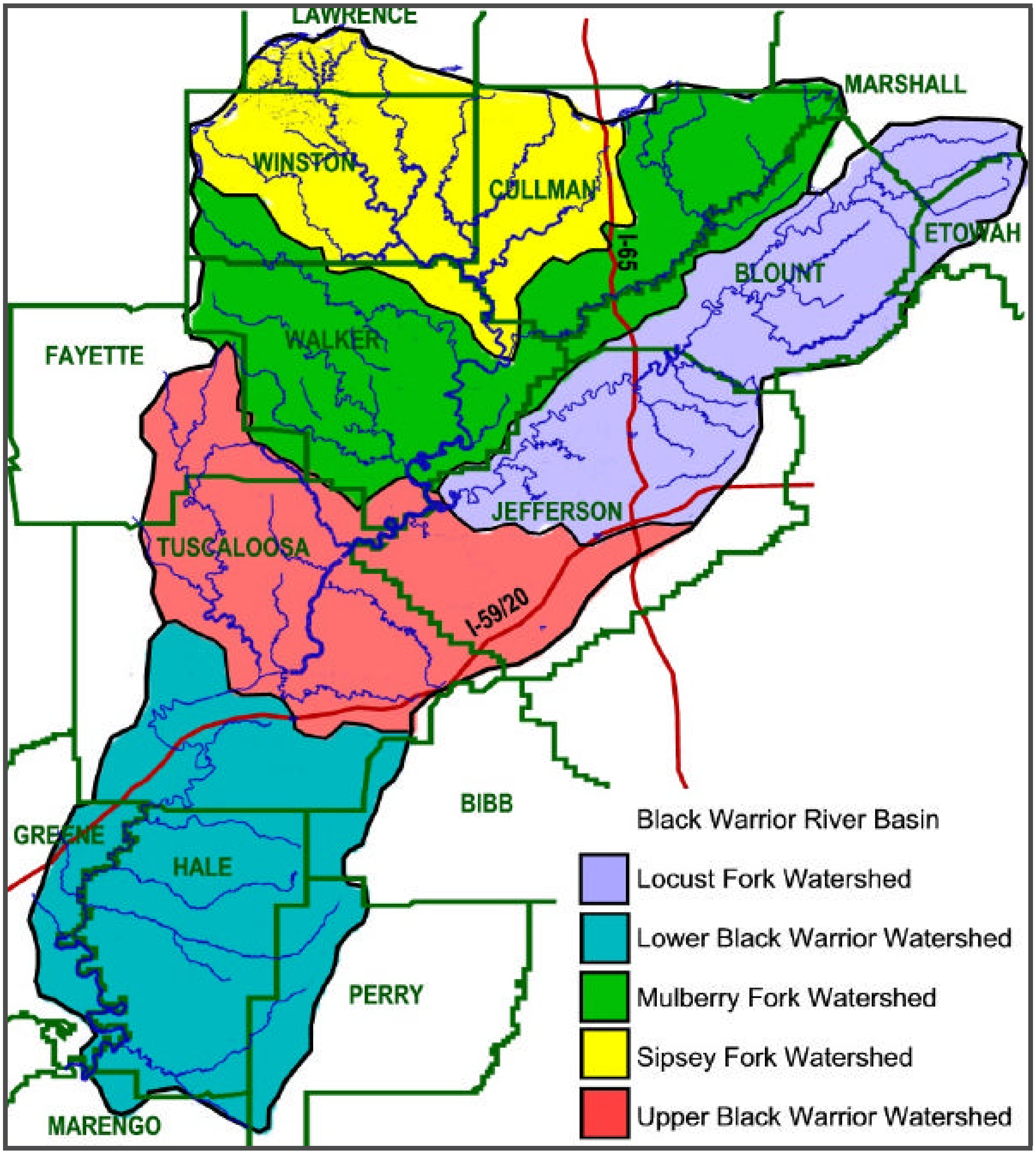
A. GEOGRAPHIC LOCATION

The Black Warrior River watershed drains 6,392 square miles (4,090,880 acres) or 12.2 percent of Alabama's land area. It flows through parts of fifteen counties in west and central Alabama. These counties are Bibb, Blount, Cullman, Etowah, Fayette, Greene, Hale, Jefferson, Lawrence, Marshall, Perry, Tuscaloosa, Walker, and Winston. *(See Figure 2 for a general map of the Black Warrior River Watershed.)* Seven counties (Winston, Cullman, Blount, Walker, Jefferson, Tuscaloosa, and Hale) contain the majority of drainage area within the watershed.

The Black Warrior River Watershed, along with the Cahaba River Watershed to the southeast, are the only drainages completely contained within state boundaries.

The Cahaba is the longest free-flowing river (i.e., not regulated by major dams) in Alabama, with the second and third longest being the Mulberry Fork and Locust Fork, which join at the Jefferson-Walker County line to form the Black Warrior River. The mouth of the Black Warrior opens into the Tombigbee River near Demopolis (Marengo County).

Figure 2: The Black Warrior River Basin Subwatersheds



B. WATERSHEDS

The Black Warrior is divided into five main watersheds: the Sipsey Fork, Mulberry Fork, Locust Fork, the Upper Black Warrior, and the Lower Black Warrior. Together, these five USDA-NRCS Hydrologic Unit Code (HUC) Cataloging units are comprised of a total of 76 sub-watersheds.

Mulberry Fork Watershed (HUC 03160109)

The Mulberry Fork of the Black Warrior River contains twenty sub-watersheds primarily within Cullman, Walker, and Winston Counties and drains portions of the Cumberland Plateau. The streams drain through steep-sided, gorge-like valleys in the east. Streams located along the western border of the watershed are characterized by the riverine wetland geomorphology of the Fall Line Hills.

Sipsey Fork Watershed (HUC 03160110)

The Sipsey Fork of the Black Warrior River Watershed drains thirteen sub-watersheds located within Winston, Walker, and Cullman Counties. The tributaries of the Sipsey Fork are generally high gradient, riffle-run streams draining the gorge-like valleys of the Cumberland Plateau. [1]

Locust Fork Watershed (HUC 03160111)

The Locust Fork of the Black Warrior River contains fifteen sub-watersheds primarily located within Jefferson, Blount, Marshall, and Etowah Counties. The entire watershed drains approximately 1,209 square miles of the Cumberland Plateau and Valley and Ridge Provinces. It is primarily located within the Southwestern Appalachian ecoregion. Elevations range from around 1,100 feet of the northern slopes to around 600 feet at the northern boundary of the Fall Line Hills near Tuscaloosa. The streams drain sandstones and shales and occur in steep sided valleys, creating high gradient, riffle-run streams characterized by abundant and diverse habitat. Flow, in larger streams of this watershed, is sustained during dry summer months, but many headwater tributaries will go dry because of low to no recharge from Pottsville shales and sandstones. The natural vegetation consists of mixed mesophytic forest restricted mostly to the deeper ravines and escarpment slopes, and an upland forest characterized by mixed oaks with shortleaf pines.

Upper Black Warrior Watershed (HUC 03160112)

The Upper Black Warrior Watershed drains twelve sub-watersheds located within

Tuscaloosa, Fayette, Jefferson, and Walker Counties. Tributaries located in the Fall Line Hills are generally low gradient, habitat poor, glide/pool streams. Streams located in the Fall Line Hills flow year round due to the extensive sand and gravel aquifers in the region. Riverine wetlands are characteristic of this ecoregion. Within the Black Warrior drainage, the Fall Line Hills sub-region is a transition zone between the Coastal Plain and the Southwestern Appalachians sub-regions. The region is primarily forested terrain of open hills with 200-400 feet of relief. This watershed drains the Fall Line Hills and the Cumberland Plateau. Tributaries of the North River, located within the Cumberland Plateau, are higher gradient streams characterized by riffle-run geomorphology.

Lower Black Warrior Watershed (HUC 03160113)

The Lower Black Warrior watershed drains nineteen sub-watersheds located within Tuscaloosa, Hale, Greene, and Pickens Counties. The entire watershed lies below the Fall Line and drains portions of both the Fall Line Hills and the Blackbelt region. They are generally low gradient, habitat poor, glide/pool streams. Streams located in the Fall Line Hills flow year round due to the extensive sand and gravel aquifers in the region. Riverine wetlands are characteristic of this ecoregion. Within the Black Warrior drainage, the Fall Line Hills is a transition zone between the Coastal Plain and the Southwestern Appalachians. The region is primarily forested terrain of open hills with 200-400 feet of relief. [1]

The Blackbelt Region of the extreme southern portion of the Black Warrior River watershed is comprised of two sub-regions of the Coastal Plain, the Blackland Prairie and the Flatwoods/Alluvial Prairie Margins. Because the regions are narrow and intermingled, many streams drain through portions of both regions. The elevations in this region range from 200-400 feet in the Flatwoods and 150-250 feet in the Blackland Prairie to elevations closer to 100 feet in the Alluvial Floodplains. The soils are primarily clays and loam that weather into nutrient rich soils that can bake hard in summers and become very adhesive when wet. Streams in this region usually erode to chalk bedrock and are noted for high rates of runoff during storms and variable flows. In summers, many smaller streams will usually go dry, and flow in larger streams becomes quite low. The natural vegetation of the Blackbelt consists of a tall or medium tall broadleaf deciduous forest with concentrations of low needleleaf evergreen trees and patches of bluestem prairie. [1]

Figure 3:

Black Warrior River Basin USGS Cataloging Units
and USDA-NRCS Subwatersheds

CU	Subwatershed No	Subwatershed Name	Sq. Miles
03160109-		**Mulberry Fork**	**1,370.48**
03160109-	010	Mulberry Fork	129.97
03160109-	020	Duck River	63.39
03160109-	030	Brindley Creek	24.52
03160109-	040	Eightmile Creek	42.93
03160109-	050	Broglen River	44.81
03160109-	060	Blue Springs Creek	22.74
03160109-	070	Mud Creek	17.89
03160109-	80	Thacker Creek	57.43
03160109-	090	Mill Creek	40.46
03160109-	100	Sloan Creek	45.25
03160109-	110	Dorsey Creek	73.77
03160109-	120	Splunge Creek	96.44
03160109-	130	Blackwater Creek	142.64
03160109-	140	Little Blackwater Creek	19.60
03160109-	150	Cane Creek	63.80
03160109-	160	Old Town Creek	32.19
03160109-	170	Lost Creek	203.63
03160109-	180	Wolf Creek	135.32
03160109-	190	Baker Creek	57.74
03160109-	200	Bluff Creek	55.96

CU	Subwatershed No	Subwatershed Name	Sq. Miles
03160110-		**Sipsey Fork**	**996.25**
03160110-	010	Sipsey Fork of the Black Warrior River	130.36
03160110-	020	Sipsey Fork of the Black Warrior River	86.19
03160110-	030	Upper Brushy Creek	87.84
03160110-	040	Lower Brushy Creek	51.45
03160110-	050	Right Fork of Clear Creek	83.55
03160110-	060	Sipsey Fork of the Black Warrior River	78.48
03160110-	080	Upper Rock Creek	87.46
03160110-	090	Crooked Creek	58.07
03160110-	100	Lower Rock Creek	61.80
03160110-	110	Upper Ryan Creek	84.60
03160110-	120	Lower Ryan Creek	96.83
03160110-	130	Sipsey Fork of the Black Warrior River	52.55

CU	Subwatershed No	Subwatershed Name	Sq. Miles
03160112-		**Upper Black Warrior**	**1,255.25**
03160112-	010	Big Branch	6.97
03160112-	020	Upper Valley Creek	95.99
03160112-	030	Lower Valley Creek	154.21
03160112-	040	Little Shoal Creek	45.72
03160112-	050	Upper Big Yellow Creek	45.72
03160112-	060	Lower Big Yellow Creek	61.18

Figure 3 continued:

03160112-	070	Blue Creek	67.78
03160112-	080	Davis Creek	170.51
03160112-	090	Upper North River	140.38
03160112-	100	Lower North River	284.33
03160112-	110	Yellow Creek	54.66
03160112-	120	Hurricane Creek	127.80

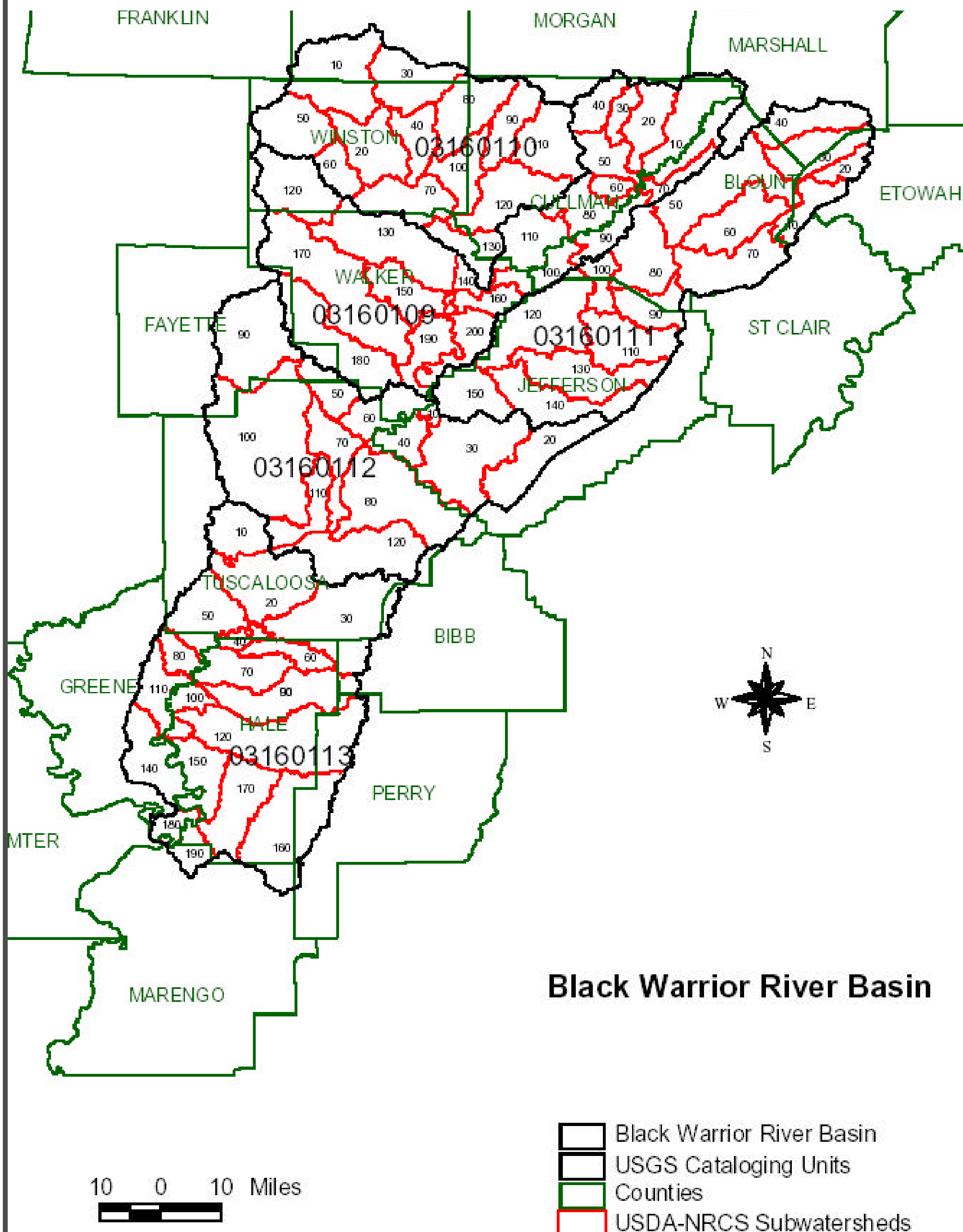
CU	Subwatershed No	Subwatershed Name	Sq. Miles
03160111		**Locust Fork**	**1,210.92**
03160111-	010	Upper Locust Fork	47.34
03160111-	020	Bristows Creek	25.14
03160111-	030	Clear Creek	73.16
03160111-	040	Lab Creek	69.65
03160111-	050	Middle Locust Fork	138.45
03160111-	060	Alvert Prong	87.01
03160111-	070	Blackburn Fork	100.91
03160111-	080	Sugar Creek	87.62
03160111-	090	Gurley Creek	56.20
03160111-	100	Hogeland Creek	32.61
03160111-	110	Turkey Creek	85.52
03160111-	120	Cane Creek	139.46
03160111-	130	Five Mile Creek	101.16
03160111-	140	Village Creek	94.53
03160111-	150	Lower Locust Fork	72.16

CU	Subwatershed No	Subwatershed Name	Sq. Miles
03160113-		**Lower Black Warrior**	**1,457.79**
03160113-	010	Big Creek	62.23
03160113-	020	Cypress Creek	119.12
03160113-	030	Big Sandy Creek	174.94
03160113-	040	Keaton Lake	16.89
03160113-	050	Grant Creek	89.74
03160113-	060	Elliotts Creek	36.82
03160113-	070	Gabriel Creek	68.28
03160113-	080	Davis Creek	29.53
03160113-	090	Fivemile Creek	110.03
03160113-	100	Coleman Branch	18.12
03160113-	110	Minter Creek	52.14
03160113-	120	Big Brush Creek	201.32
03160113-	130	Wrights Creek	9.46
03160113-	140	Dollarhide Creek	85.77
03160113-	150	Hines Creek	69.62
03160113-	160	Big Prairie Creek	162.44
03160113-	170	Little Prairie Creek	95.86
03160113-	180	Backbone Creek	22.42
03160113-	190	French Creek	33.06

Source: 1998 305(b) Report. Alabama Department of Environmental Management

Figure 4:

USDA - NRCS Subwatershed Map of the Black Warrior River Basin



Source: 1998 305(b) Report. Alabama Department of Environmental Management

C. LAKES AND RIVERS WITHIN THE WATERSHED

Smith Lake - Sipsey Fork Watershed

Lewis Smith Lake is an Alabama Power Company reservoir on the Sipsey Fork of the Black Warrior River watershed and is within Walker, Cullman, and Winston Counties. Draining into the Bankhead Reservoir, Smith Lake consists of 21,200 acres, but because of its extreme water depths, may hold more water than any lake in the state. The lake has 500 miles of shoreline and 944 square miles drain into the lake.

Construction began on Lewis Smith Dam on November 25, 1957 and was completed and placed in service on September 5, 1961. It is the largest earthen dam east of the Mississippi River. Smith Lake is a three-fingered lake with the Sipsey River making up the left fork, Rock Creek making up the middle fork and Ryan Creek making up the right fork.

In the spring, Smith Lake lake levels are stabilized to enhance bass spawning. Inflows are managed so that the lake elevation remains below 510 feet MSL to enhance fish spawning habitats in the lake.

Consumptive water users include the Water Works and Sewer Board of Birmingham, which has a raw water intake located approximately one-quarter mile downstream of the dam and is used for industrial and public water supply. This raw water intake provides a constant source of potable water for Birmingham. [2] Information obtained from ADEM and the EPA PCS database indicates that there are approximately 47 NPDES industrial permits, which allow discharges into the Smith sub-basin. In addition, there are 10 municipal/semi-public dischargers as well as 10 mining dischargers into Smith Lake. [2]

A diverse community of warm water fish species populates Smith Lake. Over 70 species of fish have been documented in the lake. Dominant recreational fish species include spotted bass and bluegill, with a forage base of gizzard shad and threadfin shad. In addition to the native fish species present, the ADCNR has stocked Gulf coast striped bass and Florida largemouth bass into the lake since 1980 to enhance recreational fishing. [2]

Bayview Lake - Locust Fork Watershed

Bayview Lake is a 554 acre, man-made reservoir constructed on Village Creek in Jefferson County in 1911 by the Tennessee Coal and Iron Company (now U.S. Steel Corporation). Its purpose was to provide a water supply reservoir for a coal mining village and, for the rolling mills and blast furnace operations at Ensley Iron Works. [3] When impounded by Bayview Dam, the reservoir received Village Creek flow, untreated wastewater from a number of industries along Village Creek (including Republic Steel Corporation's Coke By-Products operation at Thomas), as well as untreated sanitary wastewater and stormwater drainage from the Village Creek Watershed. [3]

Wastewater sources to Village Creek and subsequently Bayview Lake remained untreated until the late 1970's when the Clean Water Act of 1972 mandated compliance by 1977. In 1978, the Jefferson County Commission (Village Creek Treatment Plant) placed secondary treatment facilities in operation, US Steel Corporation closed its Ensley works, and, shortly thereafter, Republic Steel closed its Thomas Works. Discharges above Bayview have been further reduced as the result of other plant closures and connections to publically owned treatment works. [3]

In 1985, as a result of improvement in water quality, interest developed in stocking the lake with fish and improving its aesthetic quality. After successful stocking by the Alabama Department of Conservation and Natural Resources, inquiries were made, and analyses of water quality, fish tissue, and lake sediment were performed to evaluate the feasibility of this concept. [3] Findings showed improvement in water quality.

In 1988, a study was performed by ADEM to assess water quality, identify problem areas, and to develop appropriate corrective actions by 1992. Findings of the 1988 study indicated an extremely enriched water column, contaminated but seemingly non-bioaccumulative lake sediment, fish tissue exhibiting very slight organics bioaccumulation, and metals uptake not inconsistent with concentrations in fish from less impacted waters. [3]

Since then, overall appearance and water quality issues have improved since the upgrade of the Village Creek Wastewater Treatment. Obvious signs of eutrophication are absent and the lake is now used for recreational purposes.

In a 1990 report to Cawaco Resource Conservation and Development Council, a dam safety evaluation was performed by the Emergency Management Agency. The evaluation stated that, "Bayview Dam is badly deteriorated… No drawdown provisions are available should an emergency occur that would require the lake to be drained."

On June 20, 2003, the Birmingham News reported that the Adamsville zoning board approved a mining designation for 1,280 acres of US Steel Corp land near Bayview Lake. The land will be opened for methane gas drilling by Energen Corp, a sister company of Alagasco. Two test wells will be drilled on sites north and east of the lake. The drilling will extend through abandoned coal mines to untapped coal seams about ½ mile below the surface. [4]

Bankhead Reservoir - Upper Black Warrior Watershed

The Bankhead Reservoir contains 9,200 surface acres, the second largest lake on the Warrior River. Created in 1915, it is located approximately 15 miles west of Birmingham, and 30 miles northeast of Tuscaloosa and flows through Walker, Jefferson and Tuscaloosa Counties. The lake's clear waters stretch for 65 miles. This includes the Locust and Mulberry forks to the head of navigation. The John Hollis Bankhead Lock and Dam was completed for navigation and flood control by the U.S. Army Corps of Engineers in 1916. Spillway rehabilitation was completed in 1970 with lock work completed in 1970 and 1975. On July 12, 1963, Alabama Power Company completed power production facilities. The Bankhead Hydroelectric Project is owned by Alabama Power while the dam and lock chamber are owned by the U.S. Government and operated by the Army Corps of Engineers.

All development on the lake is either privately owned or commercial. The primary uses for this reservoir are navigation, hydroelectric generation, flood control, and recreation. Development of shoreline property is extensive and includes private residences and commercial marinas. Camping, boating and fishing provide the main recreational opportunities on this reservoir.

Bankhead Lake and its tributaries are inhabited by a diverse community of warm water fish species, including many sport and commercial species. A total of 113 fish species are believed to be present in the lake and its drainage (ADCNR, 1988).

Dominant recreational fish species include largemouth bass, spotted bass, white crappie, hybrid striped bass, bluegill and rainbow trout. Fish stocking has been limited to hybrid striped bass and the Florida subspecies of largemouth bass. [2]

The City of Birmingham has a water withdrawal at the far upper end of Bankhead Lake. Numerous other facilities, permitted by ADEM, discharge wastes either directly into Bankhead Lake and/or and its major tributaries. Among these dischargers are industrial wastewater dischargers, municipal /semi-public wastewater facilities, as well as mining and other non-point runoff sources. ADEM monitors these facilities and establishes and enforces water quality standards through the issuance of discharge permits. Information obtained from ADEM and the EPA PCS database indicates that there are approximately 378 NPDES industrial permits, which allow discharges into the Bankhead sub-basin. In addition, there are 56 municipal /semi-public dischargers as well as 205 mining dischargers into the Bankhead Lake. [2]

Lake Harris - Lower Black Warrior Watershed

Lake Harris is located just before Yellow Creek flows into the Black Warrior River and is one of the three man-made lakes (Lake Tuscaloosa, Lake Nichol, and Harris Lake) that supply water to the City of Tuscaloosa, Northport and portions of Tuscaloosa County.

Lake Nichol - Lower Black Warrior Watershed

Lake Nichol is built on Yellow Creek and is a man-made lake featuring a dam built in 1954 at the south end of the lake. It is one of three man-made lakes (Lake Tuscaloosa, Lake Nichol, and Harris Lake) that supply water to the City of Tuscaloosa, Northport and portions of Tuscaloosa County. These three lakes contain a combined 44 million gallons of water and cover over 6,480 acres of land. The dams are overseen by the City of Tuscaloosa Water and Sewer Department. The surface water of the lakes are considered to be inside the city limits of Tuscaloosa.

Lake Tuscaloosa - Lower Black Warrior Watershed

Located five miles north of the cities of Tuscaloosa and Northport in west central Alabama, Lake Tuscaloosa is a 5,885-acre water supply reservoir with 177-miles of shoreline. The tailwater area (North River) drains into the Black Warrior River basin and is a popular recreational area to many anglers. When the reservoir was impounded by the City of Tuscaloosa in 1971, little material was left behind to serve as fish habitat. Consequently, biologists suspected that the lake would be clear and infertile with relatively low fish production. This has proved to be the case, and water visibility near the dam often exceed 20-feet. Upper reaches of the lake near Binion and Turkey Creeks are more fertile, have lower water visibility, and are generally better areas to fish.

The Alabama Wildlife and Freshwater Fisheries Division has stocked numerous sport fish into Lake Tuscaloosa beginning in 1970, which include largemouth bass, walleye, hybrid striped bass and saltwater striped bass. The Division stopped stocking both hybrids and striped bass in the mid-80's after fisheries biologists determined that production and recruitment of forage species was very limited.

Overall, the status of the fish population in Lake Tuscaloosa remains unchanged from the 1980s. The fishery remains forage limited and growth of important sport fish species such as black bass and crappie range from below average to average.

Besides North River, several creeks supply water to the lake: Binion Creek, Turkey Creek, Dry Creek, Carroll's Creek, Brush Creek, and Clear Creek.

Holt Lake - Lower Black Warrior Watershed

Holt Lake is a narrow winding body of water, which stretches for 18 miles and encompasses 3,200 surface acres. The lake lies six miles northeast of Tuscaloosa, Alabama. Holt Lake was formed by the damming of the Black Warrior River at mile 347.0. Construction of the lock and dam was completed in 1966.

Oliver Lake - Lower Black Warrior Watershed

Oliver Lake was formed by the construction of the William Bacon Oliver Lock and Dam. The Lake is nine miles long with approximately 1,000 surface acres. Recreational development is limited to boat launching facilities and day use areas, which are located within the Tuscaloosa city limits and managed by the Tuscaloosa County Park and Recreation Authority.

D. CITIES AND TOWNS

The Black Warrior River Watershed encompasses two major metropolitan areas, Birmingham and Tuscaloosa, and a multitude of municipalities and communities. Communities within counties containing the majority of the watershed are as follows:

<u>Blount County</u>

Allgood	Highland Lake	Remlap
Blountsville	Locust Fork	Rosa
Cleveland	Nectar	Snead
County Line	Oneonta	Susan Moore
Hayden	Pine Mountain	

<u>Cullman County</u>

Baileyton	Dodge City	Joppa
Bremen	Fairview	Logan
Coal Springs	Garden City	South Vinemont
Colony	Good Hope	Vinemont
Crane Hill	Hanceville	West Point
Cullman	Holly Pond	

<u>Fayette County</u>

Alta	Boley Springs	Pea Ridge
Bankston	Cleveland	Studdard's Crossroads
Berry	New Hope	

<u>Greene County</u>

Birdine	Forkland	Knoxville
Eutaw	Jackson's Quarters	

<u>Hale County</u>

Akron	Havana	Sawyerville
Cypress	Moundville	Stewart
Greensboro	Newbern	

<u>Jefferson County</u>

Adamsville	Fairfield	New Castle
Adger	Forestdale	North Johns
Bessemer	Fultondale	Palmerdale

Birmingham
Brighton
Brookside
Cardiff
Center Point
Coalburg
Dixiana
Docena
Dolomite
Ensley
Gardendale
Graysville
Hueytown
Kimberly
Lipscomb
Maytown
Midfield
Morris
Mount Olive
Mulga
Pinson
Pleasant Grove
Sayre
Sylvan Springs
Tarrant
Trafford
Warrior
Watson
West Jefferson

Tuscaloosa County

Brookwood
Bull City
Burchfield
Cedar Cove
Coaling
Coker
Cottondale
Dudley
Duncanville
East Brookwood
Englewood
Fleetwood
Hagler
Holt
Howton
Hull
Kellerman
Lakeview
Little Sandy
Maxwell
Mount Olive
New Lexington
Northport
Pattersontown
Pearl
Pearson
Peterson
Samantha
Sandtown
Searles
Sterling
Taylorville
Thompson's Mill
Tuscaloosa
Whitson
Wiley
Windham Springs
Yolanda

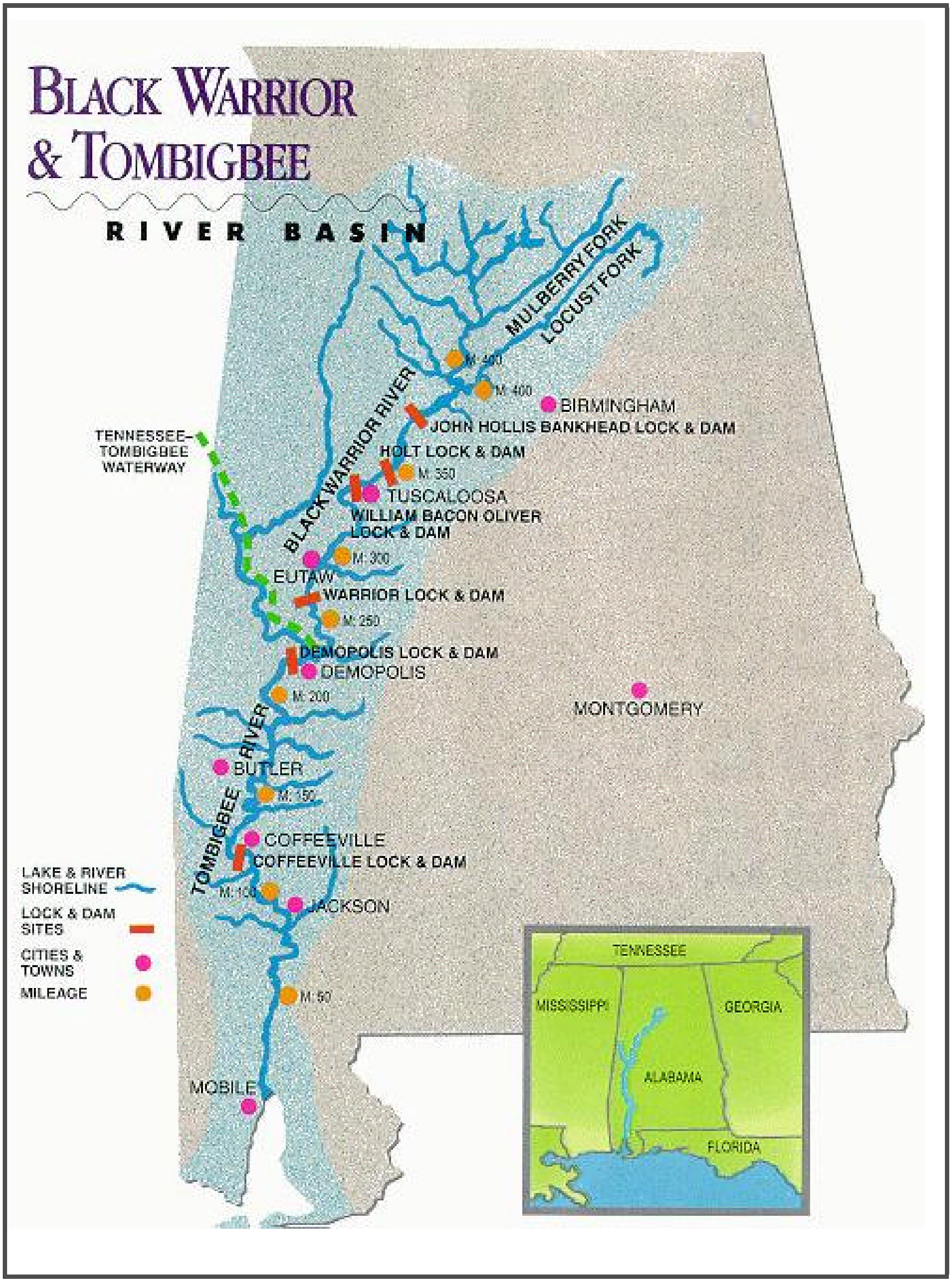
Walker County

Burnwell
Carbon Hill
Cordova
Dora
Eldridge
Parrish
Goodsprings
Jasper
Kansas
Nauvoo
Oakman
Quinton
Sipsey
Sumiton
Townley
Empire

Winston County

Addison
Arley
Delmar
Double Springs
Haleyville
Houston
Lynn
Natural Bridge

Figure 5: Locks and Dams of the Black Warrior and Tombigbee River Basin



Source: U.S. Army Corps of Engineers

E. LOCKS AND DAMS

There are five dams along the Black Warrior River. Included in these are:

- Lewis Smith Dam
- Holt Lock and Dam,
- John Hollis Bankhead Lock and Dam
- William Bacon Oliver Lock and Dam
- Armistead I Selden Lock and Dam, also known as the Warrior Dam

The Lewis Smith Dam is managed by Alabama Power Company and is the only dam on the system that does not have a lock associated with it. The U.S Army Corps of Engineers manages the other four sites. As part of the structure at John Hollis Bankhead Dam and Holt Dam, Alabama Power Company constructed and currently operates hydroelectric power plants. [33]

Figure 6:
Holt Lock and Dam

Source:
United State Army Corp of Engineers, 1998

F. ENVIRONMENTAL IMPORTANCE

The Black Warrior River and its tributaries are environmentally important for several reasons. Many Alabamians depend on the use of the Black Warrior water system as it flows through several of the most populated areas of the state. Users vary from people in urban and suburban areas to industrial entities to crop and livestock farmers, all of whom employ the water resources of the watershed in their daily activities. Other uses of the Warrior watershed vary from municipal water supplies, to wastewater receiving bodies, to transportation, to a source of electrical power, and recreation sites.

Undeveloped portions along lakes and streams serve both as buffer strips to filter out pollution and as important biological habitats that increase the potential for biodiversity. Because so many parts of the watershed have been detrimentally altered over the years, it is important to maintain these areas for their habitat, environmental and aesthetic benefits.

Endangered Species

Another example of the environmental importance of the Black Warrior basin is that it is home to many endangered species listed by the National Fish and Wildlife Service. These species are listed in Figure 7.

Figure 7:

ENDANGERED OR THREATENED SPECIES WITHIN THE BLACK WARRIOR RIVER BASIN

Alabama Moccasinshell Mussel	Kral's Water Plantain
Alabama Streak Sorus Fern	Leafy-Prairie Clover
Bald Eagle	Orange-nacre Mucket Mussel
Cahaba Shiner	Ovate Clubshell Mussel
Coosa Moccasinshell Mussel	Plicate Rocksnail
Dark Pigtoe Pearly Mussel	Red-cockaded Woodpecker
Eggert's Sunflower	Southern Clubshell Mussel
Fine-lined Pocketbook Mussel	Stirrupshell Mussel
Flat Pigtoe Mussel	Triangular Kidneyshell Mussel
Flattened Musk Turtle	Upland Combshell Mussel
Gray Bat	Vermilion Darter
Heavy Pigtoe Mussel	Watercress Darter
Indiana Bat	Wood Stork
Inflated Heelsplitter Mussel	

Source: U.S. Fish and Wildlife Service

Mussels

Alabama's diversity of freshwater mussels is greater than anywhere else in the world, including some tropical areas. There are 307 known species of freshwater mussels found in North America, as recognized by the American Fisheries Society. A total of 180 species have been reported from Alabama, representing 59 percent of the total. [5] It is estimated that there are 50 known species existing today within the Black Warrior River Basin.

Two factors play a role in Alabama's high diversity of mussel species. One of the factors is the wealth of river systems in the state. The other factor is that the river systems in the state are very old. The fact that the mussels in the Alabama region are separated in different drainages, and have been isolated for a very long time, have allowed them to evolve into the multitude of species seen today. [5]

Though the diversity of freshwater mussels in the state remains high, many species have been lost due to destruction of their habitat by human alterations to river systems. Most species require flowing water over clean, stable sand and gravel. Water pollution and construction of dams on major rivers such as the Black Warrior have eliminated many species from our state and even driven quite a few close to extinction. Also detrimental to mussel habitat is dredging and channelization of rivers. These activities cause destabilization of the river bottom and mussels cannot survive in loose, shifting sediments. [5]

Some mussels can use a wide variety of fishes as hosts during their life cycle and are referred to as 'host generalists,' but many species are intensely host-specific, meaning only one or a few species are suitable as hosts. The construction of dams and canals has severely altered mussel habitat. Some fish no longer thrive in the tailwaters downstream of dams. Therefore, the mussels that rely on these fish for reproduction have also become extinct. The dams have also altered the speed and depth of water through stream basins, and both factors determine which types of mussel survive in an area and which may not. [6]

Another effect of destroying habitat on major rivers is that populations in tributaries become isolated. So, what was once a single large population of a particular species becomes fragmented into a number of smaller populations, separated from each other by expanses of poor habitat, following impoundment of a river. These smaller populations are more susceptible to be removed or destroyed than larger populations and often lack the genetic diversity to help them overcome adverse conditions. [5]

Species Re-introduction

But, even though many species have been lost, there are some bright spots. Several areas of good habitat with diverse mussel assemblages remain in Alabama.

On July 19th, 2003, the Tennessee Aquarium Research Institute released nearly 5,000 - one year old artificially propagated plicate rocksnails (Leptoxis plicata) into the Locust Fork of the Black Warrior River above Birmingham. This is believed to be the first release of an artificially cultured endangered freshwater snail in the United States. It was the first of five annual releases planned in hopes of restoring the population of a federally endangered species. [8]

Though small, the plicate rocksnail is a cornerstone species upon which all the other animals living in the river depend, said Paul Johnson, a research scientist with the Tennessee Aquarium Research Institute. The snail lives beneath large, flat rocks and eats algae and organic matter; it is food for turtles and fish. Sixty years ago, the half-inch-long snail was so plentiful in the Locust Fork that a person standing anywhere in the river's shoals would have a couple dozen snails under each foot, Johnson said. Now those snails are almost gone, victims of pollution and sediment washed into the river. [8]

Once found along the entire length of the river, their numbers have diminished so much that they are found in only a few shoals along a 20-mile stretch between Interstate 65 and U.S. 78, about 2 percent of their original habitat.

A few smaller rivers and streams, such as the Sipsey River and many of the streams in Bankhead and Talladega National Forests, both in the Black Warrior River Watershed, have mussel faunas that are basically intact. [5] Continued vigilance in the monitoring of water quality and in the prevention of future insults to the environment is essential if we are to preserve this valuable facet of our legacy. [6]

Critical Habitat

The U.S. Fish and Wildlife Service is proposing that portions of rivers and streams, totaling some of 1,093 miles in Alabama, Georgia, Mississippi, and Tennessee, be designated as critical habitat for 11 federally listed freshwater mussels. All 11 mussels were listed March 17, 1993, under the Endangered Species Act (ESA). The final determination of critical habitat will be made by March 17, 2004.[9] Of these 11 species, 9 are historically known to occur within the Black Warrior River Basin. These species include:

- Alabama moccasin shell - Sipsey Fork

- Orange-nacre Mucket Mussel - three tributaries within the Sipsey Fork
- Fine-lined Pocketbook Mussel - tributaries above the Fall Line
- Coosa Moccasinshell Mussel - Black Warrior
- Dark Pigtoe Pearly Mussel - North River and Sipsey Fork
- Orange-nacre Mucket Mussel
- Southern Clubshell Mussel
- Triangular Kidneyshell Mussel- Sipsey Fork and Locust Fork
- Upland Combshell Mussel

As listed species under the ESA, the mussels are already protected wherever they occur and Federal agencies are required to consult on any action taken that might affect these species. [9]

As part of designating critical habitat, the Service also takes into account the economic impact, as well as any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude any area from critical habitat if it is determined that the benefits of excluding it outweigh the benefits of specifying the area as a part of critical habitat, unless it is determined that the failure to designate the area as critical habitat will result in the extinction of the species. [9]

Fish

A recent biomonitoring study of the Mulberry Fork drainage system was prepared by the Geological Survey of Alabama. Sampling was performed to determine the presence of several uncommon fish species that have recently been found to be widespread in the Locust Fork, an adjacent and similar drainage system. Targeted species for study included the Cahaba shiner *(Notropis cahabae)*, coal darter *(Percina brevicauda)*, and Tuskaloosa darter *(Etheostoma douglasi)*. [10]

Figure 8: A male Vermillion darter from Turkey Creek

A recent biological assessment of the Locust Fork of the Black Warrior River (Shepard and others, 1998) revealed significant new records of several fish species in that drainage. One of these was the Cahaba shiner, a federally listed species previously known from approximately 75 river miles of the Cahaba River. The Cahaba shiner was found in approximately 64 river miles of the Locust Fork, and apparently, in greater abundance than in the Cahaba River. Two other species - the Tuskaloosa darter and the coal darter - were also found to be much more widespread than previously known. [10]

Plants

The Alabama Streak-Sorus Fern (Thelypteris pilosa var. alabamensis) is listed as threatened without critical habitat. It is only known to occur along a 4.25 mile segment of the Sipsey Fork, a tributary of the Black Warrior River in Winston County, Alabama. The majority of the extant sites are on U.S. Forest Service land (Bankhead National Forest). [11]

Bankhead National Forest

The Alabama National Forest was established in 1914 as a result of the Weeks Act, the primary purpose of which was to protect the nation's watersheds and stream courses. During the 1930's, with the help of Civilian Conservation Corp labor, the Forest was replanted to establish a healthy forest cover on previously abandoned cutover lands. This helped to limit chronic erosion, reestablish productive soils, and maintain the forest habitat and riparian corridor. The administrative boundary of the Bankhead Ranger District incorporates the headwaters of the Sipsey Fork- a tributary of the Black Warrior River. Seven 5th level Black Warrior Basin watersheds have land under Forest Service ownership within the administrative boundary. Forest cover is the predominate land use with agriculture the second most common.

The pride of the Bankhead National Forest water resources is found in the Wild and Scenic River corridor along the Sipsey Fork. Designated by Congress in 1988, 61.4 miles of the Sipsey Fork including its headwaters and tributaries are part of the National Wild and Scenic River System. This designation allows for the maintenance of the striking landforms, diverse plant life and outstanding scenery associated with this resource. This is one of the most frequently visited free flowing rivers in Alabama, wonderful for canoeing and floating during the fall and spring. [34]

G. CLIMATE

The climate of the watershed area is humid subtropical without a dry season, but with hot summers (Christopherson, 2000). This means the summers are warm and humid, due to domination of maritime tropical air from the Gulf and the Atlantic. The incoming warm, moist air forms convectional storms and thunderstorms in the watershed area. The winters are relatively mild, with an occasional bout of more extreme weather when continental polar air masses sweep down from the northwest and collide with the maritime tropical masses to create frontal storms (Christopherson, 2000).

The average temperature of the area covered by the watershed ranges from 60-64°F depending on altitude and other factors. For example, in mountainous areas, the valleys are usually hotter in the summer than higher altitudes. *(See Appendix A.)*

The average annual precipitation is about 54 inches, with some significant areas in the northwest and the south receiving between 50 and 52 inches. The average annual runoff within the watershed varies between 26 to >30 inches per year (United States Geological Survey, 1996). *(See Appendix A.)*

H. PHYSICAL AND GEOLOGICAL FEATURES

The Black Warrior River watershed spans fairly diverse types of geological formations, it is comprised of many types of soils. The geology can be described regionally (that is, whether they are in the upper, lower, or northern tributary region of the watershed); the soil types reported here are the generalized descriptions of each county's predominant soil type.

Figure 9:
Locust Fork near Cleveland, Alabama

Geology

The upper portion of the Black Warrior basin (Blount, Cullman, and Winston Counties) is dominated by the Appalachian Plateau.

However, in Blount County, there are significant limestone ridges and valleys, which run from northeast to southwest, following the Appalachian mountain chain. Cullman and Winston Counties are essentially completely within the Appalachian Plateau, although the northwest corner of Winston is mostly major floodplains and terraces, with some coastal plain region as well. The major portion of the Middle Black Warrior River watershed (Walker and Jefferson Counties) can also be described as Appalachian Plateau. The limestone ridges and valleys continue their diagonal stretch across the length of western Jefferson, forming an abrupt border for the river basin. Walker County, like Winston, contains some major floodplains and terraces in the northeast corner. In the Lower Black Warrior watershed (Tuscaloosa and Hale Counties), the floodplains and terraces appear in larger percentages in the western half of the counties. While northeastern Tuscaloosa County lies within the Appalachian Plateau, the fall line runs across the county, separating this section of the county from the coastal plain region. The northern half of Hale County can also be typified as being within the coastal plain region, but the lower half actually lies within the Blackland Prairie, also known as the Blackbelt, for the color of the dark, nutrient-rich soil.

In traversing such a broad area, the Black Warrior River watershed drains a variety of geographical regions. The northern headwaters lie in the Appalachian Plateau, while additional tributaries feed in from limestone ridge and valley regions

Figure 10: Five Mile Creek, near its mouth, at Highway 78 in Graysville

(at the end of the Appalachian Mountain chain) as well as the softer sediments of the coastal plain region on the other side of the Fall Line (the boundary between the Appalachian and the Atlantic Coastal Plain regions). The Black Warrior waterways finally draw to their end within the Blackbelt, a historically agricultural area due to its rich soils.

Soils

(See Appendix A Soil Map of Alabama.) There are fifteen counties in the Black Warrior River Watershed. Of these, the summary included has been limited to the counties containing the majority of the watershed area: Blount, Cullman, Jefferson, Fayette, Tuscaloosa, Walker, and Winston. There is no data available at this time for Winston County. *See Appendix A for a list of predominate soil types by county.*

Mineral Resources

See Appendix A - Mineral Resources. The Black Warrior Basin has a long history of mineral production. The basin has been mined for coal, limestone, iron ore, and sand & gravel for over 150 years. Coal was the primary mineral extracted at a commercial scale beginning in the early to mid 1800s and was produced in the early years from beds located in creeks and riverbeds to provide fuel for heating and forging as well as trade. Later, systematic forms of mining such as surface and underground mining were employed to recover the resource. [12]

Iron ore and limestone were mined in the 1800s to provide the raw materials for the industry that made the Birmingham area a center of iron and steel-making in the south. The majority of the iron ore was used to provide raw materials for the local forges and steel-making facilities. History shows that these early forges were a target of the Union force during the Civil War as arms-making centers. [12]

Limestone was used as a flux material for iron making in this era and it is still used today for cement and aggregate. Sand and gravel contributed to the cement and construction aggregate industry. This industry still provides materials for today's market. Oil & gas production had been limited until the early 1980s when coal-bed methane (CBM) became a prominent form of energy. The industry has grown from a few wells in the 1980s to over 3000 today. [12]

The major mineral industries in the Black Warrior Basin today are coal mining and CBM. Over the past 20 years, the majority of coal mining has moved from surface mining to underground mining. These changes in extraction methods have led to lessening of siltation from the removal of overburden material affecting the watershed. CBM has continued to prosper as the demand for clean energy increases. These methods of extraction create the potential for degradation to the river basin from rock dumps and settling ponds in coal mining to the production of waters high in chlorides and metals from CBM. [12]

Today mining and CBM fall under the NPDES system, which requires water quality compliance that meet standards to reduce the amount of excessive metals, chlorides and acidic waters introduced to the watershed. Prior to NPDES, water quality remained unchecked and degradation of the watershed increased. Many of the old areas of mining produce acid mine drainage (AMD) and high metal concentrations are still in existence today and contribute acid waters and high mineral concentrations to the watershed. Some of the most pronounced areas of AMD and concentrations of metals have been abated by remining or reclamation but many areas still exist today. [12]

Programs exist that provide funding for remediation of these sites but has been limited over the past several years. The Office of Surface Mining (OSM) and Alabama Department of Industrial Relations - Abandoned Mine Lands Division, provide funding for reclamation and remediation of AMD and excessive metals in the Black Warrior River basin. Efforts should be made to increase the funding from these sources to provide abatement of the AMD and excessive metal problems that exist. [12]

Mineral Fuel Extraction

Coal Resources. The main mineral resource within the area is coal, as the watershed is located in a significant coal basin that stretches throughout the Appalachians, sloping down into the earth as it reaches the westward edge of its range in Mississippi. In the Northern Appalachians, this coal basin is close to the surface and can be easily mined by surface mining methods. As the coalfield extends into Mississippi, it is sloped so deeply underground that it is not economically feasible for extraction. (Office of Surface Mining-Birmingham Field Office, June 2002). [13]

A total of 9,700 square miles of Alabama are underlain with high-volatile A bituminous coal. The main use for Alabama coal is for electric power generation, followed by methane gas recovery and coke production (Office of Surface Mining-Birmingham Field Office 2001). The estimated amount of recoverable coal is 3.1 billion tons, with 0.7 billion tons recoverable by underground mining and 2.4 billion tons recoverable by surface mining techniques (Birmingham Field Office, 2001). The Warrior coalfield is one of the four Alabama coalfields that are part of the great Appalachian coal basin. Most of the state's current mining is within the Warrior Coal Field (Birmingham Field Office, 2001). [13] Figure 11 provides the production values by county in short tons of coal mined for the year 2001.

Figure 11:

PRODUCTION VALUES BY COUNTY OF
COAL MINED IN THE BLACK WARRIOR RIVER WATERSHED
(IN SHORT TONS, FY 2001)

COUNTY	SHORT TONS
Cullman	259,582
Fayette	2,815,696
Jefferson	6,365,817
Tuscaloosa	7,117,943
Walker	1,808,996
Winston	312,273

Source: Alabama Department of Industrial Relations, Office of Mine Safety and Inspection, Annual Statistical Report, Fiscal Year 2001.

As of September 30, 2002, 27 permitted surface mines, nine (9) permitted underground mines, and four (4) preparation and loading facilities were actively producing coal in Alabama. Approximately 80 percent of the mine sites are located in the Black Warrior River Basin in Jefferson, Tuscaloosa, and Walker Counties. [14]

Coal-bed Methane. Methane (natural gas), while perhaps most closely related with petroleum, also occurs in association with coal, the Nation's most abundant fossil fuel source. Methane occurs in most coals and coal-bed methane accounts for about 7.5 percent of the total natural gas production in the US. [15]

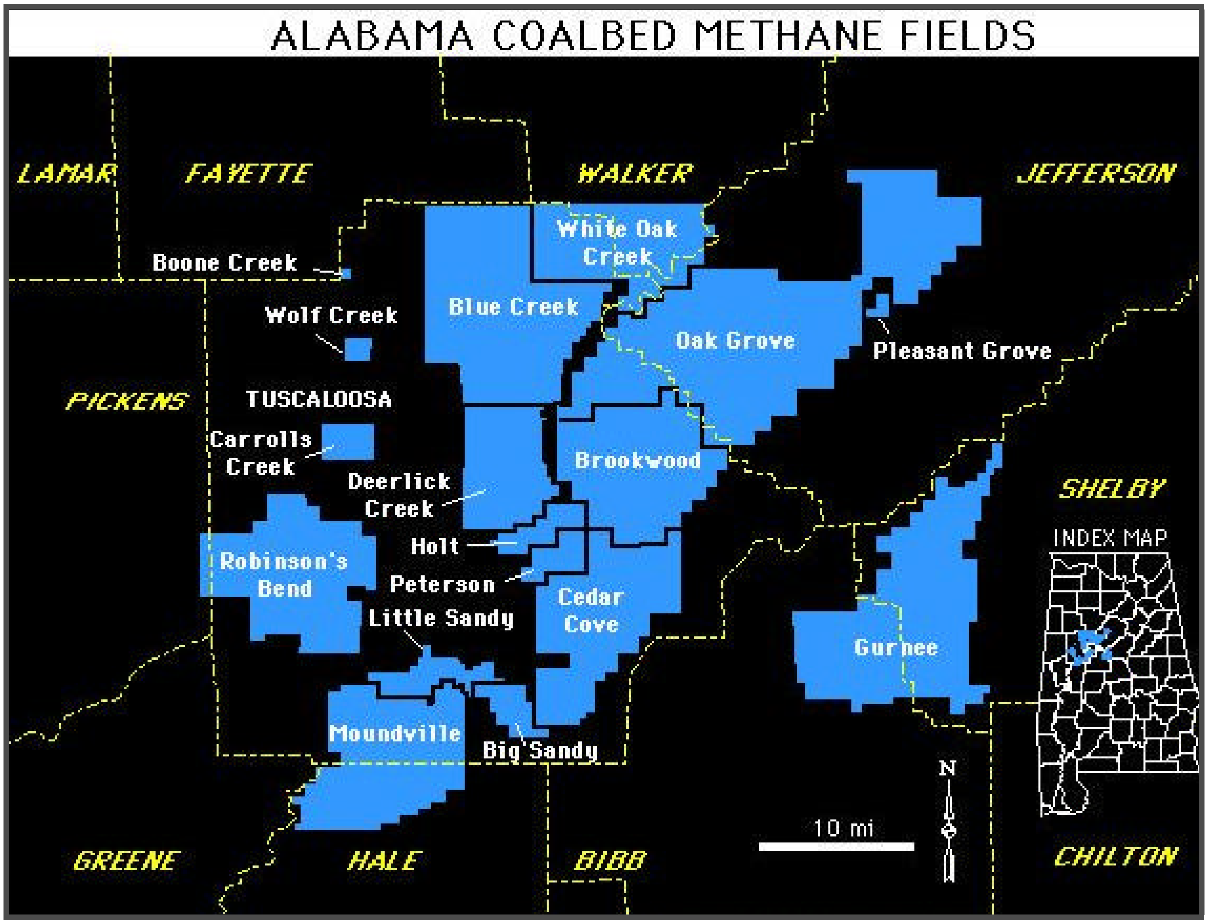
During coalification, large quantities of methane-rich gas are generated and stored within the coal on internal surfaces. Because coal has such a large internal surface area, it can store surprisingly large volumes of methane-rich gas; six or seven times as much gas as a conventional natural gas reservoir of equal rock volume can hold. In addition, much of the coal, and thus much of the methane, lies at shallow depths, making wells easy to drill and inexpensive to complete. With greater depth, increased pressure closes fractures in the coal, which reduces permeability and the ability of the gas to move through and out of the coal. [15]

The establishment of economic production of coal-bed methane in the Black Warrior basin of Alabama during 1980 demonstrated the viability of coal-bed methane as a source of pipeline gas. Coal-bed methane is currently being produced in the eastern, midcontinental, and western United States and accounts for approximately 6 percent of the nation's gas supply. Cumulative production from the 20 coal-bed methane fields *(See Figure 12)* of Alabama now exceeds 1 trillion cubic feet (tcf), and annual production has stabilized at about 110 billion cubic feet (bcf) since 1994. Coal-bed methane resources in the Pottsville Formation (Lower Pennsylvanian) of Alabama and Mississippi have been estimated to be between 10 and 22 tcf, and reserves are thought to be slightly greater than 2.5 tcf. [16]

Increased production of coal-bed methane, however, carries with it some technological and environmental difficulties and costs. In a conventional oil or gas reservoir, for example, gas lies on top of the oil, which, in turn, lies on top of the water. An oil or gas well draws only from the petroleum that is extracted without producing a large volume of water. But water permeates coal beds, and its pressure traps methane within the coal. To produce methane from coal beds, water must be drawn off first; lowering the pressure so methane can flow out of the coal and to the well bore. [15]

This water, which is commonly saline but in some areas can be potable, must be disposed of in an environmentally acceptable manner. Typical coalbed methane wells produce water in large volumes, especially in the early stages of production. As the amount of water in the coal decreases, gas production increases. In some cases water is injected into approved subsurface formations by a disposal well permitted by the State Oil & Gas Board. Most of the water, however, is disposed of after treatment under NPDES permit issued by ADEM.

Figure 12:



SOURCE: Basic Data for Coal-bed Methane Assessment in the Black Warrior Basin. Geological Survey of Alabama and USGS.
http://www.gsa.state.al.us/gsa/CBM%20assessment/CBMA_Web_page/CBMAWebPage.htm

In 1989, the Geological Survey of Alabama initiated a study in the Big Sandy Creek drainage in order to characterize hydrologic conditions and biological communities prior to the discharge of coalbed methane produced waters and to document any changes in these parameters after discharge began. Water-quality, fish, and invertebrate samples were collected. In general, the fish and benthic invertebrate faunas of the system were found to be diverse and abundant.

After produced water discharge began in April 1990, concentrations of total dissolved solids increased significantly over pre-discharge levels. Produced waters discharged into Big Sandy Creek were found to be higher in total dissolved solids, chloride, and bicarbonate compared to produced waters from the middle and northeast portions of the Black Warrior River basin. No adverse impact to the diversity or abundance of the fish and invertebrate communities inhabiting Big Sandy Creek due to the discharge of produced waters was detected.

Mineral Non-fuel Extraction

Non-fuel minerals are mined within the Black Warrior River Basin and contribute greatly to the state's economy. Examples of non-fuel minerals mined in Alabama are: sand, gravel, clay, bauxite, and shale. Lands mined for these minerals are reclaimed in accordance with the Alabama Surface Mining Act of 1969. [12] *(Also See Section 8: Existing Programs and Mechanisms.)*

Alabama Department of Industrial Relations
Non-Fuel Surface Mining Fact Sheet [17]

- An average of six (6) new permits are issued each month.
- There are 639 total permitted sites (active, abandoned, pending release).
- Approximately 500 sites are exempt by mineral category or illegally operated.
- Approximately 1,000 sites operated by state, county, and city road departments are exempt.
- Less than 50 percent of all surface mining activity is inspected while mining is in progress. Additional funding is needed for inspections.

Clay and Shale. Clay and shale resources occur throughout the Warrior basin in the Pottsville Formation. Shale is a fine-grained sedimentary rock formed by the consolidation of clay and mud and has a finely laminated to blocky structure. The Pottsville shale is typically interbedded with sandstone, siltstone, and coal. The mineralogy of shale in the Pottsville is predominantly quartz and kaolinite with variable amounts of montmorillonite, chlorite, feldspar, and iron oxide. The dark-gray to black shale has a high content of carbonaceous material. [12]

Firing characteristics of Pottsville shale indicate generally uniform physical characteristics making it suitable as raw material for the manufacture of structural clay products and lightweight aggregate. Shale mined in Walker County from the Pottsville Formation is currently used as a blending ingredient for the manufacture of brick and tile. Weathered shale and refractory clay of the Pottsville Formation were used at Cordova for manufacturing brick from the 1920's to the 1970's. This large brick operation with 12 beehive kilns, located 2 miles west of Cordova (NW1/4NW1/4 sec. 7, T. 6 W., R. 15 S.), had a ready local market for manufactured clay products such as tile, glazed brick, and face brick. Brick made in Cordova was also used throughout the state for commercial and residential construction. Clay and weathered shale were also made into common brick and face brick as early as the 1890s in Jasper. Brick operations continued for a number of years in Jasper before closing in the early 1900s.[12]

The Cordova district (regionally defined as clay production from Walker County) is one of the principal refractory clay producing areas in the eastern United States. Approximately 5.9 million short tons of clay have been mined in Walker County since 1925. Continuous production of refractory clay dates back to the early 1940s. Since 1970, a production of 107,500 short tons of refractory clay has been mined annually in Walker County, representing about 38 percent of the state refractory clay production.[12]

Clay production has come principally from the Mary Lee and Black Creek coal groups in Walker County. At present, refractory clay is typically excavated in conjunction with coal surface mining operations; however, clay has also been produced from underground coal mining operations principally from 1941-74. [12]

Sand and Gravel. Within the Black Warrior River Basin, sand and gravel are mined in Cullman, Blount, Jefferson, Tuscaloosa, Hale and Greene Counties. Sand and gravel resources of the Coker Formation that occur north and south of Eldridge in western Walker County have been used intermittently for construction material (principally road fill and base material). The small area distribution of deposits limits the resource potential of sand and gravel in Walker County. Quaternary alluvium is a source of sand and gravel and was mined from the Mulberry Fork (at Cordova in the 1920s for use as molding sand. [12]

The lack of appreciable amounts of well-sorted quartzose material and small area extent of deposits (not shown on mineral resource map) prevented any other use of alluvial material for sand or gravel. The Pottsville Formation contains quartzose sandstone and conglomerate, which are potential sources of sand and gravel, providing the rock is sufficiently weathered and decomposed to allow excavation. Highly weathered quartzose residuum can produce good quality sand and gravel suitable for construction material or silica sand, and is mined at Bremen in Cullman County. [12]

Sandstone. Sandstone is present throughout the Warrior basin as a medium-grained sedimentary rock that frequently contains small-scale sedimentary structures and fossils and is composed of quartz sand grains cemented together by silica or iron oxide. Sandstone of the Pottsville Formation is the most common nonfuel mineral resource in the Warrior basin and is quarried at Berry in Fayette County. [12]

Ecoregions

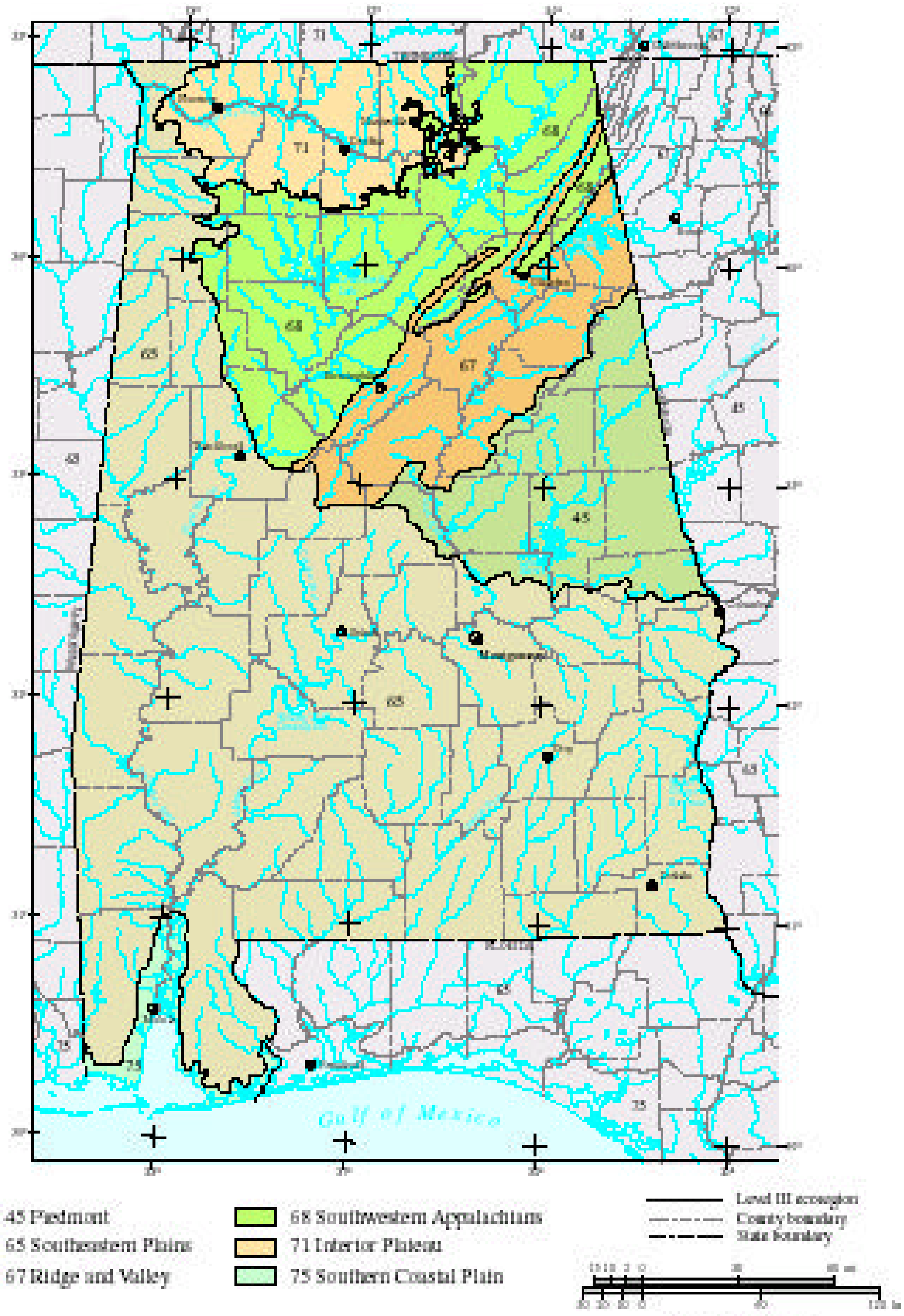
Areas where ecological systems are generally similar are identified as ecoregions. Ecoregions are based on coincident patterns of natural factors such as geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology (Omernick, 1987; Griffith and others, 1998). Ecoregions can provide a framework for assessing ecological conditions with respect to the natural environment setting. [18] There are three distinct ecoregions within the Black Warrior River Basin: Southeastern Plains, Southwestern Appalachian, and Ridge and Valley.

The Southeastern Plains ecoregion covers an extensive part of the Black Warrior River Basin. The landscape is smooth to irregular plain or flatlands separated in some places by curved bands of asymmetrical ridges and rugged hills. Surface elevation ranges from as little as 25 feet above sea level in the southernmost plains to over 400 feet above sea level in the hills. The streams draining this ecoregion are generally low gradient with silty and sandy substrates. Forest and woodland areas are prevalent and are a part of the mosaic of cropland, pasture, and urban areas which dot the landscape. The natural vegetative cover includes oak, hickory, pine, and southern mixed forests. The dominant soils are formed from the weathering of the underlying clastic sediments and are better drained than soils of the Southern Coastal Plain. Soils overlying clayey or chalk deposits, however, are poorly drained. [18]

The Southwestern Appalachians ecoregion extends from Kentucky to Alabama. These open low mountains contain a mosaic of forest and woodland with some cropland and pasture. The landscape is drained by streams of moderate gradient with cobble, gravel, and bedrock substrates. The surface elevation ranges from about 250 feet above sea level in the southwest to about 1,100 above sea level in the

Figure 13:

LEVEL III ECOREGIONS OF ALABAMA



northeast. Oak, hickory, pine, and mixed forest of maple, tuliptree, and linden are the natural forest cover for this area (Omernick, 1987). [18]

The Ridge and Valley ecoregion ranges in elevation from 700 to over 1,600 feet above sea level and is drained by moderate to high-gradient streams with cobble, gravel, and bedrock substrates. As a result of extreme folding and faulting, the roughly parallel ridges and valley vary in width, height, and geologic materials, including limestone, dolomite, shale, siltstone, sandstone, chert, mudstone, and marble. Springs and caves are numerous. Cropland and pasture are prevalent with some woodland and forest. The dominant vegetative cover is Appalachian oak forest. [18]

I. CULTURAL IMPORTANCE

The Black Warrior River Basin has always been utilized by society. Native populations used the River, much as we do today, as a resource and for commerce. It served as a common hunting ground for the Chickasaws to the north, the Creeks on the east, and the Choctaws to the south and west. [19] The University of Alabama, Office of Archeological Research maintains Alabama's official archeological site database. There are currently 3,106 official cultural sites within the Black Warrior River Basin, the majority of which are along stream segments or the main river.

Bankhead National Forest

The Bankhead National Forest has a rich variety of heritage resources. The archaeological sites range from prehistoric sites, approximately 10,000 - 500 years old, to mid-twentieth century historic sites. Most prehistoric upland sites are shallow and located on ridges near streams and stream confluences. They usually date to the Archaic through Woodland periods (8000 B.C. to A.D. 900). There are three special areas within the Bankhead National Forest: Indian Tomb Hollow, Kinlock, and High Town Path. [20]

Prehistoric people occupied many natural rock overhangs. There are remains of ancient hearths, storage pits, work areas, and other activities as well as artifacts, particularly of stone, pottery, bone, and charred botanical material. The Bankhead National Forest also has several prehistoric petroglyph sites in rock shelters and on exposed rock outcrops. These rock art sites are extremely rare in the East. [20]

In the early nineteenth century, when the Federal land patents were granted, small farmsteads were established on some ridges though poor soils did not encourage large-scale agriculture. Some bluff shelters were used during the Civil War. It was a time when several area caves were mined for saltpeter. Occasionally, evidence of liquor stills is found in the shelters as well as along small drainages, representing the activities of several generations of moon shiners. [20]

High Town Path. High Town Path, a major trade route from the eastern United States into the Mississippi Territory used by Indians and later the early settlers. It is the premier prehistoric road in Alabama, even more important than the Natchez Trace. [21]

Indian Tomb Hollow. More than 200 years ago, two Native American tribes, the Creeks and the Chickasaws, fought a bloody battle in an Alabama forest. Those who didn't survive were thrown down a sinkhole in a canyon. This area, known as Indian Tomb Hollow, became sacred to Native Americans in the region.

Moundville

During the fourteenth century, a village perched above the Black Warrior River grew to be the single largest community north of Mexico. The Mississippian Indians built some 29 mounds along the main channel and was thought to have 1,500 inhabitants, but received tribute from as many as 10,000 people in surrounding villages. For 25 miles in either direction, the leaders of the town now called "Moundville" controlled the affairs of men. [19] In the 1500s, Hernando de Soto and his men marched through the State and brought an end to Chief Tuscaloosa during the battle of Mauvila. *See Appendix A for a map of Early Archaic and Late Woodland Cultural Sites within the Black Warrior River Basin.*

As elite craftsmen developed their skills, Moundville's trade routes stretched from North Alabama and the southern Appalachians to the Gulf Coast and Florida. Galena, a shiny lead-like material, was brought from as far away as the upper Mississippi Valley in Missouri. And, as the earliest Alabamians discovered about their landscape, it was the rivers that made such commerce and communication possible. The Mississippians made great canoes 40 feet in length, that plied the Black Warrior and beyond, making possible the exchanges of goods and ideas that advanced the mound-builder's culture. [19]

At the Alabama land sales in Midgeville, Georgia and St. Stephens in Washington County, Alabama, in 1815 and 1817, speculators, planters, and others vied for the rich river valleys of Alabama. What they found was the fertile Black Belt, named for the color of its soils and just as rich as those along the Black Warrior. These lands that would support cotton harvests that would give the inhabitants twice the average national income in the coming years. [19]

Situated at the head of navigation on the Black Warrior, Tuscaloosa quickly drew pioneers from Tennessee since a main route of travel between the Tennessee Valley and the Alabama-Tombigbee region was a road from Huntsville through Jones Valley (Jefferson County) to Tuscaloosa. The site had once been a Creek trading post called Black Warrior's Town. During the Creek War, General John Coffee's troops and a Tennessee Volunteer, Davy Crockett, burned the town though white settlers would later name their village in honor of Chief Tuscaloosa who led the fight against de Soto at Maubila. In 1819, the steamboat *Mobile* attempted the ascent to Tuscaloosa, but spring currents forced it to stop at Demopolis. Soon however, many others made the journey, and cotton planters along the Black Warrior now had an outlet to markets in Mobile - and an added reason to locate the state capital in Tuscaloosa from 1826-1846. [19]

All steamboat traffic stopped at the Tuscaloosa Shoals, a two-mile stretch of low water interrupted by rocky outcrops with a steady drop in elevation. In summer, a wagon could make it across the river. Above the shoals, the river was a series of long pools 500 to 700 feet wide until it reached the junction of the Mulberry and Locust Forks. When steamboat traffic began to encounter competition from railroads during the mid-century, it declined, but by the time of the towboat and diesel power, movement of heavy freight along waterways was cheaper than other forms of shipping, and business interests began eyeing the river again for its potential transportation value. [19]

Pioneer Settlements

On the Locust Fork, pioneers used the rapids at Bear Meat Cabin Frontier, today used by avid boaters, as power to grind corn and wheat. This pioneer society is still evident today in Blount County's five historical covered bridges. [19]

Clarkson (Legg) Covered Bridge, Cullman County, West of Cullman

(North of U.S. 278). This two span, Town truss bridge, crossing a deep gorge of Crooked Creek, is 250 ft. long and 12 ft. wide. It is one of the longest bridges standing in the Deep South. Constructed in 1904, the bridge had extensive repairs made in 1923. Listed on the National Register of Historic Places, the bridge is owned by the Cullman County Commission. The bridge underwent extensive restoration in 1976 and is now the focal point of a recreational park.

Horton Mill Bridge, Blount County, near Oneonta

(Five miles north on Oneonta, just off of Alabama 75). This two span, Town truss structure is 220 ft. long and 14 ft. wide. Standing 70 ft. above the Calvert Prong of the Black Warrior River, this is the highest covered bridge above water in the United States. Built in 1934-35 to replace an earlier bridge which provided access to T.M. Horton's Mill complex, the bridge is anchored in massive boulder ledges. The bridge crosses a deep, wooded gorge; the end abutment is constructed on ledge rock and the center piers are of masonry and concrete. The floor and truss are wooden and its wooden shingles roof has been replaced.

Horton Mill Bridge was the first covered bridge in the South to be added to the National Register of Historic Places. Because of its scenic beauty and easy accessibility it has become a major tourist attraction. The bridge is now owned by the Alabama Historical Commission, who in cooperation with the Blount County Commission, completely restored it in 1974.

Oakachoy Easley Road Bridge, Blount County, near Oneonta

(Two miles off of Alabama 9, north of Nixburg). Built in 1916, this is a single span, 56 ft. long, modified Queenspost bridge and is Alabama's shortest covered bridge. Just below the span can be seen 150-year-old ruts worn there by pioneer wagons. The bridge is owned and maintained by the Coosa County Commission.

Old Easley Road Bridge, Blount County

(One mile west of U.S. 231, between Oneonta and Rose). Built in 1927, this one span, Town truss bridge is 95 ft. long, making it the oldest and the smallest covered bridge in Blount County. It is owned and maintained by the Blount County Commission.

Swann Covered Bridge, Blount County, near Cleveland

(One mile west of Alabama 79, northwest of Cleveland). Built in 1934, this three span, Town truss bridge is 324 ft. long and is the second longest covered bridge in the state. Set in a scenic canyon, it is owned and maintained by the Blount County Commission.

Iron and Coal

Jefferson County and the City of Birmingham was built on mining iron ore and coal. Shipments of these products were transported to Mobile via the Black Warrior-Tombigbee River System. Many of the small towns surrounding the Birmingham area and Walker County were built around mining camps.

J. LAND USE

Land use is likely the single most important factor to consider when discussing the causes for and the impacts of the environmental health of a region.

Historical Perspective

The land use within the Black Warrior is quite varied because it is the result of the discovery and use of local natural resources. This, in turn, is dependent on several factors, including geographic region-which dictates the availability of resources, immigration-which determines what resources are being sought out, and innovation-which governs which resources can actually be used. A discussion of this topic can be reasonably categorized by the seven counties that constitute the majority of the Black Warrior River Basin; the surrounding counties with small portions of land in the watershed can be generally associated with the adjacent county.

The region's earliest settlers were Native Americans living in Greene and Hale Counties who built impressive burial mounds along the Black Warrior River. Today the site is preserved as a park. These Indians were the ancestors of the major Indian tribes in Alabama: the Choctaws, Chickasaws, and Cherokees. In 1814, the Indians were defeated by Andrew Jackson and their land was ceded to the government.

Blount County's original borders were formed in 1818 from land that had belonged to the Creeks. This was more than a year before the state itself was formed. The first European settlers were from Georgia, Virginia, and the Carolinas, mostly of Scottish and English descent. The County lies in what is known as the mineral region of Alabama, and contains a significant portion of the Warrior coalfield. Today, poultry farming is one of the County's biggest employers. Blount County is home to Inland Lake, an important water supply for Birmingham.

According to the Cullman County Heritage Book Committee (2000), Cullman County's first white settlers arrived in 1803, and by 1820, coal speculators began engineering towns. While these few towns failed from navigational problems, the pioneer dirt farmers from Tennessee and the Carolinas were increasing and holding on. After the Civil War, there was a significant influx of settlers from Georgia. In 1877, the county's boundaries were set with land being acquired from Blount, Morgan, and Winston Counties. The population jumped from 6,355 in 1880 to 17,849 in 1990 largely because of the construction of a railroad by German, Irish, and Italian immigrants. Cotton and other farming proved to be foundational to the area's economy. Iron deposits were mined, and the first iron factory was established in 1878 (Cullman County Heritage Book Committee, 2000).

Hale County was formed in 1867 from the land in Greene County east of the Black Warrior River and from parts of Marengo, Perry, and Tuscaloosa Counties. Georgians constituted the first main group of settlers, and some the earliest towns were started in 1816 (Hale County Heritage Book Committee, 2000). Farming and livestock were the main industries, as the county is located in Alabama's "Black Belt," which derives its name from the region's rich, dark soil, highly suitable for agricultural uses. Poultry and cotton farming were the major pursuits, but gave way to cattle and soybean farming, with the advent of packing companies and poultry processing plants, as well as the commercial cotton gins. The commercial cotton gins closed in the early 1970s (Hale County Heritage Book Committee, 2000). The area below Greensboro is now primarily used for dairy, soybean, and catfish farming. The western part of the county is flat and swampy, and in the eastern part, Lake Payne borders the Talledega National Forest.

Figure 14:
Hale County Homestead

Source: National Archives

According to the Jefferson County Soil Survey (1982), many of the original settlers of Jefferson County emigrated from Tennessee in 1813, settling in the agricultural land of the Jones Valley. During most of the 1800s, the county's main industry was agriculture, with cotton as the primary cash crop. In the late 1800s, coal and iron mining led to the establishment and rapid growth of the City of Birmingham, as well as numerous small mining towns. By the early 1900s, most of the agricultural land in the Jones Valley vicinity had been transformed to industrial and residential uses, while surface mining remained as a major land use for much of the area during the mid-1900s. In the current post-mining era, much of the land is either urban or forested land. As the coal sources were depleted, many of the small towns created by the mining boom simply disappeared.

Tuscaloosa County was formed in 1818 and derives its name from two Indian words, Tushka, meaning "warrior", and Lusa, meaning "black," perhaps referring to one or more great warrior chieftains. The county is well known for its metropolitan area, which is home to the University of Alabama, and for its industrial business.

Figure 15:
Ensley Ironworks, Jefferson County

Source:
National Archives

Timber and iron have historically been two of the main industries in the county. The national headquarters of the Gulf State Paper Corporation, as well as several other companies' lumber mills are located in the county. The 1800s Tannehill Ironworks has been resurrected as a state park for its historical value. B.F. Goodrich Tire once had a plant in the county, and Mercedes-Benz has more recently opened a manufacturing plant outside Tuscaloosa. The county is also the home of Jim Walter Resources, Inc, which sells unfinished houses and building materials, and is involved with marble quarries, coal mining, and water pipelines. By 1980, this corporation was ranked among the 200 largest industries in the United States (Tuscaloosa County Heritage Book Committee, 1999).

Before 1819, most of the white settlers in Walker County had been land speculators, with those who were well off settling on the Alabama, Tombigbee, or lower Black Warrior Rivers, and the poorer settlers settling in the creek bottoms. The settlement in much of the county was slow, due to the remoteness from good roads and navigable waters, and thus, markets. Farmers, however, still made up the majority of the settlers (Dombhart, 1937). The county boundaries were established in 1824 with land appropriated from Marion and Tuscaloosa Counties. Walker is important as the site where the region's coal deposits were discovered. At that time, coal was so abundant that it could be easily worked from surface outcroppings. In 1827, the first load of coal traveled down the Black Warrior River from Locust Fork to Tuscaloosa (Dombhart, 1937). The first underground mine in the area was built by Herman Drummond near Sipsey. While much attention was focused on utilizing coal resources, farmers kept up their work with cotton, grain, cattle, hogs, and sheep. Lumber proved to be another important commodity (Dombhart, 1937).

Figure 16:
Miner at Bankhead

Source: National Archives

Winston County was legally established from Walker County land in 1850. It wasn't until 1858 that the name was changed to Winston County, as it had been originally named Hancock County. The earliest white settlers were from Tennessee, the Carolinas, Virginia, and Georgia, with some of the early settlements being formed around 1815 (Winston County Heritage Book Committee, 1998). The Land Act of 1820 and the Homestead Act did much to promote settlement of the area, with most purchasing 80 acres or less (Winston County Heritage Book Committee, 1998). The isolated subsistence farmers had a hard lot-they worked a poor, rocky, mountainous land. During the Civil War, the independently minded people of the county wished to remain neutral, but they suffered for this, and three times, the county was threatened to be dissolved by legislators in Montgomery (Winston County Heritage Book Committee, 1998). Land that had been too steep and hilly to be bought by the early farmers was set aside as National Forest. Adjacent land was bought over time, accumulating to about 180,000 acres in both Winston and Lawrence Counties, and the area was named the William B. Bankhead National Forest. As a result of the Wilderness Act, about 14 percent has been set aside as the Sipsey Wilderness area, and over 60 miles of the Sipsey River has been designated as a Wild and Scenic River, a national designation stipulating that the body of water must meet all toxicity (pollution) requirements such that the propagation and palatability of fish and the aesthetic values of the river are not affected *(See Appendix A)*. Smith Lake, created by an Alabama Power dam completed in 1961, provides a base for tourism and recreation. Cattle and chicken production now replace much of row crops and cotton. Lumber is also an important resource today, and many factories deal in timber products (Winston County Heritage Book Committee, 1998).

Current Land Use

Another important perspective on the environmental importance of the Black Warrior River basin can be understood by looking at general trends in current uses of the land. The following tables present an overall picture of current land use within the Black Warrior River watershed.

Figure 17:

Percent Land Use in the Black Warrior River Basin, 2002

Land Use	Percent
Forestland	74.6
Agriculture	16.8
Urban and Misc. Uses	2.1
Open/Barren	1.4
Wetland	3.4
Water	1.5
Quarry/Mining	0.3

Source: USEPA & ADEM, 2002.

Federal lands within the Black Warrior River watershed include the Bankhead National Forest (Winston County) and portions of Oakmulgee National Forest (Hale County) include watersheds that are in relatively pristine condition. These watersheds are extremely important as sources of clean water for drinking water, fish, and wildlife, and for other purposes. Protecting the integrity of these sensitive watersheds and recognizing their value as sources of high-quality water are important goals. The need to continue advancing a coordinated and cooperative approach to clean water on federal lands has never been greater. [22]

Agricultural lands provide a great resource to watershed health by providing open space for water infiltration. The majority of agricultural lands within the Black Warrior River watershed are in Blount, Cullman, Fayette, and Hale Counties. In these watersheds, stewardship of privately owned croplands, pastures, wetlands, and rangelands is the key to pollution prevention. These watersheds are largely in the care of local farmers, ranchers, and other private landowners. The skill with which they manage their lands is key not only to producing food and fiber for the nation, but also to the health of watersheds. Ensuring that farmers and ranchers have the technical, financial, and educational assistance they need to be good stewards of their lands is a fundamental element of a comprehensive clean water program. [22]

Waters associated with federal or rural watersheds, whether pristine, sensitive, or impaired, often flow to urban or suburban areas where other human-caused activities can affect water quality. The population in urban areas is increasing faster than in rural areas, resulting in increasing water quality concerns. Urban and residential areas can affect the quality and quantity of water resources by altering the physical hydrology and by adding waste products to water bodies. As urbanization increases, the amount of impervious area increases, thus decreasing the amount of water that would naturally infiltrate into the soil. Increased runoff can alter the magnitude and timing of storm peaks, increasing the likelihood of localized flooding. Urban runoff also can transport large nonpoint-source loads of sediment and inorganic and organic constituents from paved surfaces, parks, lawns, and golf courses. Point sources of contamination from urban areas can include sewage-treatment facilities, industrial discharges, landfills, and leaking underground storage tanks. [18]

Policies and programs such as Phase I and Phase II Stormwater regulations, and MS4, are specifically designed to address the runoff of urban and suburban pollutants to mitigate their effects. Programs designed to prevent pollution in upper portions of the watershed can complement and support efforts to reduce urban runoff and help reduce the cost of water treatment. [22] *See Section 8: Existing Programs and Mechanisms.*

Wetlands contribute to the environment in ways that parallel rain forests in tropical climates and perform many functions that are important to the nation's economy and quality of life. As waters flow across watersheds through wetlands, chemicals that otherwise would contaminate waterways are removed through natural processes that assimilate pollution. When heavy rains fall, wetlands store and slow down the release of floodwaters, thereby reducing damage to property and communities. Some wetlands recharge aquifers, providing drinking water for communities. [22]

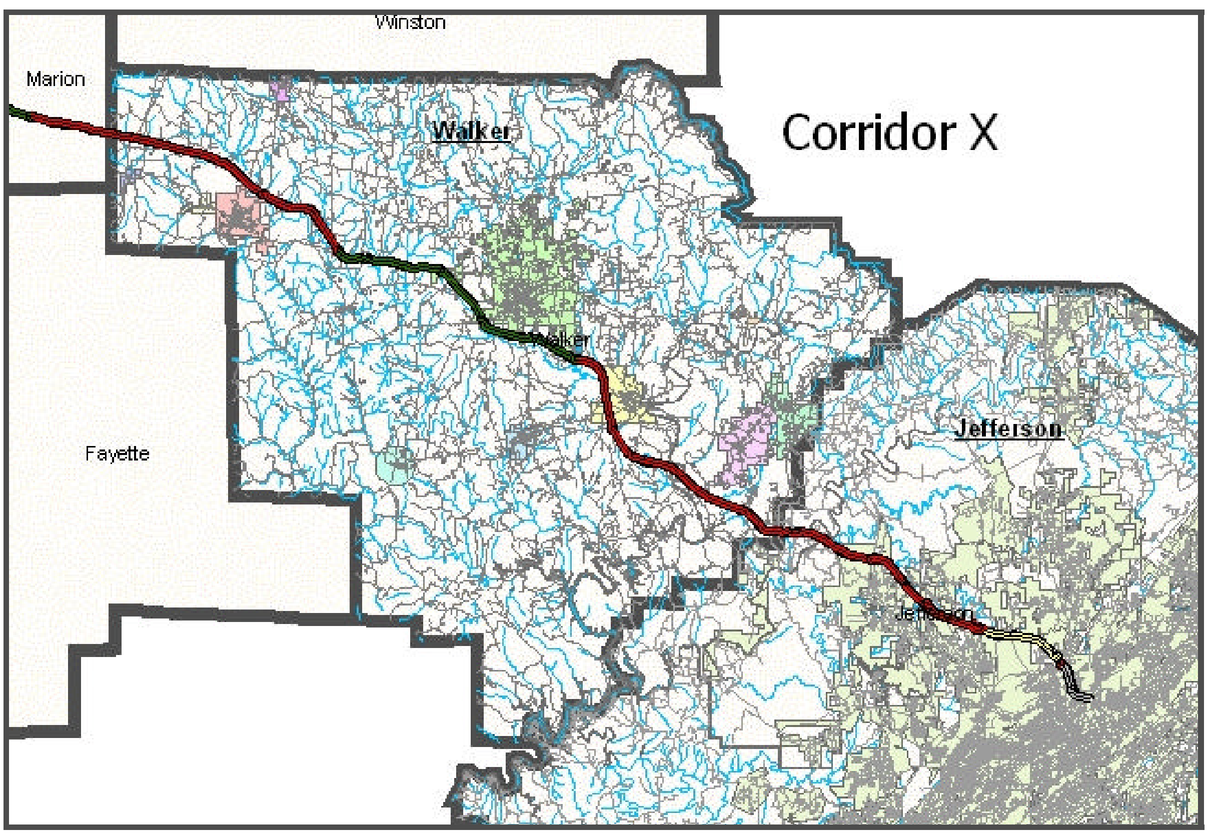
Changing Land Use

The Black Warrior River Basin has four main population centers: Birmingham, Cullman, Jasper, and Tuscaloosa. Changing land use is expected to significantly affect growth patters and future land use. Major land use changes within the Black Warrior River Basin are summarized below.

Corridor X. The Appalachian Development Highway Program (ADHP) is a road building program that is intended to break Appalachia's regional isolation and encourage Appalachian economic development. Administered by the Appalachian Regional Commission (ARC), the ADHP is authorized to develop a network of 3,025 miles of corridor roads. Corridor X was authorized in 1978 and will connect Birmingham, Alabama with Memphis, Tennessee the length of the corridor within Alabama is 95.7 miles. [35]

As of July, 2002, Forty-eight miles of Corridor X is open to traffic and an additional forty-three miles is under construction. A final segment from Republic Road in

Figure 18:



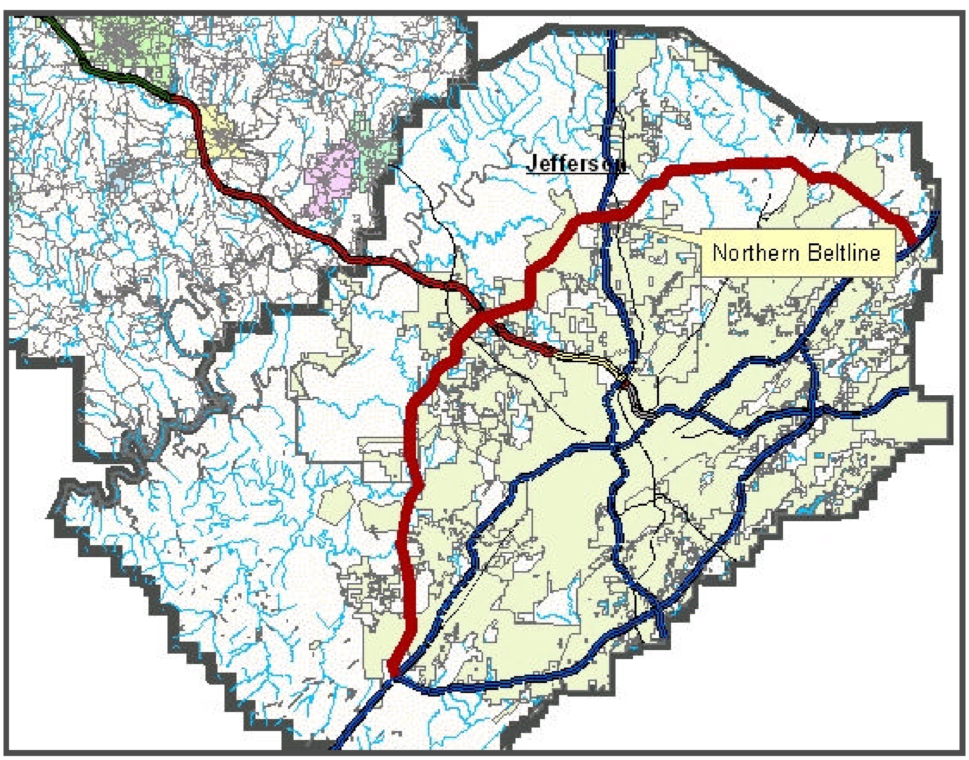
SOURCE: Map provided by the Regional Planning Commission of Greater Birmingham

Jefferson County to I-65 is still in the design phase with right-of-way appraisal and acquisition ongoing. [35]

The ALDOT expects the entire section from the Mississippi State Line to east of Jasper to be open to traffic by Spring 2005 and the next segment to Graysville to be open to traffic by Fall 2006. Elected officials and business leaders throughout the corridor are united with the ALDOT in their requests to Congress for the necessary funding to complete Corridor X. It is anticipated that an additional $300,000,000 will be needed to complete the final segments and the route interchange with I-65. [35]

Northern Beltline. The Northern Beltline will complete the I-459 loop around the Birmingham Area, linking suburbs, metropolitan areas, and rural areas from Trussville to Bessemer. It will also connect Corridor X to the City of Birmingham. Construction will be a combination of four and six lane. Projections estimate that the Northern Beltline will divert 15,000 vehicles per day from the downtown I-65 and I 20/59-route interchange and is expected to open up growth and economic development in the northern end of Jefferson County. [35]

Figure 19:



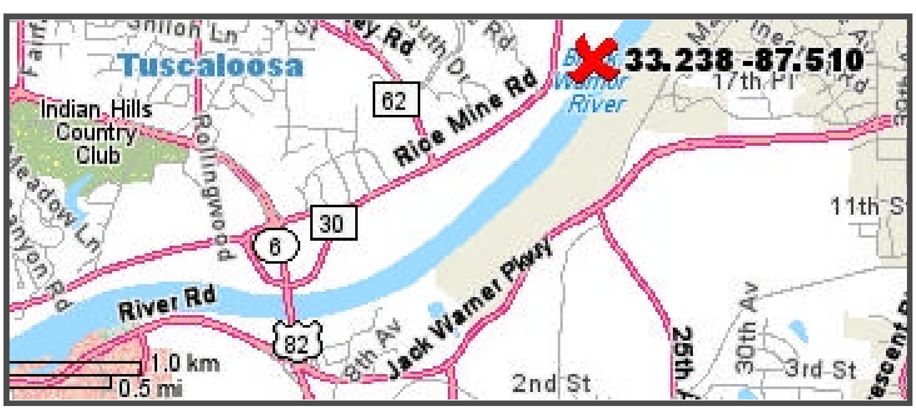
Source: Map provided by the Regional Planning Commission of Greater Birmingham

Tom Bevill Reservoir Management Area (Fayette County). The Tom Bevill Reservoir Management Area Authority was authorized June 2, 1992. This would create a reservoir in the headwaters of the North River for the purposes of water conservation and supply, dam construction and reservoir development, for industrial development, flood control, navigation, irrigation, public recreation and related purposes. [23] As of August, 2003, the reservoir has not been constructed. Effects of this project are currently being studied.

Eastern Bypass - Hwy 43 Tuscaloosa. Tuscaloosa's Eastern Bypass, under construction in the eastern part of the county, and will receive $10 million from the U.S. Department of Transportation, through the efforts of Senator. Richard Shelby and Congressman Spencer Bachus. The bypass is designed to alleviate traffic on U.S. 82 passing through Northport and Tuscaloosa. [24] From a bridge being built over the Black Warrior River the bypass will stretch northward to Interstate 20/59. Then southward it will go to the Airport Industrial Park. [25] The Eastern Bypass Bridge, which will connect Jack Warner Parkway and Rice Mine Road, is set to open in December 2003. [24]

The project has gathered criticism from environmental activists, who argue that the planned route will ruin the scenic beauty and affect imperiled species of Hurricane Creek near Holt. [24] On Tuesday (July 30), a report was released by the national Sierra Club, listing the Eastern Bypass in Tuscaloosa County as one of the 26 "wrong-way" projects nationwide. The bypass received it's low marks from the group because of the impact the highway will have on the cliffs of Hurricane Creek. [26]

Figure 20:



SOURCE: Tuskaloosa, The Druid City. http://66.23.194.230/. Accessed August 6, 2003.

According to the Tuscaloosa News, two years ago, Friends of Hurricane Creek (FOHC) and the West Alabama Sierra Club joined forces to convince the Alabama Department of Transportation (ALDOT) officials to move the bypass corridor 1500 to 1800 feet northeast of the current proposal. The Sierra Club's report, which is titled "Smart Choices, Less Traffic" highlights the best and worst local plans for alleviating traffic and air pollution. http://www.sierraclub.org/sprawl/report02/ [26]

Five Mile Creek Greenway. For many years, Five Mile Creek's water quality designation has been "Agricultural and Industrial" allowing for industrial discharges. However, in 2002, as a result of community efforts, the designation have been changed to "Fish and Wildlife," requiring more effective discharge methods. This will affect several industries along the Creek, but particularly Sloss Industries Corporation and ABC Coke, Inc. [27]

On May 5, 2003, as a part of a wide-ranging plan to improve the water quality of Five Mile Creek, Sloss Industries announced that it would donate 326 acres of land to help establish a Greenway along the creek to an approved land trust. This will ensure that the land is maintained in its natural condition. [27] Additionally, Sloss will facilitate development of a Greenway Master Plan for the creek with the help of local stakeholders. The Master Plan will inventory existing conditions, identify areas for habitat restoration and provide a community-based blueprint for the future of the Greenway. [27]

This is in support of a section of Five Mile Creek within the City of Tarrant, which is the site of a future recreational public park and Greenway trail, an action which has been an inspiration to other cities along Five Mile Creek. For example, the City of Graysville is also in the process of developing a public walkway along Five Mile Creek using land already donated by a developer for public use (Ellaby, 2002).

An inter-municipal, long-term goal has been formed to create a network of hiking trails and Greenways along the Five Mile Creek corridor to its mouth at Locust Fork. A Memorandum of Agreement establishing the Five Mile Creek Greenway Partnership (MOA) was signed in July of 2002. This agreement is supported by the Cities of Birmingham, Tarrant, Fultondale, Brookside, Graysville, and the Jefferson County Commission (RPCGB, 2002).

Benefits of the Greenway projects include general water quality improvements associated with reclamation efforts such as stream mitigation and streambank stabilization. Ensuring that the land will remain vegetated will also help with Jefferson County's efforts to meet ground-level ozone standards. The large system of managed Greenways is also expected to boost the socioeconomic situation of the creek's communities in light of future expansion anticipated with the development of Corridor X and the Northern Beltline (Ellaby, 2002). The significance of this Greenway project lies in the groundbreaking example of cooperation between cities to steward their common watershed in an ecologically responsible manner.

K. POPULATION

Population data was derived from the U.S. Bureau of Census, Summary File Tape 3 using Census County Divisions. Because the boundaries of the Black Warrior River Watershed and the boundaries of the census county divisions are not always the same, the population data is estimated. As of 2000, the total population of the Black Warrior River watershed is 1,011,625 persons, representing 74 percent of the total population of the 15 counties that are located within the watershed boundaries. The total 2000 population of the 15 counties in the Black Warrior River watershed is 1,372,358 persons, which is an 5.82 percent increase from the 1990 total population

Figure 21:

Population Change by County, 1990 to 2000

Bibb County	16,576	20,826	
Blount County	39,248	51,024	
Cullman County	67,613	77,483	
Etowah County	99,840	103,459	
Fayette County	17,962	18,495	
Greene County	10,153	9,974	
Hale County	15,498	17,185	
Jefferson County	651,525	662,047	
Lawrence County	31,513	34,803	
Marengo County	23,084	22,539	
Marshall County	70,832	82,231	
Perry County	12,759	11,861	
Tuscaloosa County	150,522	164,875	
Walker County	67,670	70,713	
Winston County	22,053	24,843	
Total	1,296,848	1,372,358	

Source: U.S. Bureau of the Census, 1990 and 2000 of 1,296,848 persons. The county with the highest population growth in the ten year period is Blount County, with a 30 percent increase, followed by Bibb County with a 25.64 percent increase. During the same ten year period, three of the fifteen counties lost population. Perry County suffered a 7.04 percent loss in population, while the population in Marengo County and Greene County decreased by 2.36 percent and 1.76 percent, respectively.

By far, the two counties which comprise the greatest portion of the Black Warrior River watershed population are Jefferson and Tuscaloosa Counties, with a population of 573,282 persons and 160,500 persons, respectively, located within the watershed boundaries. Together, these two counties comprise 72.54 percent of the total population of the watershed.

Population within the Black Warrior River watershed is concentrated in two of the five subwatersheds: Locust Fork and the Upper Black Warrior. The Locust Fork subwatershed has a population of 379,320 persons and includes the northern part of Jefferson County and the majority of Blount County. The Upper Black Warrior subwatershed has a population of 309,052 persons and includes the southern portion of Jefferson County and the northeast portion of Tuscaloosa County. Combined, these two subwatersheds comprise 68 percent of the total watershed population. The subwatershed with the lowest population is Sipsey Fork, located in Cullman, Lawrence, Walker and Winston Counties, with a total population of 60,200, which is 6 percent of the total watershed population. Mulberry Fork and the Lower Black Warrior comprise 11 percent and 15 percent of the total population, respectively. The majority of the population, at 68.25 percent, lives in an urban setting. The urban population in Mulberry Fork and Sipsey Fork, however, is considerably lower with only 23.12 percent and 20.76 percent, respectively, living in an urban area.

The majority of the population of the Black Warrior River watershed is white at 64.95 percent of the total watershed population, while the average white population among the five subwatersheds is 72.93 percent. The watershed with the highest proportion of white population is Sipsey Fork, at 95.21 percent, followed by Mulberry Fork, at 93.77 percent. The average African American population among the subwatersheds is 24.35 percent. The watersheds with the highest proportion of African American population are the Upper Black Warrior, at 43.82 percent, and the

Figure 22:

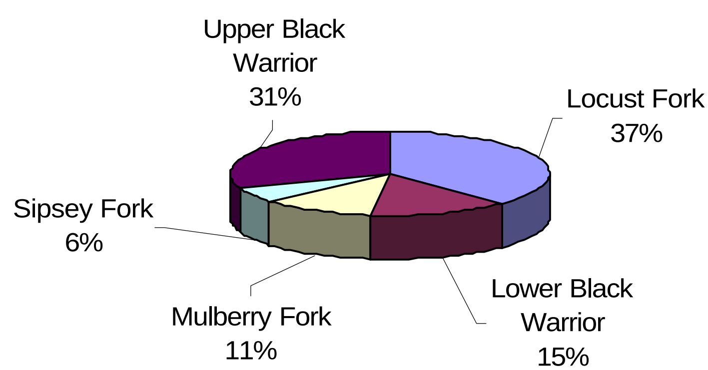
Population Within Black Warrior River Watershed By County, 2000

County	Population Within Watershed	% Watershed Population
Bibb County	2,966	0.29%
Blount County	49,389	4.88%
Cullman County	68,812	6.80%
Etowah County	9,524	0.94%
Fayette County	4,614	0.46%
Greene County	3,523	0.35%
Hale County	17,185	1.70%
Jefferson County	573,282	56.67%
Lawrence County	2,901	0.29%
Marengo County	2,761	0.27%
Marshall County	15,605	1.54%
Perry County	4,953	0.49%
Tuscaloosa County	160,555	15.87%
Walker County	70,713	6.99%
Winston County	24,843	2.46%
Total	1,011,625	100.00%

Source: U.S. Bureau of the Census, 2000

Figure 23:

2000 Population Distribution Among Subwatersheds



Watershed	Total Population
Locust Fork	379,320
Lower Black Warrior	147,150
Mulberry Fork	115,904
Sipsey Fork	60,200
Upper Black Warrior	309,052
Black Warrior River	

Source: U.S. Bureau of Census, 2000

Lower Black Warrior, at 38.06 percent. In comparison with the State of Alabama and the nation, the white population comprises 71.1 percent of the total state population and 75.1 percent of the national population, while the African American population represents 26.0 percent of the total State population and 12.3 percent of the national population. Races other than white and African American account for less than 5 percent in each of the five watersheds. The same is true in the State, with persons of other races comprising only 2.9 percent of the total population. Nationally, however, persons of other races comprise 12.5 percent of the total population, with the largest single racial sector other than white or African American being the Asian population, at 3.6 percent.

Figure 24:

Racial Composition, 2000

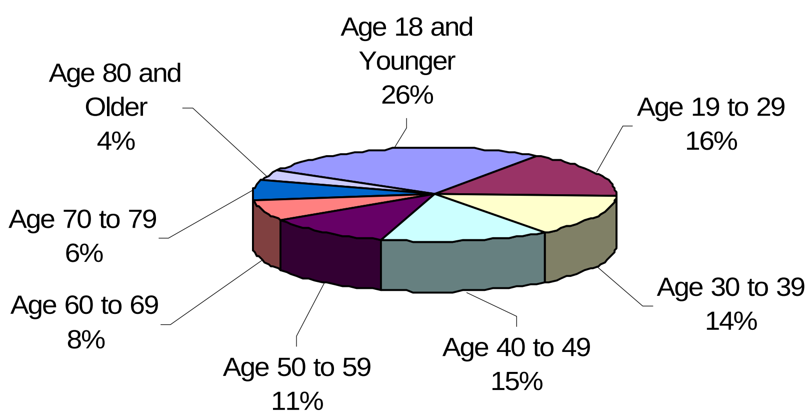
	Watershed Total	Locust Fork	Lower Black Warrior	Mulberry Fork	Sipsey Fork	Upper Black Warrior	Avg
White	64.95%	62.79%	59.31%	93.77%	95.21%	53.58%	72.93%
African American	32.30%	34.15%	38.06%	4.13%	1.58%	43.82%	24.35%
American Indian or Alaska Native	0.29%	0.24%	0.36%	0.30%	0.76%	0.23%	0.38%
Asian	0.65%	0.64%	0.82%	0.24%	0.29%	0.79%	0.56%
Native Hawaiian Pacific Islander	0.02%	0.02%	0.02%	0.02%	0.01%	0.02%	0.02%
Some Other Race	0.84%	1.19%	0.58%	0.49%	0.84%	0.66%	0.75%
Two or More Races	0.95%	0.96%	0.86%	1.04%	1.32%	0.89%	1.01%

Source: U.S. Bureau of Census, 2000

The gender breakdown of the population of the entire watershed is 52 percent female and 48 percent male. These proportions are consistent throughout the subwatersheds, with the female proportion of the population in each subwatershed ranging from 51 percent to 53 percent. The same is also true with the State of Alabama and the Nation, with the female population representing 51.7 percent of the state population and 50.9 percent of the total national population. The percentage in each age category is also consistent throughout the five subwatersheds, i.e., there is not one watershed that has a particularly high elderly population while another has a very young population. Within the total Black Warrior River watershed, the majority of the population, at 56 percent, is under 40 years of age. The age bracket with the largest percentage of the population is 18 years and under, at 26 percent, followed by 19 to 29 years of age, at 16 percent. The "middle age" bracket, including ages 30 to 59, comprises 40 percent of the total population; and the elderly population, including ages 60 and older, comprises 18 percent of the total population. The average median age of the counties located within the Black Warrior River watershed is 36.2 and ranges from a low of 31.9 in Tuscaloosa County to a high of 39.0 in Fayette County. In comparison, the median age of the State of Alabama is 35.8 and of the Nation is 35.3.

Figure 25:

Population by Age, 2000



Source: U.S. Bureau of Census

Housing Demographics

There are approximately 446,330 housing units located in the Black Warrior River watershed, of which 89.83 percent are occupied and 10.17 percent are vacant. The subwatersheds with the highest percentage of housing units are Locust Fork, with 164,332 units or 36.82 percent of the total, and the

Figure 26:

Housing Units, 2000

Subwatershed	Housing Units	% of Total
Basin Total	446,330	100.00%
Locust Fork	164,332	36.82%
Lower Black Warrior	64,371	14.42%
Mulberry Fork	52,058	11.66%
Sipsey Fork	29,305	6.57%
Upper Black Warrior	136,264	30.53%

Source: U.S. Bureau of Census, 2000

Upper Black Warrior, with 136,264 units or 30.53 percent of the total housing units. The Sipsey Fork subwatershed has the lowest percentage of the total housing units at 6.57 percent or 29,305 units. The housing vacancy rate of the watershed, at 10.17 percent, is lower than that of the State of Alabama, at 11.5 percent, but higher than the national housing vacancy rate of 8.9 percent. Housing vacancy is highest in the Sipsey Fork subwatershed, at 17.89 percent and lowest in the Locust Fork subwatershed, at 8.68 percent.

Only four of the 15 counties located in the watershed had vacancy rates of owner-occupied housing higher than that of the State of Alabama, at 2.0 percent. Throughout the watershed, the vacancy rate of rental housing is four to ten times higher than the vacancy rate of owner-occupied housing. The same is true at the State level, with a 11.8 rental housing vacancy rate compared to a 2.0 owner-occupied vacancy rate.

Owner-occupied housing constitutes the majority of the of the total occupied housing units in the watershed, at 68.43 percent, while 31.57 percent of the housing units are renter-occupied. Owner-occupancy is highest in the Sipsey Fork and Mulberry Fork subwatersheds, at 79.29 percent and 79.27 percent, respectively. In comparison, with the State of Alabama, the watershed statistics are comparable with the State's 72.46 percent of owner-occupied housing and 27.54 percent of renter-occupied housing.

Figure 27:

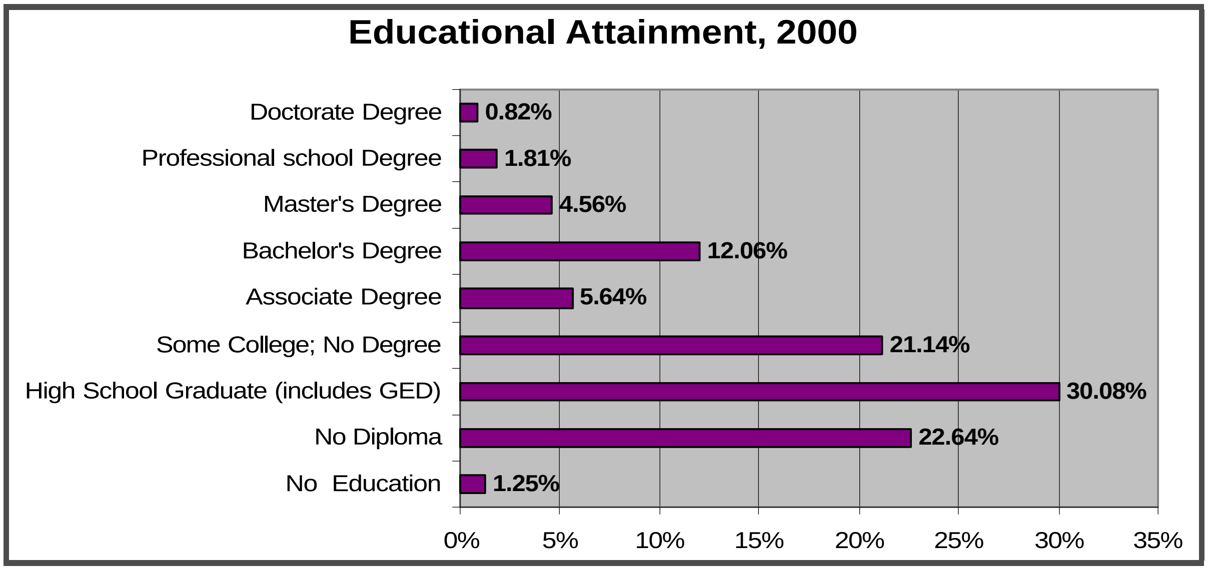
HOUSING OCCUPANCY, 2000

Subwatershed	Total Housing Units	Occupied	% Owner Occupied	% Renter Occupied	% Vacant
Basin Total	446,330	400,937	68.43%	31.57%	10.17%
Locust Fork	164,332	150,060	68.75%	31.25%	8.68%
Lower Black Warrior	64,371	57,315	64.31%	35.69%	10.96%
Mulberry Fork	52,058	46,205	79.27%	20.73%	11.24%
Sipsey Fork	29,305	24,063	79.29%	20.71%	17.89%
Upper Black Warrior	136,264	123,295	63.76%	36.24%	9.52%

Source: U.S. Bureau of Census, 2000

Of the total housing units located in the Black Warrior River watershed, 4,364 units (.98 percent) are lacking complete plumbing facilities. The subwatersheds with the highest percentage of housing units without complete plumbing facilities are the Lower Black Warrior, with 1,205 units at 1.87 percent of the total units, and Mulberry Fork, with 664 units at 1.28 percent of the total units. Although it is only .74 percent of the total units in the subwatershed, the Upper Black Warrior has a high number of units (at 1,006) lacking complete plumbing facilities.

Figure 28:



Source: U.S. Bureau of Census, 2000

Economic Demographics

Educational levels in the Black Warrior River watershed are fairly high, with about three-fourths of the population age 25 and older having received a high school diploma or equivalent (76.11 percent); and, of those with a high school education, 30.08 percent have some form of college degree. Of the 23.89 percent of the population that does not have a high school education, only 1.25 percent have had no education whatsoever. These statistics are fairly consistent throughout the subwatersheds. Overall, however, the Sipsey Fork and Mulberry Fork subwatersheds tend to have slightly lower education levels than the other subwatersheds.

Figure 29:

2000 Unemployment

County	Unemployment Rate
Bibb	6.2
Blount	4.8
Cullman	4.1
Etowah	6.0
Fayette	7.7
Greene	13.1
Hale	8.0
Jefferson	6.3
Lawrence	6.2
Marengo	8.7
Marshall	5.7
Perry	14.7
Tuscaloosa	6.2
Walker	6.4
Winston	6.3

Source: U.S. Bureau of Census, 2000

Unemployment of the civilian labor force, as of the 2000 Census, differs greatly among the 15 counties located in the Black Warrior River watershed with the average unemployment rate of 7.36 percent being higher than that of both the State of Alabama, at 6.2 percent, and the Nation, at 5.8 percent. The counties with the lowest unemployment rate are Cullman County, at 4.1 percent, and Blount County, at 4.8 percent. Counties with the highest unemployment rate are Perry and Greene Counties, at 14.7 percent and 13.1 percent, respectively. There are 432,559 workers in the watershed, age 16 and older, of which 83.91 percent work in the county in which they reside, while 16.09 percent work in another county. The subwatershed that has the highest percentage of workers commuting to a county other than their resident county for employment is Mulberry Fork, at 36.24 percent. Less than 1.5 percent of the workers in all of the subwatersheds work outside the State of Alabama. By far, the majority of the workers in the Black Warrior River watershed, at 98

Figure 30:

Employment by Occupation by Subwatershed, 2000

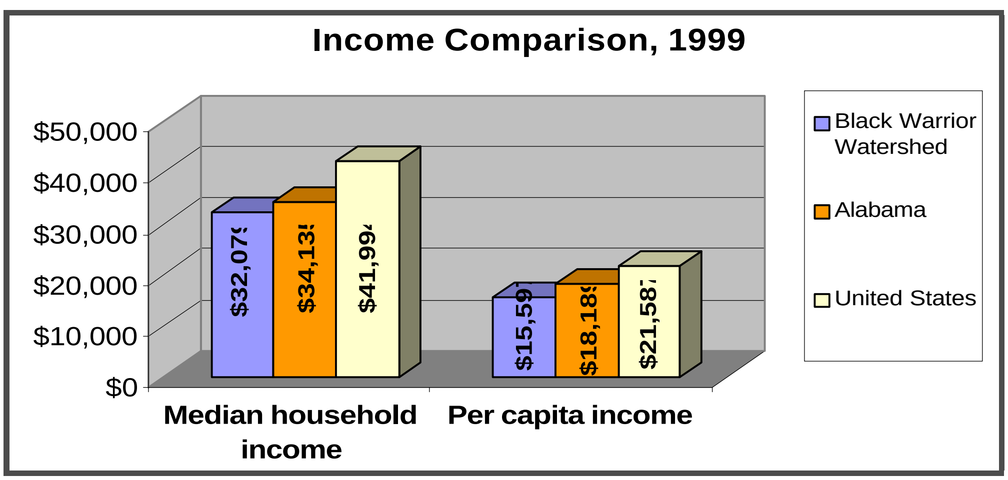
Occupation	Black Warrior Watershed	Locust Fork	Lower Black Warrior	Mulberry Fork	Sipsey Fork	Upper Black Warrior
Employed Population, 16 Years and over	439,936	167,164	62,883	48,548	26,295	135045
Agriculture/Forestry/ Fishing/Hunting/Mining	1.90%	1.06%	2.13%	4.86%	4.63%	1.25%
Construction	6.96%	7.12%	6.48%	8.57%	8.68%	6.07%
Manufacturing	13.99%	12.40%	16.13%	18.42%	25.71%	11.09%
Wholesale Trade	4.11%	4.64%	3.25%	3.61%	3.22%	4.21%
Retail Trade	12.52%	12.02%	13.06%	14.61%	13.57%	11.92%
Transportation/ Warehousing/Utilities	5.58%	5.85%	3.71%	7.49%	6.96%	5.17%
Information	2.71%	3.16%	1.61%	1.65%	1.01%	3.36%
FIRE	7.40%	8.76%	4.43%	4.47%	3.62%	8.88%
Professional Services	7.62%	8.48%	6.42%	4.47%	3.95%	8.97%
Education/Health/ Social Services	21.69%	20.66%	27.53%	17.95%	16.62%	22.58%
Arts/Recreation/ Entertainment	6.30%	6.19%	6.77%	5.14%	4.57%	6.97%
Public Administration	3.97%	4.21%	3.71%	3.50%	3.09%	4.14%
Other Services	5.24%	5.45%	4.76%	5.26%	4.37%	5.39%

Source: U.S. Bureau of Census, 2000

percent, do not work at home. Commute time for most of the workers in the watershed, at 66.4 percent, is less than 30 minutes. Commute times are consistent throughout the subwatersheds.

The U.S. Census provides information regarding the occupation of the population, by categorizing occupations into one of 13 categories: Agriculture, forestry, fishing, hunting and mining; Construction; Manufacturing; Wholesale trade, Retail trade; Transportation and warehousing, utilities; information; Finance, insurance, real estate and rental and leasing; Professional, scientific, management, administrative, and waste management services; Educational, health and social services; Arts; entertainment; recreation; accommodation and food services; Public administration; and Other services. Of the total employed population of the Black Warrior River watershed, the occupation with the largest percentage of employees is educational, health and social services, at 21.69 percent, while the occupation with the smallest percentage of employees is agriculture, forestry, fishing, hunting and mining, at 1.9 percent. The percentage of employees in each of the occupation categories is similar in the five subwatersheds. The Sipsey Fork subwatershed is most dissimilar, with a higher percentage of workers employed in manufacturing, at 25.71 percent, as compared to an average of 14.51 percent in the remaining four subwatersheds. The Sipsey Fork subwatershed also has a lower percentage of workers in the finance, insurance and real estate and professional services occupations than the other watersheds. In the Lower Black Warrior subwatershed there is a higher percentage of workers employed in the educational, health and social services occupational category, at 27.53 percent, than in the other subwatersheds. However, the remaining categories in the Lower Black Warrior subwatershed are consistent with the other subwatersheds.

Figure 31:



Source: U.S. Bureaus of Census, 2000

In comparison with the State of Alabama and the United States, the income levels of the Black Warrior River watershed are low. The per capita income of the watershed, at $15,597, is only 72 percent of that of the United States, at $21,587, and 86 percent of that of the State of Alabama, at $18,189. Likewise, the median household income of the Black Warrior River watershed, at $32,079, is 76 percent of that of the nation, at $41,994 and 94 percent of the State's, at $34,135.

L. ECONOMIC IMPORTANCE -- The Black Warrior River As A Resource

Barge Transportation

Shippers have long known that barge transportation is the most cost-effective mode of getting goods to market. Water transportation consumes far less fuel per ton-mile of cargo hauled than airplanes, railcars or trucks. Barge transportation is more than eight times more efficient than truck transportation and more than twice as efficient as rail transportation. Additionally, it is ideally suited to high-tonnage shipments of bulk commodities and fuels and is especially beneficial to mining, processing, manufacturing, construction and farming enterprises. Efficient barge transportation is also critical to the domestic supply of motor fuels, heating oil and fuels basic to the steel and chemical industries and in the generation of electric power. [28]

Today, navigable waterways have a positive economic impact on 56 percent of the nation's heavy manufacturing and 61 percent of America's agricultural jobs generating 49 percent of the federal tax revenue. Since the end of World War II, the volume of freight transported on America's waterways has increased dramatically and now accounts for some 600 million tons of cargo annually. [28]

One of the most utilized waterways in the Southeast, the Warrior-Tombigbee Waterway is the number one choice for shippers utilizing Alabama's waterways. The Warrior-Tombigbee stretches from the foothills of the Appalachian Mountains to its deepwater terminus at the Port of Mobile. From the coal-rich Black Warrior Basin, the Black Warrior River flows west and south 165 river miles to its juncture with the Tombigbee River at Demopolis. The Tombigbee River flows southward from Demopolis 175 miles to join the Alabama River. The confluence of the Tombigbee and the Alabama creates the Mobile River, which flows 45 miles to the seaport at Mobile. [28]

The Warrior-Tombigbee system employs six locks to accommodate a total water level differential of 262 feet. The waterway is linked to 16,000 miles of barge routes stretching from the Great Lakes to the Gulf of Mexico via the Tennessee-Tombigbee Waterway, which runs from the town of Demopolis to the Tennessee River. This represents more than a century of improvements; going from a three-foot channel with 17 locks in 1915, to today's nine-foot channel with six locks. Five of the six modern locks were built between 1954 and 1975: Bankhead, Holt, Selden (originally Warrior), Demopolis and Coffeeville. The sixth and final lock, William Bacon Oliver, was opened to traffic in July 1991. The six locks feature chamber dimensions of 110-feet-wide and 600-feet-long. [28]

Before the system of locks and dams were built, steamboats could only operate on the Black Warrior River during high water and could not get above Tuscaloosa because of the shoals there. The first successful steamboat voyage from Mobile to Tuscaloosa was made by the Cotton Plant in 1821.

Construction of the first lock at Tuscaloosa began in 1888 and the first commercial tow destined for Mobile passed through the locks on January 12, 1896. [28] As improvements were made to the Warrior-Tombigbee system over the years, more industry located along its banks. The Alabama State Docks Department developed and maintains inland docks facilities at Cordova, Tuscaloosa-Northport, and Demopolis. This has initiated numerous privately owned facilities that have built along the waterway. [29]

Initial studies had predicted that the waterway would not carry eight million tons a year until 1980, but that level was reached by 1966. By 1980, twice that projected tonnage was moving on the waterway annually. [28] Today, more than 25 million tons of goods and materials are transported on the Warrior-Tombigbee Waterway each year with a value exceeding one and a half billion dollars each year. [29]

In the recent past, the waterway has accounted for nearly 50 percent of the export coal handled by the Port of Mobile. However, in the past several years, movement of coal via the Warrior-Tombigbee has increased from nearly eight million tons of coal to ten million tons (2000) to the area's electric generating plants. This increase is based on shifts in the sources of coal and the economics of water transportation and not an increased use of coal. [29] Other commodities moving in significant numbers include ores, crude and fuel oils, chemicals, aggregates and forest products. The iron and steel industry represents another important user of the Warrior-Tombigbee Waterway. U.S. Steel's Fairfield works and Corus Steel (previously known as British Steel) mill at Tuscaloosa both utilize the waterway, and the industry has caused increases in the amounts of coal and iron ore pellets moving on the Warrior-Tombigbee system. [28]

Numbers on the economic impact of the Warrior River alone are difficult to find. However, for all of the waterways in Alabama, it is estimated that industries, which use water transportation, contribute over sixty thousand jobs. As mentioned above, the Black Warrior alone moves over one and a half billion dollars worth of cargo each year (this number does not include the Boeing shipments on the Warrior-Tombigbee Waterway which can run over three hundred million dollars per shipment). [29]

Drinking Water Supply

Drinking water in the Black Warrior River watershed is typically safe. However, there are a number of potential threats to the safety of drinking water, including both chemical and microbial contamination. There is growing recognition of the value of protecting the high quality of waters that are a source of drinking water as a means of reducing the cost of treatment systems required under the Safe Drinking Water Act. [22] *Appendix B shows public water suppliers within the Black Warrior River watershed.*

Birmingham Water Works services a great percentage of the Black Warrior River Watershed's population. They have four primary water sources which supplies its five county service area. Three of these sources are within the Black Warrior River Watershed, accounting for 80 percent of allotted draws.

<u>Cahaba River System</u>	
Watershed Area	196 Square Miles
Storage Capacity Gallons	5,682 Million
Safe Yield	52 MGD

Black Warrior River Watershed	
<u>Inland Lake/Blackburn Fork</u>	
Watershed Area	72 Square Miles
Storage Capacity	21 Billion Gallons
Safe Yield	47 MGD
<u>Sipsey Fork</u>	
Watershed Area	946 Square Miles
Storage Capacity	442 Billion Gallons
Allotment	75 MGD
<u>Mulberry Fork</u>	
Allotment	85 MGD

SOURCE: Birmingham Water Works Board. www.bwwsb.com

Hydroelectric Generation

The Black Warrior River Basin provides two sources of hydroelectric generation for Alabama Power (APC) customers: Bankhead Dam and Powerhouse and Lewis Smith Development. APC provides more than 30 percent of the power needs for Southern Company's residential, commercial and industrial customers. Of this 30 percent, 7.2 percent of the power is derived from APC's 14 hydroelectric facilities. Bankhead Dam and Lewis Smith Development provides a significant source of reliable, dependable, and reasonably priced electricity for APC's consumers. Electricity produced at the Bankhead powerhouse is transmitted to APC's power grid for allocation, as needed, to residential, commercial, and industrial customers throughout the service area. [2]

Bankhead Dam and Powerhouse. The Bankhead Dam and Powerhouse are located on the Black Warrior River in Tuscaloosa County in west central Alabama, approximately 154 river miles upstream of the confluence of the Black Warrior and Tombigbee Rivers. The dam, spillway, navigation lock, and reservoir are owned and operated by the Army Corps of Engineers (ACOE). APC owns only the powerhouse and a non-overflow section of dam between the powerhouse and the spillway, including a trash gate. The Project area is approximately 126 acres. There are no federal lands within the Project area. [2]

Lewis Smith Development (Smith Development). The Lewis Smith development (Smith development) is located in Walker, Winston, and Cullman counties in north central Alabama, on Sipsey Fork, a tributary of Mulberry Fork and a headwater stream of the Black Warrior River (River). The Smith development is approximately 14 river miles above the mouth of the Sipsey Fork. A portion of the 180,000-acre Bankhead National Forest is located within the Project area.

Recreation

The Black Warrior has a multitude of resource and water-related recreation opportunities, which include hunting, fishing, canoeing, kayaking, and pleasure boating. The value of recreational activities, specific to the Black Warrior, would be difficult to estimate or compile. However, State revenue, generated by recreational activities would be difficult to ignore. [30] According to the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation:

- Alabama resident participation in wildlife-associated recreation was 1,323,000, which is 39 percent of the State's population.
- Alabama resident hunting and fishing participation was 726,000, which is 21 percent of the State's population.
- Alabama resident wildlife-watching participation was 965,000, which is 28 percent of the population.
- The total number of anglers fishing in the state was 851,000; of this total 610,000 (72 percent) were residents are 241,000 (28 percent) were nonresidents.
- The total number of hunters hunting in the State of Alabama was 423,000; of this total 307,000 (73 percent) were residents and 116,000 (27 percent) were nonresidents.
- Trip-related expenditures for these activities totaled $633 million. These expenditures include food and lodging, transportation and other trip-related costs.
- The overall economic impact of hunting and freshwater fishing is $2.8 billion ($1.6 billion for hunting and $1.2 billion for freshwater fishing.)
- Sales tax paid to the State from hunting and freshwater fishing expenditures was $61.4 million ($31.2 - hunting and $30.2 - freshwater fishing.)
- The number of jobs supported by hunting and freshwater fishing is 30,661.
- Alabama has moved from 9th to 5th in the nation for hunting-related retail sales, and is 10th for retail sales associated with freshwater fishing.

Annual recreational use of Smith Lake was estimated to be 1,539,759 person-hours of recreational activity in 1994 to 1995, which translates to 244,406 person-trips (FIMS, unpublished data). Approximately 81 percent of the total annual use occurred from March through August. Boating was the primary activity, accounting for 30 percent of use, followed by other water recreation activities (25 percent), and land recreation (24 percent) (FIMS, unpublished data). Between February 1 and March 31 (during "rising water") and December 1 through January 31 (winter "drawdown" season) boat fishing was the primary activity. [2]

Rainbow trout from the Dale Hollow National Fish Hatchery are stocked downstream of Smith development seven times a year making it the only unique cold water trout fishery in Alabama. APC monitors the water quality in the Smith development tailrace and has also studied trout distribution in the tailrace. This information is shared with the ADCNR so that the trout fishery can be managed according to state fishery goals. Through APC's monitoring efforts, it has been determined that the trout fishery extends over 12 miles down the river below Smith Dam. A quick release, in the form of a sluice pipe, was also installed below the dam to make it easier for the fish to be stocked in the tailrace. Fish attraction devices were installed during 1999 to provide velocity refuges and to provide additional structures in the tailrace area. [2]

Subsistence Fishing

Many low-income citizens supplement their food budget with fish caught from local rivers, lakes and streams. Recreational fishermen, low-income citizens, and others who regularly catch and consume fish may be exposed to contaminants held in fish tissue. Studies have not yet proven that fish contaminated with PCB's are harmful to humans. However, there is a recommendation that mercury contaminated fish should not be consumed children and pregnant women. *See Section 10: Current Research and Future Research Needs for a list of Fish Advisories within the Black Warrior River Watershed.*

Agriculture

Although agricultural uses have been cited as being a contributor to water quality problems, improvements have been made in best management practices and owner-operator practices. There are 47,000 people in Alabama who identify themselves as farmers, creating a $4.8 billion dollar business. Agriculture is Alabama's largest industry creating 476,000 jobs employing 21 percent of the state's workforce, with annual earnings of more than $9 billion. Of the total agricultural jobs, 85 percent are not on the farm at all. These include farm equipment dealers, seed and feed suppliers, food processors, exporters and retailers. Together, these industries account for more than $43 billion, or 22 percent of the state's direct output.

SOURCE: Serving More than Just Food. Alabama Agriculture. Alabama Farmers Federation

According to the 2002 Alabama Agricultural Statistics, Bulletin 44, four of the fifteen counties located in the Black Warrior River watershed are the state's top agricultural producers for certain crops. Cullman County is ranked as the number one producer of cattle, eggs and broilers, while Hale County and Greene County are ranked first and second, respectively, for catfish sales. Leading agricultural producers include: Bibb County, which is ranked fourth for the production of broilers and fifth for eggs; Lawrence County, which is ranked third for the production of cotton and fifth for corn; Marshall County, which is ranked third in the production of both eggs and broilers and fourth for cattle; and Perry County, which is ranked fourth for catfish sales.

Total 2001 cash receipts from farm marketings in the fifteen watershed counties was $1,242,641, with cash receipts being highest in Cullman County, at $410,218, and lowest in Fayette and Jefferson Counties, at $11,205 and $11,039, respectively. Poultry production generated the largest cash receipts in the watershed, with $775,873 generated from broilers and $111,274 generated from eggs.

Approximately 24 percent of the total land area of the 15 counties located in the Black Warrior River watershed is used for agricultural purposes. According to the 2002 Alabama Agricultural Statistics, there are 11,022 farms in the 15 counties, totaling over 1.73 million acres of farm land, with the average farm size being 211 acres. The counties with the highest percentage of land in agricultural use is Lawrence County, at 46.19 percent, Cullman County, at 42.92 percent, and Marshall County, at 40.26 percent, while only 5.8 percent of the land in Jefferson County and 6.48 percent of the land in Tuscaloosa County is used for agricultural purposes.

Figure 32:

2001 Cash Receipts from Farm Marketing by County
(thousands of dollars)

County	Livestock and Poultry	Crops	Farm and Forestry	Total
Bibb	$1,854	$161	$10,471	$12,486
Blount	$134,571	$5,571	$3,294	$143,436
Cullman	$396,050	$9,524	$4,644	$410,218
Etowah	$47,459	$3,218	$2,283	$52,960
Fayette	$4,691	$1,454	$5,060	$11,205
Greene	$15,349	$188	$4,107	$19,644
Hale	$42,198	$877	$35,320	$78,395
Jefferson	$1,324	$3,021	$6,694	$11,039
Lawrence	$64,183	$18,648	$1,076	$83,907
Marengo	$9,989	$2,042	$24,897	$36,928
Marshall	$184,463	$4,164	$1,006	$189,633
Perry	$9,717	$332	$13,580	$23,629
Tuscaloosa	$13,630	$4,921	$15,923	$34,474
Walker	$47,655	$1,336	$7,590	$56,581
Winston	$70,904	$394	$6,808	$78,106
Total	**$1,044,037**	**$55,851**	**$142,753**	**$1,242,641**

Source: Alabama Agricultural Statistics, 2002 - Bulletin 44

Forestry

Ranking as the state's number one manufacturing industry, Alabama's forest products industry is a vital component of the state's economy.

- Alabama forests directly provide employment for about 70,000 people with an annual payroll of $1.9 billion and represents 12.8 percent of the state's total manufacturing workforce.
- Private individuals own about 71 percent of Alabama's forestland, 6 percent is owned by corporations, 5 percent is owned by government entities, and 18 percent by the forest industry. [31]

Figure 33 provides the specific economic impact of forestry within the Black Warrior River Basin:

Figure 33:

Economic Impact of Forestry Within The Black Warrior River Watershed 1997 to 1999

County	# Firms	Employ. Payroll (1997)	Supporting Jobs	Market Value of Harvested Timber (millions)	(millions)	Economic Impact (1999)
Blount	21	137	3.5	208	6.1	77.6
Greene	12	346	8.7	526	11.5	145.6
Fayette	32	565	13.2	859	7.1	90.4
Hale	16	330	9.8	502	38.1	482.3
Cullman	43	996	25.0	1,514	7.8	98.2
Jefferson	83	2,724	68.4	4,140	12.6	159.5
Tuscaloosa	79	1,576	38.5	2,396	15.6	198.1
Walker	47	885	22.4	1,345	12.7	161.1
Winston	72	5,747	116.8	8,735	9.4	119.5
TOTAL	405	13,306	306.3	20,225	120.9	1,532.3

SOURCE: Phillip Sassnett, President, Sustainable Forestry Initiative

Land Values

Water pollution clearly degrades environmental quality, but it also diminishes recreation and economic opportunities and poses clear threats to public health. [22] The health of the watershed affects the aesthetic value of land and therefore, the economic potential of communities. While some towns may wish for their land to be developed in order to raise the tax base and improve their cities, many citizens realize that it is important not to forfeit their valuable natural resources for the sake of development (Hall, 1992). As streams become undesirable for municipal, industrial, agricultural, or recreational use, property values along the streams are substantially reduced. [32]

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3 Sources of Impairment

SOURCES OF IMPAIRMENT

The following is a general discussion that explains the sources of water quality impairments found in the Black Warrior River Watershed. The intent of this chapter is to provide a broad understanding of activities that can diminish water quality. Specific activities, and documentation thereto, affecting the Black Warrior River can be found in Chapter 4, along with potential remediation activities. Further, specific effects of the impairments in the Black Warrior River watershed can be found in Chapter 5.

A. STORMWATER RUNOFF ASSOCIATED WITH RAPID DEVELOPMENT AND RELATED CONSTRUCTION

Rapid development and associated construction without the proper application of construction best management practices affect both the quantity and quality of stormwater runoff, which in turn has impacts on water quality. By enhancing and channeling surface drainage in favor of natural drainage systems, impervious surfaces like asphalt, concrete, and roofing increase the volume, velocity, and temperature of the runoff, and can result in flooding, erosion, and permanent alterations in stream form and function. In addition, by blocking the infiltration of storm water and its associated pollutants into the soil, impervious surfaces interfere with the natural processing of nutrients, sediment, pathogens, and other contaminants, resulting in degradation of surface water quality. [6]

Figure 34: Urban runoff from impervious surface due to construction.

A growing body of scientific research is finding a direct relationship between the amount of impervious surface in a watershed and the water quality of the watershed's receiving streams. Many studies find that without nonpoint source management of some kind, stream water quality becomes increasingly degraded as impervious levels climb above 15 percent; in highly sensitive streams, degradation can begin when as little as 8 percent to 10 percent of the watershed area has impervious cover. [6]

On March 1, 2003, Stormwater Phase II regulations went into effect which governs runoff from disturbed sites of one acre or greater. *See Section 8: Existing Programs and Mechanisms for a discussion of Stormwater Phase I and Phase II Programs. Also, see Appendix B for a map of current and historical construction within the Black Warrior River Basin.*

B. AGRICULTURAL ACTIVITIES

Improvements in water quality have been made by the agricultural community due to the voluntary application of best management practices (BMPs) through the efforts of concerned landowners and local Soil & Water Conservation Districts. Most BMPs involve the application of sound conservation principles that not only minimize water pollution, but also meet the needs of the total ecosystem, that is the soil, water, air, plants, and animals. In this way, BMPs may also be referred to as "conservation practices." A single BMP will prevent a specific water quality problem, but generally, combinations of practices are needed. Simple problems may require a small number of practices, while complex problems may require a greater number of practices.

Impairments from agricultural sources are the second most frequent cause of impairment within the Black Warrior River Basin. However, data used to list stream segments on the 2000 303(d) list are more than five years old. Since then, the Soil & Water Conservation Districts have installed a number of BMPs. Their affect on water quality is considered to be significantly improved although undocumented.

C. UNPAVED PUBLIC AND PRIVATE ROADS

Unpaved public roads carry local traffic and provide connecting links to paved arteries that carry the main streams of traffic. They are seldom built to accommodate today's heavy loads. Large vehicles can promote the deterioration of road surfaces and can lead to excessive erosion problems. This compounds the problem of unpaved public road maintenance for local governments. There has been no recent study identifying unpaved public and private roads within the Black Warrior River Watershed.

D. SILVICULTURE ACTIVITIES (FORESTRY)

On a national level, silvicultural activities are consistently found to be a minor source of water quality impacts. Silviculture is at or near the lowest "leading source" of pollution or impairments for rivers and streams shown in summary charts in each EPA 305(b) report from 1994 through 1998. In the 1998 305(b) report, EPA dropped silviculture from the chart that showed the leading sources of impairment for rivers and streams. [1] In Alabama's 2000 303(d) list for impaired stream segments, there was no streams listed with impacts from forestry or forestry operations.

Brown and Binkley (1994) [2] compiled a comprehensive review of the effects of management of water quality in North American forests. Their review included discussions on pathogens, dissolved oxygen, nutrients, dissolved solids, sediment, toxics, temperature, and water quality protection programs. They concluded that the quality of water draining forested watersheds is typically the best in the nation, whether managed or undisturbed. They note the potential for poorly implemented forestry practices to adversely affect water quality. Generally, small non-industrial private landowners operating without the guidance of professional foresters have the lowest level of BMP implementation. [1]

Excess sediment in streams is the most widespread water quality problem in forestry. Forest roads can be a major contributor to sediment delivery if not correctly designed and maintained. They conclude that the most effective way to meet water quality standards on forestland is through site-specific BMPs. [1]

E. ROAD CONSTRUCTION

Although perceived as a temporary impairment, improperly installed and/or inadequate or improperly maintained BMPs for road construction can be a significant contributor to erosion, sedimentation and siltation for the short and long term. ADEM permits DOT sites under the federally delegated NPDES program and has a memorandum of agreement to assist DOT in compliance issues. However, sub-basin committee members have commented that inadequate funding of enforcement personnel and resources hinder the field offices from adequately enforcing these types of permits. *See Changing Land Use section in Section 2: Description of Watersheds.*

F. UNRECLAIMED ABANDONED MINE LAND

An analysis of the 2000 303(d) list shows that the primary source of sedimentation is from abandoned mine lands. The Alabama Department of Industrial Relations - Mining and Reclamation Division and the Office of Surface Mining is working to reclaim many of these areas. *See Alteration of pH in Section 4 and Section 7: Water Quality Initiatives.* Funding for reclamation of abandoned mine land is insufficient to reclaim all sites within a short amount of time. In fact, at the current rate of funding, it is estimated that it will take over 30 years to reclaim sites within Alabama. *See Appendix B for a map of current and historical mining within the Black Warrior River Watershed.*

G. LARGE WATERCRAFT RELEASE OF SEWAGE

When boats are not equipped with a holding tank for sewage, the sewage goes directly in the water where people swim, fish and play. Sewage "fertilizes" the water, reduces the oxygen and can result in algal blooms and fish kills. (Also see Nutrients-Large watercraft release of sewage.) Over 100 different intestinal pathogens - viruses, parasites and bacteria can be found in sewage. This disease and contamination moves up the food chain, into fish, shellfish and humans. Skin rashes, earaches and stomach ailments are just a few of the side effects associated with exposure to sewage-contaminated waters.

H. URBAN STORM WATER RUNOFF CONTAINING FERTILIZERS AND DETERGENTS (Parks, Golf Courses, Residential, Commercial)

Turf management is frequently blamed for non-point-source pollution because turf fertilizers typically contain substantial amounts of nitrogen and phosphorus, the two most-implicated nutrients in water-quality problems. These nutrients, especially phosphorus, are often the limiting factor for algae and aquatic weeds in natural habitats. A large increase may cause excessive growth in surface waters. [8]

I. SANITARY SEWER OVERFLOWS

Sewage in typical municipal domestic waste collection systems carries a variety of constituents that can alter local environmental conditions as well as spread disease-causing agents such as bacteria, viruses and protozoa. Sewage may include untreated human and animal wastes, household chemicals, industrial chemicals, pesticides, oxygen-demanding pollutants, suspended solids, nutrients, toxicants, floatable matter, radioactive materials and pathogens. Separate sanitary sewage collection systems are not intended to convey a significant level of stormwater and are expected to deliver the sewage intact to the sewage treatment plant for processing prior to discharge. [3]

Wastewater indicators are chemical compounds commonly found in wastewater and urban runoff that can be indicative of contamination associated with a human source. Sixteen constituents that are good indicators of the presence of human wastewater can be classified info five different categories: (1) food by-products, (2) pharmaceutical by-products, (3) phosphate based chemical surfactants and additives, (4) detergent agents, and (5) fragrances. Standards have not been established by ADEM or USEPA for these constituents. [4]

Properly designed, sized, and maintained combined sewers can be an acceptable part of a city's water pollution control infrastructure. Combined sewer overflows (CSO) occurs when the capacity of the collection and treatment system is exceeded due to high volumes of rainwater and the excess volume is diverted and discharged directly into receiving waters, bypassing sewage treatment plants. Often, the excess flow that contains raw sewage, industrial wastes, and stormwater is discharged untreated. [5]

A more recent issue concerning some cities is the problem of overflows from municipal separate sanitary sewers (SSOs) that are not CSOs because they transport only sanitary wastes. Discharges of untreated sewage from these sewers occur from manholes, broken pipes and deteriorated infrastructure, and undersized pipes, and can occur in wet or dry weather. [6] A total number of SSOs that occur each year is unknown. In some areas, they might not be reported or are underreported to state environmental agencies. In a 1994 survey of 79 members of the Association of Metropolitan Sewerage Agencies, 65 percent of the respondents reported wet weather SSOs. They reported that between 15 and 35 percent of their sewers were filled above capacity and/or overflowed during wet weather. [5]

Discharges from SSOs can contain nutrient-rich sanitary wastewater, pathogens, toxic and hazardous chemicals, and heavy metals. Pathogen loads and toxicants from SSOs may be very important in urban watershed quality. This is especially true when SSOs drain into recreational contact waters, environmentally sensitive areas, or drinking water sources. Sewers can be a significant source of disease-producing protozoa such as *Cryptosporidium* and *Giardia*, which may remain viable for extended periods in streams and streambeds. [3]

Many avoidable SSOs are caused by inadequate or negligent operation or maintenance, inadequate system capacity, and improper system design and construction. The SSOs can be reduced or eliminated by:

- Sewer system cleaning and maintenance,
- Reducing infiltration and inflow through system rehabilitation and repairing broken or leaking service lines,
- Enlarging or upgrading sewer, pump station, or sewage treatment plant capacity and/or reliability,
- Constructing wet weather storage and treatment facilities to treat excess flows.
- Considering SSOs during community planning and facilities planning, or while extending the sewer system into previously unsewered areas. [7]

Although municipal treatment plants have elaborate water treatment systems, the risk of drinking water contamination is greatly minimized if the surface water prior to treatment is cleaner.

As a result of a consent decree by EPA, Jefferson County was required to update sewer facilities in Cahaba and Black Warrior River Watersheds. Specifically in the Black Warrior River Watershed, sewer rehabilitation in Village, Valley, Turkey, Prudes and Fivemile Creeks are either underway or completed. Other water treatment systems completed or in process are shown under Initiatives.

J. WASTEWATER TREATMENT DISCHARGES IN EXCESS OF NPDES PERMIT

One of the most common forms of pollution control in the United States is wastewater treatment. Municipalities have a vast system of collection sewers, pumping stations, and treatment plants. Sewers collect the wastewater from homes, businesses, and many industries, and deliver it to plants for treatment. Most treatment plants were built to clean wastewater for discharge into streams or other receiving waters, or for reuse. [9]

The basic function of wastewater treatment is to speed up the natural processes by which water is purified. There are two basic stages in the treatment of wastes, primary and secondary. In the primary stage, solids are allowed to settle and removed from wastewater. The secondary stage uses biological processes to further purify wastewater. Sometimes, these stages are combined into one operation. [9]

New pollution problems have placed additional burdens on wastewater treatment systems. Today's pollutants, such as heavy metals, chemical compounds, and toxic substances, are more difficult to remove from water. Rising demands on the water supply only aggravate the problem. The increasing need to reuse water calls for better wastewater treatment. These challenges are being met through better methods of removing pollutants at treatment plants, or through prevention of pollution at the source. Pretreatment of industrial waste, for example, removes many troublesome pollutants at the beginning, not the end, of the pipeline. To return more usable water to receiving lakes and streams, new methods for removing pollutants are being developed. Advanced waste treatment techniques in use or under development range from biological treatment capable of removing nitrogen and phosphorus to physical-chemical separation techniques such filtration, carbon adsorption, distillation, and reverse osmosis. These wastewater treatment processes, alone or in combination, can achieve almost any degree of pollution control desired, Waste effluents purified by such treatment, can be used for industrial, agricultural, or recreational purposes, or even drinking water supplies. [9]

From time to time, waste effluents may exceed the capacity of the plant to process the effluents. On other occasions, outdated or failing equipment may cause an excess discharge. During these events, waste effluents may be discharged in violation of NPDES permits. [9] *See Appendix B for a list of Waste Water Treatment Plants Within the Black Warrior River Watershed.*

K. FAILING SEPTIC SYSTEMS

Septic tank systems are the largest of all contributors of wastewater to the ground and are the most frequently reported sources of groundwater contamination in the United States. Bacteria, viruses, and parasites (including worms and protozoans) are the types of pathogens in wastewater that are hazardous to humans. Fungi that can cause skin, eye, and respiratory infections also grow in sewage and sewage sludge. These bacteria and viruses may be transported very rapidly and could contaminate nearby drinking water supplies or recreational surface water. [10]

Each county's public health department is responsible for permitting septic systems. It is the individual homeowner's responsibility to ensure that the system is properly maintained and functioning. There are no exact numbers of failing septic systems within the Black Warrior River Watershed. However, county public health departments are required to estimate these numbers for reporting purposes. Health department estimates of failing septic systems within the Black Warrior River Watershed are shown in Figure 38 in Section 4: Documented Impairments-Pathogens. [9]

L. IMPERVIOUS SURFACE POLLUTED RUNOFF CONTAINING OIL, GREASE AND ANTIFREEZE

Used motor oil is especially a problem when it enters the environment. It tends to soak into the ground, where it slowly mixes with rainwater leaching through the ground. This contaminated water is difficult for a public treatment works to clean to the point that it is acceptable for human consumption. According to EPA studies, simply pouring one gallon of used oil on the ground can ultimately cause one million gallons of water to become undrinkable. [11]

Motor oil can impart a toxicity to water it contaminates, prevent oxygen from dissolving in the water and make the water unattractive and undrinkable. The collection and storage of engine oil must not endanger the area's water supplies. Be sure that used oil storage is not exposed to rain! Storm water run off containing oil needs to be controlled so as not to contaminate water running into the storm water or sewer systems. [11] *See Appendix G for Project ROSE Used Motor Oil Collection Sites Within the Black Warrior River Basin.*

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4 Documented Impairments

DOCUMENTED IMPAIRMENTS

Water pollution is generally categorized as either "point" or "nonpoint" source and occurs when the rate at which these types of contaminated pollutants entering the receiving waterbody exceed natural background levels. Point source water pollution results can generally be traced to an identifiable "point", i.e., "end-of-pipe" discharge. Among these sources are permitted facilities such as municipal wastewater treatment facilities and industrial discharges, effluent from animal feeding operations and solid waste disposal systems. Point source discharges are managed by ADEM through the National Pollutant Discharge Elimination System (NPDES) permitting process. There are numerous point source NPDES permitted discharges to the Black Warrior River and its tributaries. [1] *See Appendix C for a Map of NPDES discharges. Also see Section 4-I for a discussion on NPDES.*

Waterbodies within the Black Warrior River Watershed receive significant pollutant loadings related to activities of the population and land-use activities. This is known as nonpoint source pollution. Pollutants originate from runoff associated with agriculture, forestry, construction, urban land use, mining land disposal, and other sources. Nonpoint source pollution is generally associated with stormwater runoff that transports sediment, nutrients, fertilizers, chemicals, pesticides, petroleum products, and other contaminants to receiving waters. Atmospheric deposition may also contribute nonpoint source pollutants. Nonpoint source pollution is a challenge to control due to of the diversity of sources and complexities associated with the interactions of many pollutants. [1]

As noted in the introduction of this plan, a substantial amount of data has been obtained, however, more research and data is needed for a complete understanding of the Watershed and its processes. Many of the water pollution problems in the Black Warrior River Watershed may be attributable to inadequate or malfunctioning onsite septic treatment systems, increasing urban sprawl, erosion and sedimentation from construction, forestry, mining, agricultural, and channelization of stream segments. [1] Any type of land disturbance activity may increase stormwater runoff which carries: sediments, fertilizers, herbicides, and pesticides from lawns, sod farms, golf courses, cultivated fields, pastures, managed forests, and construction sites; animal wastes from cattle feedlots, dairy farms, poultry houses, and catfish ponds; septic tank leakage and gray-water discharge from rural, suburban, and urban residences; and oils and greases from parking lots, highways, and roads. Some forms of nonpoint source runoff can be toxic to aquatic organisms at one or more of their life stages. Pollutants in stormwater runoff can also add to the effects of point source discharges from municipalities and industries. [3]

Although considerable State, Federal, and private efforts are currently underway to reduce pollution, protect habitat, and minimize conflicts, increasing and changing demands for the Basin's resources will continue to locally impact imperiled species populations and their habitats. Federally listed threatened or endangered species and other isolated imperiled species populations will remain vulnerable to random accidents, such as toxic spills, and to natural catastrophic events, such as droughts and floods, even if land uses and human populations were to remain constant within isolated watersheds. The implications are that it is highly unlikely that recovery can be achieved, or the status quo of the Basin's imperiled aquatic species can be maintained, without some degree of habitat management and aquatic species population manipulation. [3]

Leading causes of water quality impairments reported by the State of Alabama in the 305(b) report include siltation, nutrients, bacteria, and oxygen depleting substances, metals, habitat alteration, pesticides, and organic toxic chemicals. *(See Figure 44 in Section 6: Total Maximum Daily Loads)* Sources shown on this report vary widely and include municipal point sources, hydrologic and habitat modification, urban runoff, agricultural runoff, resource extraction, abandoned mine lands, land development, and removal of streamside vegetation.

Water quality management efforts in the Black Warrior River Watershed should address all aspects of water quality problems for all beneficial uses of water, and the lands from which pollutants originate.

A. EROSION, SEDIMENT, AND SILTATION

Erosion, sediment, and siltation is widely recognized as being the one of the primary impairments of stream segments throughout the nation as well as within the Black Warrior River Watershed.[4] *See Section 6: Total Maximum Daily Loads.* Sediment is eroded soil transported by wind and water. All types of land disturbances have the potential for increasing sediment. Excessive volumes of sediments entering waterbodies can diminish water clarity, alter habitats, impair fish spawning success, and increase drinking water treatment costs. Any disturbance of the soil can introduce increased sediments if improperly managed.

Increased impervious surfaces exacerbate this problem. Impervious surfaces include buildings, sidewalks, driveways and roads. Increases in impervious surfaces decrease infiltration of rainwater into soils, increase the volume of surface runoff, and increase the velocity of surface runoff. Increases in surface runoff increases soil erosion and sediment transport to streams, lakes and rivers. [12]

Sources of sedimentation and/or siltation include:

- Stormwater runoff associated with rapid development and associated construction
- Agricultural fields
- Unpaved public and private roads
- Silvicultural activities
- Road construction
- Unreclaimed abandoned mine lands
- Lack of across-the board enforcement of silviculture activities
- Removal of riparian vegetation *(See Section 5-A: Biology-Habitat Alteration)*
- Increased water velocity and channelization of streams *(See Section 5-B: Flooding)*

Figure 35: Silt Wash on Mulberry Fork

Documented Impairment

- *"An assessment of water quality in the Brushy Creek watershed by ADEM (1999c) found that sedimentation was a source of impairment … Silviculture as well as agricultural activities in the watershed were possible sources of nonpoint source pollution in the watershed."* Source: Geological Survey of Alabama. *Biomonitoring in the Mulberry Fork Watershed, 1999-2002*. Tuscaloosa, 2002.

- *Siltation also appears to be a primary factor affecting the species' habitat. Adverse effects of silt seem to be: (1) the extirpation or reduction of mollusk populations and other invertebrates on which the turtles feed; (2) physical alteration of the rocky habitats where the turtles seek food and cover; and, (3) development of a substrate in which heavy metals and other chemicals that may be toxic to the turtles tend to accumulate. A study by Dodd et al., (1986) supports findings that siltation has had a negative impact on the flattened musk turtle.* [6]

- On August 17, 2003, the Birmingham News reported that the vermillion darter populations, only known to Turkey Creek in Jefferson County, have decreased dramatically. In 1998, an estimated 1,800 to 3,000 darters lived in a 7.2-mile stretch near the headwaters of Turkey Creek. A recent population count by Samford University found about 250 of the fish remaining in a dwindling habitat. Dr. Blanchard, a Samford professor said that a possible cause is sediment washed into the creek. [7]

- As a result of the hydroelectric relicensing process, surveys have been performed to identify several "hot-spot" erosion sites in the tailraces and other identified areas of concern. Future efforts will focus on other erosion issues, including tributary erosion and shoreline erosion at the storage reservoirs.

  As a result, four sites were identified on the Smith Tailrace. All four sites erosion initiation appears to be based upon land use. SMI 101 was initiated by road construction adjacent to the tailrace, SMI 102 was initiated by clear cutting of forestland, SMI 103 was initiated by construction of Birmingham Water Works intake structure and SMI 104 appears initiated by adjacent farming activities. All sites have had erosion accelerated due to project operations (tailrace fluctuations of up to 10 ft.). Site SMI 101 is the worst and most active of the sites. Project operations continue to actively promote erosion at this site. [8] *See Appendix C.*

- In August of 2003, Dr. Bernard R. Kuhajda performed an *Inventory of Aquatic Resources, Particularly Special Status Mussels, Snails, Turtles, and Fishes, in Cedar, Flat, and Tyro Creeks, Fayette County, Alabama* for the US Bureau of Land Management, Jackson Field Office. Noted were the following erosion-related impairments:
  - *Cedar Creek at Berry Quarry had unstable and eroding banks with little riparian vegetation. Silt was very heavy and larger substrate was embedded*. [9]
  - *Cedar Creek at County Road 46: A large amount of silt was present and the riparian vegetation had recently been removed in a clear-cut operation.* [9]
  - *Flat Creek at Flat Creek Road: No riparian vegetation was present, silt was heavy.* [9]
  - Tyro Creek at an unnumbered gravel road: Siltation at this site was very heavy; silt was even in the riffle proper downstream of the bridge. There was a huge clear-cut upstream of this site within the Tyro Creek Watershed. [9]

B. ORGANIC ENRICHMENT / LOW DISSOLVED OXYGEN

Organic enrichment (OE) occurs when there is a large amount of organic matter from oxygen depleting wastes. Oxygen-consuming bacteria decompose organic matter. Large populations of these bacteria can deplete water of dissolved oxygen (DO), killing fish and other forms of oxygen-consuming organisms. Sources of OE/DO include:

- Failing or substandard septic systems
- Agricultural runoff containing fecal matter
- Large watercraft release of sewage
- Urban runoff containing excess fertilizers (turf management-residential, commercial, and recreational

- Impervious surface polluted runoff containing oil, grease, and antifreeze
- Sanitary sewer overflows
- Wastewater treatment discharges in excess of NPDES permit

DO content is a widely used water quality indicator because it regulates individual and ecosystem-level metabolic processes. Alabama's water criteria mandates DO levels to be at least 5.0 mg/l for Swimming, Fish and Wildlife, and Public Water Supply classifications. [NEMO]

Organic enrichment can be measured by the trophic status of a waterbody. Lakes with a TSI of seventy (70) or greater are generally considered to be hypereutrophic and in need of regulatory action appropriate for protection and restoration. A TSI of fifty (50) to seventy (70) indicates eutrophic conditions in a lake. Trophic state index values from forty (40) to fifty (50) indicate mesotrophic conditions. Oligotrophic conditions are indicated by TSI values less than forty (40).

According to ADEM's 2000 305(b) report, the trophic status of reservoirs within the Black Warrior River Watershed is shown in Figure 36. There are no reservoirs within the Black Warrior River Watershed that are considered to be degrading. However, four of the reservoirs in the watershed, as shown in Figure 37, are considered to be threatened but supporting their water use classification. *See Appendix E.*

Figure 36:

TROPHIC STATE OF RESERVOIRS WITHIN THE BLACK WARRIOR RIVER WATERSHED

RESERVOIR	TSI STATUS
Warrior	53
Bankhead	51
Holt	51
Oliver	51
Smith	42
Tuscaloosa	40
Inland	35

SOURCE: Alabama Department of Environmental Management 2000 305(b) Report to Congress

Figure 37

SUPPORT BUT THREATENED RESERVOIRS WITHIN THE BLACK WARRIOR RIVER WATERSHED

RESERVOIR	USE	CONCERN
Lake Tuscaloosa	Water Supply	Trophic State
	Aquatic Life	Trophic State and Mining
Bankhead Lake	Aquatic Life	Trophic State and Mining
Lake Oliver	Aquatic Life	Nutrients
Warrior Lake	Aquatic Life	Trophic State and Mining

SOURCE: Alabama Department of Environmental Management 2000 305(b) Report to Congress

Documented Impairment

- (Simpson Creek at Smith Lake) *Oxygen concentrations … more often approached the minimum required to maintain the "Fish and Wildlife" classification. … A 2-meter Secchi disk reading is generally thought to be the minimum that an unpolluted lake should have. Low Secchi disk readings at this site suggest that the water has excess amounts of suspended solids, algae, or both.* Citizen Volunteer Water Quality Monitoring of Alabama's Reservoirs. Volume 1: Lewis Smith Lake. Alabama Water Watch. October 1999.

- *The ADEM (1999b) investigated water-quality parameters in Black Warrior River reservoirs including the Mulberry Fork section of Bankhead reservoir. Within the reservoir, they determined that water-quality concerns related to nitrification and eutrophication were centered more on the Locust Fork and Valley Creek embayments than on the Mulberry Fork embayment."* Source: Geological Survey of Alabama. Biomonitoring in the Mulberry Fork Watershed, 1999-2002. Tuscaloosa, 2002.

- Permitted, industrial and domestic effluents from the Birmingham Metropolitan area continue to flow into [Bankhead Lake]. Highly polluted tributary streams are suspected of causing periodic sags in dissolved oxygen (DO) levels particularly in times of hot weather and low river conditions (ADCNR, 1988). [10]

Current Remediation

- Diminished DO levels caused by pollution occasionally occur in Bankhead Lake and are passed downstream during generation. APC has implemented a turbine aeration system at the Bankhead Project to improve water quality (DO levels) conditions downstream of the ACOE's John Hollis Bankhead Lock and Dam. The type of turbine aspiration that APC uses is referred to as "draft tube aeration". This method uses the naturally occurring low-pressure area below the turbine runner to aspirate atmospheric air into the draft tube via a pipe or manifold. The low-pressure area is created by the flow of water past the pipe or manifold opening, which draws air into the water flow. As the air and water mixture travels through the draft tube, it is subjected to turbulence and pressure changes that result in the formation of very small bubbles of air. The small bubbles provide an excellent condition for gas-transfer (oxygen and other naturally occurring gases) to the water for the length of time that the water and bubbles are in contact. As the water-air mixture moves into the tailrace area the remaining portions of the air bubbles float up to the surface. This type of aeration system typically results in an increase of 1 to 3 mg/l above initial DO levels. [10]

C. NUTRIENTS

Nutrients, in the appropriate amounts, are essential to the health and continued functioning of aquatic ecosystems and include any chemical that increases growth of plant or animal communities. Excessive nutrient loadings (eutrophication) will, however, result in excessive growth of macrophytes or phytoplankton and potentially harmful algal blooms, leading to oxygen declines, imbalance of aquatic species, public health risks, and a general decline of the aquatic resource. [5] Two major nutrients that cause water quality problems are nitrogen and phosphorus.

Potential sources of nutrients include:

- Urban storm water runoff containing fertilizers and detergents (parks, golf courses, residential, commercial)
- Animal waste (residential, agricultural)
- Failing septic systems
- Large watercraft release of sewage

- Waste water treatment plant overflows
- Auto emissions.
  - More than 23 million tons of nitrogen are emitted to the atmosphere each year. About half of the nitrogen compounds emitted from fossil-fuel-burning plants, vehicles, and other sources are deposited in watersheds. [5]

  State water quality reports indicate that over-enrichment of waters by nutrients (nitrogen and phosphorus) is the second leading source of impairment in the Black Warrior River watershed. *(See Section 6: Total Maximum Daily Loads)* Currently, Alabama does not have a standard for nutrients. In order to control algal growth, the EPA recommends that phosphorus should not exceed 0.05mg/l if streams discharge into lakes or reservoirs, 0.025 mg/l within a lake or reservoir, and 0.1 mg/l in streams or flowing waters not discharging into lakes or reservoirs.

Documented Impairment

- *"The USGS conducted a 16 month investigation (2000-2001) of water quality, aquatic-community structure, bed sediment, and fish tissue in Village (four sites) and Valley Creeks (three sites) and at two reference sites near Birmingham (Five Mile Creek/McCalla and Little Cahaba River)."* [11]
  - *Concentrations of total nitrogen exceeded the USEPA recommendation for streams and rivers in the Ridge and Valley Level III Ecoregion.*
  - *Concentrations of total phosphorus exceeded the USEPA recommendation at sites on Village and Valley Creeks in 60 of the 63 samples.*
  - *Median concentrations of total nitrogen and total phosphorus were highest at the most upstream site on Valley Creek.*
  - *In Village Creek, median concentrations of nitrite and ammonia increased in a downstream direction.*
  - *In Valley Creek, median concentrations of nitrate, nitrite, ammonia, organic nitrogen, suspended phosphorus, and orthophosphate decreased in a downstream direction.*

D. PATHOGENS

Pathogens are disease-causing bacteria, parasites, and viruses associated with the presence of fecal matter. Pathogens may be easily transported by storm water runoff into neighboring creeks or storm drains. Sources of pathogens include: animal waste, compromised or failing septic systems, or malfunctioning or overloaded waste treatment lagoons. [4]

Microbial contamination of drinking water is an area of special concern. While filtration and disinfection of drinking water can effectively remove microbiological contaminants, the reliability of these microbial treatment systems is not as high as some chemical treatment systems. The added cost of chemical treatment is passed on to the consumer. Ensuring the high quality of sources of drinking water is especially important for reducing risks from microbial contamination. [5]

Fecal Coliform counts are an indicator of the possible presence of waterborne pathogenic organisms in surface or ground water which live in the digestive tracts of warm-blooded animals. The presence of these bacteria in surface or ground waters is used to indicate contamination from human or animal waste. Fecal Coliform bacteria are generally short-lived and do not reproduce in water. They reach surface waters through direct contact (such as wildlife in a stream), discharge into surface waters (such as an outfall from a wastewater treatment facility), surface water runoff (usually associated with rainfall), or transport by groundwater (such as from failing septic systems). [14]

ADEM has set a fecal Coliform standard for the Swimming use classification as not to exceed 200 colonies per 100 milliliters (ml). This is a geometric mean, which is the average of at least five samples over a 30-day period. For Fish and Wildlife and Public Water Supply use classifications, fecal Coliform must not exceed a geometric mean of 1000 colonies/100 ml, nor exceed 2000 colonies/ml in a single sample. [22] *Also see Section VII Water Quality Initiatives - State Revolving Fund and USDA-Rural Development for water quality projects within the Black Warrior River Watershed.*

Figure 38:

ESTIMATES OF FAILING SEPTIC SYSTEMS
WITHIN THE BLACK WARRIOR RIVER WATERSHED

County	# of Septic Systems(Estimate)	# of Systems Failing(Estimate)
Blount	42,000 +	Unknown
Cullman	10,000	20%
Fayette	3,100	11.5%
Greene	3,000	20-30%
Hale	Not reported	Not reported
Jefferson	100,000 +	1 - 3%
Tuscaloosa	40,000	10%
Walker	8,000	Less than 5%
Winston	50,000	5%

Source: Prepared for the Black Warrior River Watershed Management Plan by the Tuscaloosa County Soil and Water Conservation District per conversations with County Public Health Departments.

Documented Impairment

- The Tuscaloosa County Department of Public health has recently documented fecal coliform bacteria in Lake Tuscaloosa in levels exceeding the standards of full body contact. (2003) Sources of fecal coliform are thought, but not documented, to be from failing septic systems around Lake Tuscaloosa

- The 2000 303(d) listed identifies the following stream segments as being impaired for pathogens:

Stream Segment	County	Date of Data Used for Listing
Long Branch	Cullman	1990, 1997
Brindley Creek	Cullman	1996
Eight Mile Creek	Cullman	1991, 1996
Broglen River	Cullman	1991, 1996
Thacker Creek	Cullman	1991, 1997
Rock Creek	Cullman	1990-91, 1997
Crooked Creek	Cullman	1991, 1997
Dry Creek	Blount	1991
Hurricane Creek	Tuscaloosa	1993-1996
Hurricane Creek	Tuscaloosa	1996

- The Cullman Soil & Water Conservation District currently monitors certain 303(d) listed stream segments for *E. coli*. Monitoring is performed by using Alabama Water Watch protocols. Findings are as follows:

Date	Source	Avg Fecal Coliform	High Fecal Coliform
Jul-02	Eightmile	367	1100
Aug-02	Thacker	8	33
Sep-02	Duck 1	25	67
Oct-02	Duck 1	277	433
Nov-02		0	0
Dec-02		0	0
Feb-03	Brindley	33	100
Mar-03	Minnow	420	1167
Apr-03	Minnow	275	633
May-03	Minnow	55	300
Jun-03	Minnow	72	200
Jul-03	Crooked	53	200
Aug-03	Minnow	55	133

Bacteria colonies/100ml creek water

- *"The USGS conducted a 16 month investigation (2000-2001) of water quality, aquatic-community structure, bed sediment, and fish tissue in Village (four sites) and Valley Creeks (three sites) and at two reference sites near Birmingham (Five Mile Creek/McCalla and Little Cahaba River)."* [11]
  - *Concentration of enterococci at sites in the Birmingham area exceeded the USEPA criterion (151 col/100 mL) in 80 percent of the samples;*
  - *E coli concentrations exceeded the USEPA criterion (576 col/1L) in 56 percent of the samples.*
  - *Fecal coliform concentrations exceeded the ADEM criterion (4,000 col/mL) in 26 percent of the samples.*

E. METALS (TRACE AND MAJOR ELEMENTS)

Trace and major elements are commonly found in surface water and may occur naturally due to geochemical weathering of rocks and soil. Trace elements, such as arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc generally are present in water in concentrations less than 25 micrograms per liter. Abundant metals such as iron, manganese, and aluminum are commonly found in greater concentrations and are frequently detected in the water column. High frequencies of detection do not necessarily imply human sources. However, industrial and municipal discharges, as well as urban land-use activities, often account for elevated concentrations above natural levels. [11] Sources that could affect water quality in the Black Warrior River Basin are the Black Warrior coal fields (aluminum and mercury) [16] and NPDES discharges above permitted limits.

Used oil contains many toxic and environmentally harmful substances, e.g.: cadmium, chromium, lead, benzene, toluene, benzo (a) pyrenes, etc. These arise through use as a lubricant and the inadvertent contamination of the oil during vehicle servicing and bulk handling. Modern motor oils are based upon oil refined from crude petroleum, synthetic oil created from various compounds, or a mixture of the two. Various compounds are added to the oil to extend its range of operating temperatures, to keep solids in suspension, and to discourage the formation of varnish and other deposits. Regardless of the oil base and additives, all motor oils eventually become contaminated through use with substances that are a threat to the environment.

Because of the potential environmental harm, uses of some trace elements have also been restricted, such as lead as an additive in gasoline. Trace elements in the environment occur from many natural and manmade sources. For example, arsenic, barium, cadmium, chromium, mercury, nickel, lead, and zinc can all be released into the environment from metallurgy, wood and pulp production, and the production of electrical power. Trace elements also have nonpoint sources in urban areas and are associated with runoff from urban centers. Nonpoint sources for trace elements in urban areas include batteries, ceramics, wear of automobile parts, pigments, and fossil fuel combustion. [16]

Many trace elements do not easily dissolve in stream water. Instead, these materials tend to accumulate in streambed sediments and aquatic organisms. Both acute and chronic exposure to these materials can adversely affect the health of aquatic organisms and, depending on the concentration and the duration of exposure, can be lethal or sub-lethal. Once in the food chain, these materials can affect terrestrial organisms, such as fish-eating wildlife (herons, otters, and kingfishers), and potentially humans. [16] *A general description of trace and elements is included Appendix C.*

Documented Impairment

- "*The USGS conducted a 16 month investigation (2000-2001) of water quality, aquatic-community structure, bed sediment, and fish tissue in Village (four sites) and Valley Creeks (three sites) and at two reference sites near Birmingham (Five Mile Creek/McCalla and Little Cahaba River).*" [11]
  - *Concentrations of cadmium, copper, lead, and zinc in the water column exceeded acute and chronic aquatic life criteria in up to 24 percent of the samples that were analyzed for trace and major elements.*
  - *At Valley Creek, median concentrations of these constituents were highest upstream and decreased downstream.*
  - *Concentrations of iron, manganese, and aluminum exceeded secondary drinking-water standards set by ADEM in up to 37 percent of the samples.*

- *ADEM measured concentrations of eleven heavy metal ions in the photic zone of Smith Lake as part of a Phase I Feasibility study (Bayne et al., 1997). Results of the study conducted on the lake detected concentrations of chromium, copper, iron manganese and zinc occasionally exceeded EPA recommended criteria while concentrations of aluminum, arsenic, copper, cadmium, mercury, nickel and selenium never exceed the recommended criteria.* [10]

- A study conducted by the Alabama Rivers Alliance in 2000 found high concentrations of metals and low pH in areas of the Hurricane Creek Watershed. This agrees with previous samples performed by ADEM and EPA. *40 percent of the samples contained iron concentrations higher than 1.000 mg/l with concentrations as high as 46 mg/l found in the headwaters of Weldon Creek. 32 percent of the samples including all of the samples collected in Weldon Creek headwaters exceeded a concentration of 0.106 mg/l for zinc. 21 percent of the samples [Weldon Creek] exceeded the 0.158 mg/l of nickel. 79 percent of the samples contained aluminum concentrations greater than 0.09* *mg/l. High concentrations of manganese were also found in the watershed, particularly in Weldon Creek and Blanchet Branch.* [18]

F. AMMONIA

Although ammonia is present naturally in surface waters, some forms of nitrogen found in waterbodies are toxic to aquatic life and are potentially harmful to humans. Ammonia can cause fish kills, noxious odors, and human health problems. [1] Sources for ammonia include:

- Urban storm water runoff containing fertilizers and detergents (parks, golf courses, residential, commercial)
- Animal waste (residential, agricultural)
- Failing septic systems
- Waste water treatment plant overflows
- Auto emissions
  - More than 23 million tons of nitrogen are emitted to the atmosphere each year. About half of the nitrogen compounds emitted from fossil-fuel-burning plants, vehicles, and other sources are deposited in watersheds. [5]

Although there are no specific State standards for ammonia, the "Agricultural and Industrial" water use classification *(See Appendix E)* narrative criteria for toxicity requires that "(toxicity) shall not render waters unsuitable for agricultural irrigation, livestock watering, industrial cooling, industrial process water supply, fish survival or interfere with downstream water uses." [1]

Documented Impairment

The 2000 303(d) list *(See Appendix E)* shows the following waterbodies impaired due to ammonia:

Waterbody	County	Listed Source	Date of Data
Long Branch	Cullman	Pasture Grazing _ Int. animal feeding operations	1990, 1997
Brindley Creek	Cullman	Urban runoff/Storm sewers	1996
Thacker Creek	Cullman	Pasture Grazing	1991, 1997
Crooked Creek	Cullman	Pasture Grazing+Int animal feeding operations	1991, 1997
Dry Creek	Blount	Pasture Grazing	1988
Village Creek	Jefferson	Ind,municipal, urban runoff, storm sewers, surface mining-abandoned, subsurf-aband, mill tillings-aband, mine tailings-aband	1990-1991, 1997
Bayview Lake	Jefferson	Municipal, urban runoff, storm sewers, ind, spills, surface mining-aband	1991, 1997

G. ALTERATION OF pH FROM OUTSIDE SOURCES

The pH of the water affects and responds to chemical reactions in the water. The pH measures relative amounts of acids and bases in water and can range from 1 (low or acidic) to 14 (high or alkaline). When algae or plants consume carbon dioxide and produce oxygen, a chemical reaction causes the pH to increase. Decay of plant or animal matter can cause pH to decrease.

Each aquatic species requires a particular pH range for survival and is at risk if the pH falls above or below this range. The pH standard for Fish and Wildlife and Public Water Supply use classifications is between the range of 6.0 to 8.5 standard units (SU) for both streams and reservoirs. [1]

Acid Mine Drainage

Acid drainage is a problem common to most of the states in the Appalachian region where extensive coal mining is being or has been undertaken. In the mining process, unweathered rocks and minerals that contain iron sulfide are exposed to the atmosphere. Where rainfall and runoff are abundant, the oxidation forms sulfuric acid from the iron sulfide and releases iron, manganese, and aluminum from the rocks to the water. If acid drainage enters a stream, the immediate effects are to lower the pH; to destroy or reduce the natural alkalinity; to increase the total hardness; to produce excessive amounts of iron, manganese, aluminum, and sulfate; and to raise the specific conductance. [19]

The presence of acid drainage in a stream has a detrimental effect on the general welfare of the area through which the stream passes. The corrosiveness of the acid water shortens the life of ordinary metals, concrete, and most other materials use in culverts, bridge piers, dams, pumps, pipes, turbines, and boats. Additionally, the precipitation of iron salts in acid streams smothers bottom flora and fauna and destroys food that supports many forms of aquatic life. [19]

The control of acid drainage is hydrologically complex and often economically impractical. To date, no single method has been developed which is entirely reliable or economically feasible for all cases. [19]

Federal agencies have been studying for some time how best to approach the restoration of watersheds affected by abandoned mines. The Department of Interior Office of Surface Mining has been developing inventories of abandoned mines and acid mine drainage sites. The scope and number of abandoned mine sites and the watersheds they affect require setting priorities. To better focus scarce financial and human resources, federal agencies developed an Interdepartmental Abandoned Mine Land Watershed Initiative, which includes a collaborative effort with state and local agencies, and private parties. Both the USDA and DOI continue to expand the program with available funding. [5]

Documented Impairment

- The Dean's Ferry Project (also known as Nyota) has been selected by the State of Alabama for reclamation under the Appalachian Clean Streams Initiative, because acid mine drainage (AMD) originating from a site is adversely impacting water quality in the Locust Fork. *(Also see AML Acid Mine Drainage Sampling Results, 2002 in Figure 39.)*

Under the preferred reclamation alternative, the gob pile will be excavated, loaded, and transported approximately one mile from its present location to the highwall site. An impervious black plastic liner will be placed in the highwall pit, then the gob placed on the liner and used to partially backfill the highwall. The liner will prevent ground water from flowing into the gob, thus eliminating the potential for creation of AMD. After the gob has been placed in the highwall fill, on-site spoil material will be used to cover the gob and complete the backfill operation.

The project will be designed to prevent water from contacting the buried gob material. Open limestone drainage ditches and a small limestone basin will, however, be constructed to treat any less than desirable drainage that might leach from the reclaimed highwall.

- Cane Creek, near Oakman in Walker County is listed on Alabama's 2000 303(d) list as being impaired for metals, nutrients, pH, OE/DO, and sediment. The source, as identified on the 303(d) list, of all listed impairments for Cane Creek is abandoned surface mining. (Date of data used 1988 and 1993.)

  In 1970, the Geological Survey of Alabama conducted a study of acid mine drainage in the Cane Creek Basin. *"The most practical solution to control acid mine drainage in strip-mined areas similar to Cane Creek basin, appears to be the reduction of contact between water and acid-producing materials…. With a little more effort and expense, the dark materials could be buried beneath the lighter-colored materials. Although this does not eliminate the acid drainage problem, it reduces the amount of acid drainage by removing the contaminating material from direct contact with precipitation and surface runoff.*

- A study conducted by the Alabama Rivers Alliance in 2000 found high concentrations of metals and low pH in areas of the Hurricane Creek Watershed. This agrees with previous samples performed by ADEM and EPA. [17]

- OSM (BFO) entered into an Appalachian Clean Streams Initiative agreement with ADIR to provide technical assistance toward developing an inventory of potential Clean Streams Initiatives projects. The BFO used the listing of 81 AMD-impacted abandoned mine land sites, which was developed in July 1996, to provide the population for he field review. Water quality data was last collected on all but five of these problem areas during the early 1980's. The BFO agreed to assist in quantifying current conditions at the 81 sites identified as being sources of AMD and provide updated information. [20]

As a result of the completed water testing screening of the original 81 inventory sites, 34 sites were identified with AMD problems. Also, 8 other sites were added as a result of OSM field visits and citizen inquiries. All 42 sites were tested during EY 2002. Nineteen (19) of the 42 sites exhibited AMD conditions. Three (3) other sites that did not meet the definition of AMD exhibited high specific conductivity. The sites that did not exhibit AMD will be tested under low flow conditions in FY 2003. ADIR was provided with the data collected on each sites. [20] *See AML Acid Mine Drainage Sampling Results 2002 in Figure 39.*

- The Camp Cherry Austin Acid Mine Drainage Remediation Project is located in Tuscaloosa County, northeast of Peterson, Alabama. The site was reclaimed by ADIR under the Alabama AML Program in November, 1996, to eliminate the health and safety hazard of a 1,200-linear-foot dangerous highwall. Seventeen acres of unstable and eroding mine spoils, a small garbage dump, and a 0.1 acre coal slurry area were also reclaimed and stabilized. The drainage from the site intersects Brush Creek immediately below the site, with the creek draining into Holt Lake (a water supply for the City of Tuscaloosa) a little over a mile below the site. At the time the project was reclaimed, the Alabama AML Program did not have funding to remediate acid mine drainage problems.

  Water quality samples taken on March 19, 2002, from the site showed the following results: pH -2.6 total iron-45.5 mg/l, acidity-680, alkalinity-<1, manganese-19.2 mg/l, aluminum-87.5 mg/l, and sulfates-1378 mg/l. Historic water quality samples showed pH consistently at 3.3 to 3.4 with high metal loading. A pH reading of 3.2 was secured on June 17, 2003 after several days of heavy rains. [21]

- The Office of Surface Mining-Birmingham Field Office an inventory of AML sites. Each site is sampled during high and low-flow. 2002 results with a pH of less than six are shown in Figure 39.

Figure 39:

AML ACID MINE DRAINAGE SAMPLING RESULTS 2002 (pH<6)

LONGITUDE	LATITUDE	AMLIS PROBLEM AREA NAME	TYPE OF MINE	PH
W86, 44, 28.94	N33, 51, 16.29	Nyota East	Prep	2.12
W86, 22.789’	N33, 16.014’	Camp Cherry Austin	Surface	2.60
W86, 29, 57.89	N33, 59, 55.40	Faulkner Ford	Prep	2.80
W86, 53, 09.71	N33, 37, 43.70	Mineral Springs Northwest	Surface	2.81
W86, 46, 35.31	N33, 38, 34.47	New Castle	Prep	3.00
W87, 19, 09.05	N33, 32, 37.24	Three Forks	Surface	3.20
W87, 13.08.02	N33, 39.06.36	Gorgas West	Prep	3.30
W87, 15.95’	N33, 18.08’	North Alabama Junction	Surface	3.40
W87, 02, 27.01	N33, 33, 35.25	Short Creek North	Prep	3.43
W86, 59, 13.53	N33, 30, 19.74	Pleasant Grove	Prep	3.50
W87, 22.39’	N33, 17.48	Howton Northwest	Surface	3.80
W87, 06, 3.62	N33, 06, 31.19	West Blocton	Prep	3.82
W86, 54, 59.28	N33, 38, 32.56	Lee’s Chapel North	Underground	4.10
W87, 09, 02.45	N33, 34, 53.93	Maxine	Surface	4.50
W87, 22.29’	N33, 16.12’	Brush Creek	Surface	4.70
W87, 27, 14.16	N33, 5, 30.99	Blair Mine	Underground	4.80
W86, 57, 19.43	N33, 31, 20.52	Edgewater	Prep	5.00
W87, 20, 58.28	N33, 008, 13.15	Coaling South	Surface	5.60
W87, 05, 11.93	N33, 20, 27.56	Blue Creek	Prep	5.70
W87, 09, 14.20	N33, 34, 01.12	Pineywoods	Surface	5.80

SOURCE: *Office of Surface Mining-Birmingham Field Office*

H. PESTICIDES AND HERBICIDES

Although usually, associated with agricultural activities, pesticides and fertilizers are applied to urban land at greater rates per unit area than typically applied to agricultural land, thus contributing to water-quality impairment. Lawns, gardens, parks, and golf courses are subject to intense pesticide application. Insecticides used largely around homes and in gardens, parks, and commercial areas are frequently detected in urban streams at levels of concern for aquatic life and may be a significant obstacle for restoring urban streams. Because chemical applications for urban use are not as stringently regulated as for agricultural purposes, the levels of pesticides found in streams in urban areas nationally generally is comparable to levels of pesticides found in streams in agricultural areas, with higher levels of herbicides in agricultural areas and higher levels of insecticides in urban areas. [5]

Pesticides and herbicides in the environment have been a concern nationally since the 1960's because of their toxicity and persistence in the environment. The majority of pesticides were banned in the US in the 1970's and 1980's. In particular, the use of chlordane and PCB's has been banned since 1988 and the use of dichlorodiphenyltrichloroethane (DDT) since 1973. [2] DDT was used heavily as a pesticide in agriculture and for mosquito control; chlordane was used for termite control; and PCB's were used as a dielectric fluid in transformers, lubricant, solvent, and as a plasticizer. [16]

Many pesticide and herbicide compounds do not easily dissolve in stream water. Instead, these materials tend to accumulate in streambed sediments and aquatic organisms. Exposure to these materials can adversely affect the health of aquatic organisms and, depending on the concentration and the duration of exposure, can be lethal. Once in the food chain, these materials can affect terrestrial organisms, such as fish-eating wildlife (herons, otters, and kingfishers), and potentially humans. [16] *A list of pesticides and herbicides is included in Appendix C.*

The number of pesticides present in a stream may be important from a toxicological standpoint. Generally the effects of several pesticide and/or herbicide mixtures on biota or humans are not included in water-quality criteria which are most commonly based on single-species, single-chemical toxicity texts conducted under laboratory conditions. Some pesticides could be more toxic when combined with other toxic compounds than when present individually. The synergistic effects created from the low concentrations of multiple pesticides have yet to be quantified. The combined ecological effects of pesticides in streams are yet unknown. [11]

Documented Impairment

- In 1998, as part of the National Water-Quality Assessment Program, the USGS performed a survey to determine which organochlorine compounds and trace elements occur in streambed sediments and fish tissues in the Mobile River Basin, which includes the Black Warrior River Basin. Sites within the Black Warrior River Watershed included:
  - Lost Creek above Parrish
  - Locust Fork below Snead

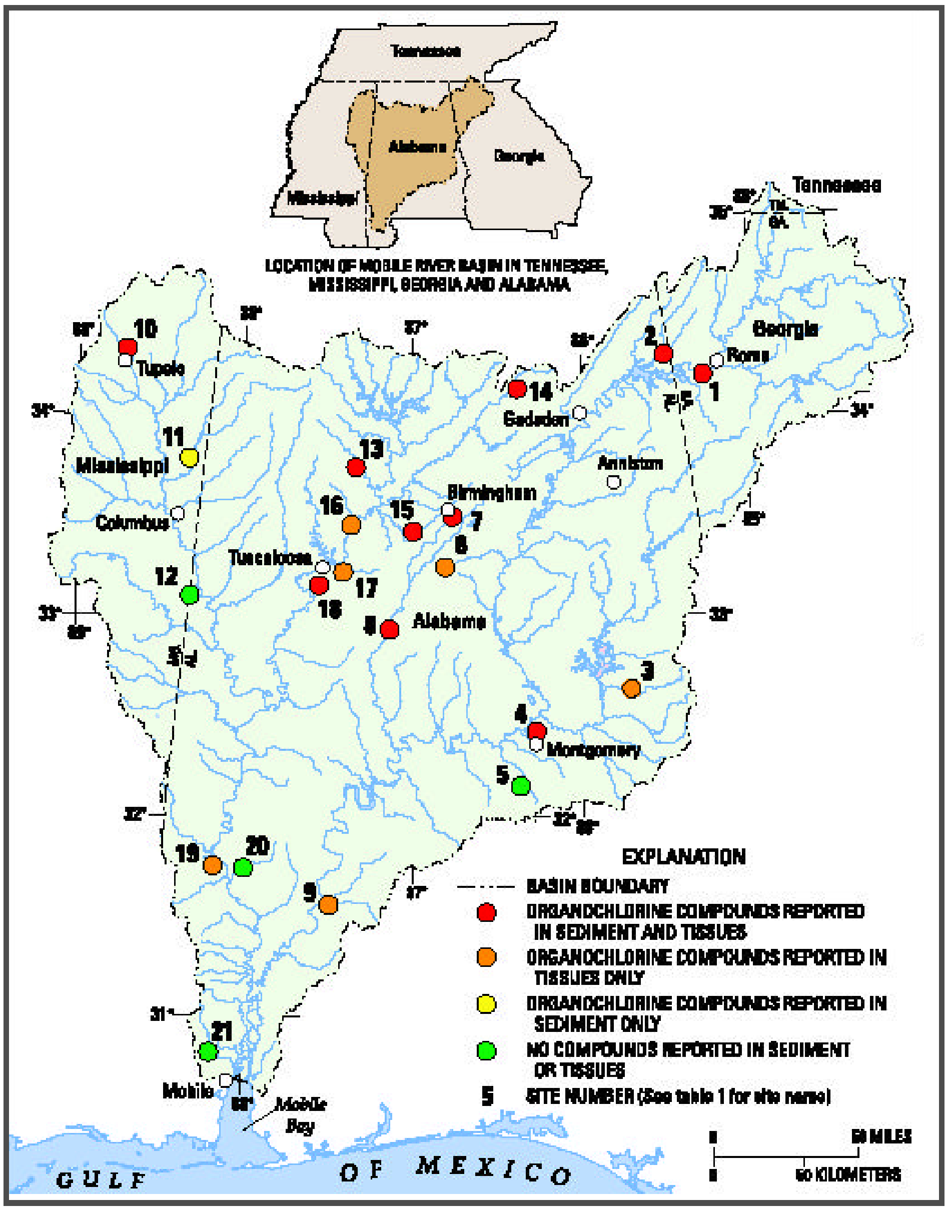
- Valley Creek near Bessemer
- Black Warrior River at Bankhead Lock and Dam
- Hurricane Creek near Holt
- Cribbs Mill Creek at Tuscaloosa

In samples taken from sites located at Lost Creek, Locust Fork, Valley Creek, and Cribbs Mill Creek organochlorine compounds were found in both sediment and fish tissues. In the samples taken from the Black Warrior River at the Bankhead Lock and Dam and Hurricane Creek, organochlorine compounds were found in tissues only. The site on Valley Creek was the only site within the Black Warrior River Watershed from which samples contained compounds that exceed probable-effects concentrations which indicate a high probability of adverse effects to organisms.

- *"The USGS conducted a 16 month investigation (2000-2001) of water quality, aquatic-community structure, bed sediment, and fish tissue in Village (four sites) and Valley Creeks (three sites) and at two reference sites near Birmingham (Five Mile Creek/McCalla and Little Cahaba River)."* [11]
  - Of the 24 pesticides detected in the water column, 17 were herbicides and 7 were insecticides. Atrazine, simazine, and prometon were the most commonly detected herbicides.
  - Concentrations of atrazine, carbaryl, chlorpyrifos, diazinon, and malathion exceeded criteria for the protection of aquatic life.
  - The concentrations of organic compounds and trace-element priority pollutants detected in bed-sediment samples were elevated at all sites in Village and Valley Creeks in comparison to the reference sites.
  - Concentrations of chromium, copper, lead, mercury, and silver were highest in Valley Creek (VAL-1 sample site).
  - Concentrations of cadmium, nickel, selenium, and zinc were highest in Village Creek (VIL-2 sample site).
  - Concentrations of PAHs (polycyclic aromatic hydrocarbons), p,p'-DDE (an isomer similar to DDT), and chlordane exceeded PELS (probable effect levels) at sites on Village and Valley Creeks.
  - Dieldrin was detected in fish-tissue from every site and exceeded NAS/NAE guidelines for the protection of fish-eating wildlife (VIL-1, VAL-1, and VAL-2 sampling sites).

"The most frequently detected insecticides in urban areas in the NAWQA Program was prometon, the third most commonly detected pesticide/herbicide, after atrazine (herbicide) and simazin (herbicide). The most frequently detected insecticides were diazinon, carbaryl, and chlorpyrifos." [11]

Figure 40: Sites in the Mobile River Basin where organochlorine compounds were reported.



Source: Organochlorine Compounds and Trace Elements in Fish Tissue and Streambed Sediment in the Mobile River Basin, Alabama, Mississippi, and Georgia, 1998. U.S. Geological Survey.

I. NPDES DISCHARGES

Many manufacturing and other types of businesses use water in their manufacturing or processing operations and, at some point, must discard this water. Some of these businesses also conduct their operations outdoors in a manner that exposes the operations to rain. Discarding used process water or allowing a drainage system of a business to carry storm water runoff away from the business may result in the "discharge of a pollutant." [24]

The CWA make the "discharge of a pollutant" by any person unlawful unless the discharge complies with all applicable water quality effluent limitations, national standards of performance, toxic and pretreatment effluent standards, and aquaculture guidelines. The CWA further requires that a business or municipality obtain a National Pollutant Discharge Elimination System (NPDES) permit from the EPA that allows the "discharge of a pollutant." Under the CWA, such permits will be approved only if the discharge complies with all applicable guidelines and standards described above. [24]

However, the CWA also contains provisions allowing individual states, such as Alabama, to promulgate their own rules and procedures governing discharge permits. Alabama administers its own NPDES program upon application by the governor to EPA. For the application to be approved, the State's program must insure compliance with the applicable requirements of the CWA. [24]

The EPA no longer issues permits pursuant to the CWA in Alabama because ADEM has developed rules and procedures of sufficient stringency to ensure compliance with the CWA; accordingly ADEM administers its own permit program and enforces the Alabama Water Pollution Control Act (AWPCA). [24]

Alabama NPDES program exceeds the scope of EPA's program in two significant respects. First, while the CWA governs only the discharge of pollutants that occurs from a point source, the AWPCA allows ADEM to regulate more types of pollutant discharges, including nonpoint source pollution. ADEM regulates nonpoint source pollution by requiring Alabama businesses to adopt Area Wide Waste Treatment Management Plans and by requiring NPDES permittees to adopt "best management practices". [24]

Second, the AWPCA permits ADEM to regulate a greater variety of waters than the EPA can regulate under the CWA. The CWA only prohibits the discharge of pollutants into the "navigable waters of the United States," which does not include groundwater. In contrast, the AWPCA permits ADEM to regulate all waters contained wholly or partially within the state of Alabama, including groundwater. The AWPCA attempts to regulate discharges into nearly all of the waters within the state by defining "waters" to include: *"all waters of any river, stream, watercourse, pond, lake, coastal, ground or surface water, wholly or partially within the state, natural or artificial."* (Ala. Code §22-22-1(b)(2). However, the AWPCA also creates a limited exception for pollutant discharges into *"waters which are entirely confined and retained completely upon the property of a single individual, partnership or corporation unless such waters are used in interstate commerce."* [24]

To ensure that a discharger complies with the effluent limitations and water quality standards that are incorporated in its NPDES permit, each permit also imposes monitoring and reporting duties upon the discharger. The discharger must maintain detailed records, install monitoring equipment, report anticipated or actual permit violations, and submit a monthly discharge summary known as a Discharge Monitoring Report (DMR) form. The information disclosed in a DMR facilitates the filing of suits by private citizens to enforce NPDES permit conditions and provisions of the AWPCA. All compliance information becomes a matter of public record to the extent such information does not disclose trade secrets. [24]

See Appendix C for a list of Major NPDES Dischargers Within the Black Warrior River Basin; a Map of Industrial NPDES Dischargers Within the Black Warrior River Basin; a Map of NPDES Permitted Municipal, Semi-Public and Private Waste Water Treatment Facilities Within the Black Warrior River Basin; and a Map of NPDES Storm Water Permits Within the Black Warrior River Basin.

Document Impairment

- Sloss Industries was found to be in violation of their NPDES permit for Five Mile Creek, classified as Agricultural & Industrial. Violations included an exceedance of cyanide and organic chemicals. [25] Sloss had been fined nearly $90,000 for polluting Five Mile Creek for over 18 months. [26] *Also see Section VII: Water Quality Initiatives/Industry/Sloss.*

- In Fall of 2002, Koppers Industries, Inc. paid $2.9 million to settle a civil suit charging it violated environmental rules at its many companies, including the defunct Woodward coke plant in Dolomite (Jefferson County.) EPA investigations revealed that Koppers did not submit monitoring data required by federal permits and violated discharge limits in its permits. [27]

  As a result, the violations resulted in the discharge of pollutants - some designated as hazardous and toxic in small quantities to fresh water fish - above the allowed amounts affects Opossum Creek. [27]

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5 Effects of Impairments

EFFECTS OF IMPAIRMENT

During the past two centuries, increasing human needs for transportation, housing, water supply, electricity, food, and waste disposal have caused many changes in the nature and quality of the Watershed's aquatic habitats. The current status and condition of the Basin's aquatic biota and habitats result from a historical progression of accumulating human use and impact to the ecosystem. Some impacts have been immediate and long lasting (e.g., physical habitat destruction). Others have changed over time with resource exploitation, regulation, or human population density. [3]

The current condition of the Basin's aquatic ecosystem and the species it supports is the result of significant and widespread changes over time in flow, substrate, and/or water quality in river and stream habitats. Channel modification and water pollution have gradually eliminated those native species that are dependent upon a narrow range of flowing water habitat conditions from extensive portions of their former ranges within the Basin. [3]

A. BIOLOGY - HABITAT ALTERATION

Habitat alternation in general refers to physical processes that may dramatically or gradually change the conditions and structure of an ecosystem. There are many different forms of habitat alteration.

- <u>Shoreline Construction/Alteration</u>
  Most loss or degradation of shoreline habitat is from many small-scale activities by individuals, small industries or local utilities. Considered on their own, these activities may appear benign. The net consequence over many years, however, is a cumulative loss of these critical habitats. Areas where populations are experiencing growth are of particular concern. *See Section 2-K: Description of Watershed-Population.*

  Through the hydro relicensing process, Alabama Power is working with stakeholder committees to develop a shoreline management plan for Smith Lake. Additionally the U.S. Army Corps of Engineers has a shoreline management plan for Bankhead and Holt Lakes.

- Biological Alteration
  Biological alterations are caused by the accidental transport of exotic or non-indigenous species of plankton, crustaceans, pathogens and parasites in the bilge and ballast water of boats. Many of the Black Warrior's native mussel species have decreased while non-native species have increased.

- Wetland Alteration
  Since the earliest settlements, wetlands have been altered or destroyed. Losses are greatest in areas of intense urbanization and agriculture. *See Decrease of Wetland Areas.*

Habitat Loss

Habitat loss has severe impacts that can be permanent. Many times, conversion of wetlands to commercial or residential uses contributes to declines beneficial wildlife populations by destroying prime breeding and nursery locations. Forest and wetland losses increase overland flow and reduce filtration of sediments and pollutants, increasing the likelihood that pollutants will reach streams and rivers.

On August 17, 2003, the *Birmingham News* reported that the vermillion darter populations, only known to Turkey Creek in Jefferson County, have decreased dramatically. In 1998, an estimated 1,800 to 3,000 darters lived in a 7.2-mile stretch near the headwaters of Turkey Creek. A recent population count by Samford University found about 250 of the fish remaining in a dwindling habitat. Dr. Blanchard, a Samford professor said that a possible cause is sediment washed into the creek. [4]

When the species was first identified in 1992, its habitat stretched from near Shadow Lake to the Jefferson County landfill past the Turkey Creek narrows. This year, the habitat starts around Tapawingo Road near Pinson, and populations from there to the landfill are spotty. [4]

Habitat Fragmentation

One of the primary causes of the precarious status of many of the Watershed's species is habitat fragmentation. Manmade structures such as dams, locks, levees, and other channel modification projects have separated and fragmented the aquatic habitats of many species that depend on free-flowing rivers. This habitat fragmentation has resulted in the elimination of many riverine species from extensive portions of their former range. Most of the Watershed's imperiled species now live in small and isolated populations. [1]

These isolated populations, in turn, are made even more vulnerable to changes in land use that affect their habitats. Without the natural ability to move unrestricted up and down a river, the loss of populations and the genetic codes they contain cannot be replaced. The surviving populations are then forced to face the gradual and combined effects of surface runoff (nonpoint source pollution) from common activities such as construction, agriculture, silviculture, urban activities, and other land use practices. Nonpoint source runoff can be toxic or cause sedimentation (siltation) and nitrification (excessive nutrient input.) [1]

Each imperiled species within the Watershed is unique in some aspect of its life history and habitat requirements. But two factors are shared by all: the adaptation to their natural fluctuations of a free-flowing riverine habitat and the dependence upon the stability of that environment, including substrate (river bottom materials) and water quality. [1] While the detrimental effect of any one source of impairment or land use activity may be insignificant by itself, the combined effects of land use runoff within a watershed may result in gradual and cumulative adverse impacts to isolated populations and their habitats. [3]

The Alabama shad *(Alosa alabamae)*, Alabama sturgeon *(Scaphirhynchus suttkusi)*, and striped bass *(Morone saxatilis)* are all anadromous (migrating from salt to fresh water to spawn) fish species that are currently known to use Alabama rivers. The American eel *(Anguilla rostrata)* is the only catadromous (migrating from fresh to salt water to spawn) species native to the Black Warrior River system (Mettee et al., 1996) . However, use of the Black Warrior River by these species has been impeded and/or effectively blocked since the 1960's by the construction of several ACOE lock and dam projects along the river system downstream of Bankhead (Coffeeville and Demopolis on the Lower Tombigbee River, and Selden, Oliver, and Holt on the Black Warrior River). [10]

Habitat Modification

Urban streams often provide good examples of habitat modification. When communities straighten and channelized urban streams and line them with concrete, they modify the vegetative and physical structure of the riverine habitat, increase river velocities during rainstorms, and decrease river volumes during dry periods. Straightened and channelized streams also carry more sediments and chemical pollutants to receiving waters.

Dams constructed for navigation, water supply, electricity, recreation, and flood control have impounded some river and stream habitat in the Basin. Impoundment results in burial of rock or other coarse substrate habitats by accumulating fine sediments, reduced velocities in impounded reaches, changes in current patterns below dams, and changes in water quality both above and below the dam. [3]

Impounded waters have eliminated many native species from extensive portions of the Basin's larger rivers, and virtually all of the Basin's snail and mussel extinctions are a direct or indirect result of dam construction and river impoundment. [3] The present primary adverse impact of existing dams and their impounded waters in the Basin is to form barriers to the movement of many species of fishes, mussels, snails, inspects, and crustaceans, fragmenting populations and eliminating genetic interchange between them. As a result, imperiled aquatic species surviving in the Basin's unimpounded tributaries and mainstem river reaches have become isolated and virtually without avenues of immigration or emigration. [3]

Channelization, the straightening, deepening, and/or enlarging of stream and river channels, has occurred to some degree in every major river system of the Basin. The effects of channelization on stream ecosystems include accelerated erosion; altered depth; and loss of habitat diversity, substrate stability, and riparian canopy. Such changes in habitat cause changes in the aquatic community, including the loss of species, reduced biomass, and shifts in species dominance. [3]

Past channelization projects often caused headcutting (progressive channel bed and bank erosion that gradually advances upstream from a channelized reach and/or up the tributaries of a channelized stream). The aquatic community response to headcuts is similar to that of channelization, i.e., loss of diversity and biomass.

Headcuts are not only detrimental to aquatic and riparian communities, but also cause considerable offsite destruction of public and private property. [3]

Channelization of natural streams in the Basin has diminished in recent years as the detrimental effects of the practice have become recognized and weighed against the benefits. However, maintenance of channelized river and stream reaches and, more rarely, new channelization projects are still occasionally conducted for flood protection in heavily populated areas or areas of high agricultural. Such projects now normally include grade control structures or other efforts to prevent headcutting; however, loss of habitat still occurs in the channelized reach. [3]

The present primary adverse impact of channelization is the continuing geomorphic response of stream and river channels in previously channelized systems (including channel erosion, filling, and headcutting). [3]

Dredging for navigation or gravel mining physically destroys benthic (live on the river/stream bottom) organisms and their habitats, and may eliminate habitat and prey for fishes and turtles. Dredging may also initiate or perpetuate upstream channel instability and erosion. In-channel dredge spoil disposal may cover benthic species and their habitats and/or contribute to temporary downstream turbidity. [3]

The Tombigbee, Black Warrior, Alabama and Mobile Rivers have been gradually developed for navigation for more than a century. Deepening channels for navigation involved the removal of shallow shoals and other historic habitat for species that are now imperiled. Today, however, most navigation dredging consists of removing seasonally accumulated sediments in previously dredged reaches to maintain developed channels. Maintenance dredging and spoil disposal within such areas rarely adversely impact imperiled species, since these areas are too unstable for most of these species. [3]

Gravel armored river bottoms provide important habitat for imperiled as well as commercial and sport species. Gravel armoring usually occurs in areas of a channel that naturally scour, and as such are not normally subject to maintenance dredging. Gravel armoring protects the river bed from erosion, stabilizes banks and bars, and prevents excessive sediment movement. Gravel dredging in such areas not only destroys bottom organisms and their habitats, but can also disrupt channel geomorphic stability causing channel bed and bank erosion. Currently, there are no active permitted instream gravel dredging operations in navigable waters of the Basin. [3]

Mining for coal, sand, or gravel is locally concentrated in areas within the Basin. Active and inactive coal mines are found in the upland drainages of the Black Warrior River. Runoff from coal surface mining has resulted in acidification, mineralization, and sedimentation of streams and rivers, all of which are detrimental to aquatic species. Such impacts are more closely associated with past activities and abandoned mines, since presently operating mines are required to employ environmental safeguards established by the Federal Surface Mining Control and Reclamation Act of 1977 and the Clean Water Act of 1972. [3]

Loss of Riparian Vegetation

Riparian areas comprise a small percentage of the landscape, yet are critical to water quality protection and to the maintenance and health of streams and aquatic habitat. These small but critically important ecosystems directly affect water quality and the quality of fish and wildlife habitat. As much as 75 percent of terrestrial wildlife species are associated with riparian areas. They can also serve as effective traps for sediment, nutrients, and other potential pollutants before they enter streams and lakes. [7]

The condition of many riparian areas suffers from past effects and many continue to receive tremendous pressure for use. Streams and riparian zones reflect the overall health of the watershed and are often the focal point for conflicting resource demands. [7]

Decrease of Wetland Areas

Taking a basin-wide perspective, wetlands serve important ecological functions that contribute significantly to the health of river ecosystems. Wetlands moderate flooding, filter pollutants and sediment, facilitate groundwater recharge, and provide important habitat for fish and wildlife. Wetlands also contribute to the aesthetic value of project lands and serve as important educational and recreational resources. [5]

Flood control and groundwater recharge are among the most important functions served by wetlands. By serving as temporary storage basins, which hold excess water, wetlands, allow excess floodwaters to filter slowly back into the groundwater system rather than entering streams and rivers. Not only does this recharge the groundwater supply that many people depend on for drinking, it also results in lower flood crests and ultimately reduces the destructive potential of flooding events. Similarly, wetlands slow the velocity of water runoff during storm events, creating a natural silt trap and minimizing erosion within the watershed. Finally, shoreline wetland plants buffer wave action and help reduce erosion of reservoir shorelines. [5]

Wetlands also play a major role in purifying the water that makes its way into downstream lakes and rivers, as well as the groundwater system. Wetlands serve as natural settling basins, filtering out excess silt, heavy metals, organic solids, and harmful fecal coliform bacteria that enter the watershed from agricultural operations, sewage treatment plants, faulty septic systems, and other industrial and natural sources. Silt and organic solids, along with runoff from fertilizer, contain large amounts of excess nutrients, such as nitrogen and phosphorus. Removal of such nutrients from the ecosystem helps prevent eutrophication downstream, a process that leads to rapid algal and plant growth and can result in reduced dissolved oxygen levels and negatively impact aquatic resources. Wetlands not only serve as a filter to trap many of these pollutants in sediments, but many wetland plants are able to process and eliminate these compounds from the aquatic environment. Wetland plants have been found to remove more than 99 percent of fecal coliform from sewage effluent and concentrate toxic metals, such as mercury and cadmium, at levels up to 100,000 times those found in surrounding waters. [5]

Wetlands also provide quality habitat for a wide range of wildlife species. Common species that are dependent on wetlands include American alligator, beaver, muskrat, cottonmouth water moccasin, and river otter. In the southeastern U.S., wetlands are extremely important as breeding areas for wood ducks and as feeding and over-wintering grounds for migratory waterfowl. Wetlands also provide nesting areas for a wide range of colonial waterbirds, including endangered wood storks. It has been estimated that approximately 80 percent of U.S. breeding bird populations rely on wetlands in some way. Virtually all freshwater fish species are dependent on wetlands to some degree through spawning and rearing in river bottomlands during spring floods or in shallow marshy areas surrounding reservoirs. Also, wetlands provide critical breeding habitat for amphibians. [5]

In addition to their many ecological benefits, wetlands have a significant socioeconomic impact on surrounding communities by providing an abundance of recreational and educational opportunities. Nationwide surveys indicate that waterfowl alone provide recreational opportunities for approximately 2 million hunters each year and that anglers and hunters spent more than $37 million in license fees, travel expenses and gear related to hunting and fishing in 2001. Hiking, camping and wildlife watching also provide additional wetland related recreation, with wildlife watchers alone providing tens of millions of dollars in economic stimulus. Finally, wetlands also serve as outdoor classrooms which foster environmental stewardship and aid in the understanding of ecology, hydrology, and wildlife and fisheries biology. [5]

Wetland Regulations

Section 404 of the Clean Water Act is administered by the U.S. Army Corps of Engineers and establishes a program to regulate the discharge of dredged and fill material into waters of the U.S., including wetlands. Activities in waters of the U.S. that are regulated under this program include fills for development, water resource projects, such as dams and levees, infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry. [2]

Regulated activities are controlled by a permit review process. An individual permit is usually required for potentially significant impacts. However, for most discharges that will have only minimal adverse effects, the Army Corps of Engineers often grants up-front general permits. [2]

In certain instances, permitees may be required to establish or create another wetland to replace a wetland damaged or converted. Constructed wetlands perform the function of natural wetlands in all respects. Other wetlands are being augmented or damaged from polluted runoff from abandoned mine lands and urban stormwater. This runoff may alter water pH levels or add chemicals affecting the flora and fauna of the wetland. [2]

Decline of Wetlands

According to the U.S. Fish and Wildlife Service [1], in 1997, there were an estimated 100.5 million acres of freshwater wetlands in the conterminous United States. Between 1986 and 1997, a net of 644,000 acres was lost. Estimated future losses have been calculated at 58,500 acres annually. The analysis during this study attributed causes of wetland losses nationally to:

Urban Development	30%
Agriculture	26%
Silviculture	23%
Rural Development	21%

Forested wetlands experience the greatest decline of all wetland types with a loss of 1.2 million acres. For the first time in the Nation's history, there are fewer than 50 million acres of forested wetlands in the conterminous United States. [1]

Black Warrior River Basin Wetlands

There are no readily available statistics concerning wetland loss or decline within the Black Warrior River Basin. Wetland maps, covering the entire basin have been difficult to obtain. At this writing, it is our understanding that large portions of the Black Warrior River Basin have yet to be mapped.

Under the hydro relicensing process, Alabama Power assessed wetland areas within their project areas. Findings are as follows:

- Bankhead FERC boundary is limited to the powerhouse area and has no wetlands associated with it. [5]

- There are 1,316 acres of wetlands within the Lewis Smith project boundary, which can be broadly classified into lacustrine, palustrine and riverine wetland types. The dominant wetland types within the project boundaries are lacustrine littoral wetlands along the reservoir shoreline, accounting for 70 percent (876 acres) of the total wetland acreage; and palustrine forested and emergent wetlands, accounting for approximately 20 percent (273 acres) and 10 percent (131 acres) of the total wetland area, respectively. The remaining 36 acres are a combination of palustrine and riverine wetlands. [5]

Documented Impairment

- *Greatest threats [to the watercress darter] may be habitat alteration and pollution. Extensive development in Birmingham-Bessemer area has increased runoff into drains and gutters and decreased recharge of aquifer, resulting in wide fluctuations the water level in the springs (Matthews and Moseley 1990). The nearby developments also may result in pollution and siltation.* [8]
- *Threats to this species [Eggert's Sunflower] are loss of habitat through conversion of the habitat for other uses, fire suppression, exotic plant invasion, and right-of-way (roadside and powerline) maintenance (herbicide spraying and inappropriately timed mowing).* [9]
- *The first documented impact to T. pilosa var. alabarnensis (Eggert's Sunflower) was the destruction of the type locality during bridge construction and subsequent inundation from stream impoundment (Short and Freeman 1978)* [9]
- *Cedar Creek at Flat Creek Road: has larger substrate embedded due to the presence of moderate to moderately heavy silt. The capture of numerous aquatic red oligochaetes at this site indicated severe habitat degradation.* [11]
- *Cedar Creek at Berry Quarry had unstable and eroding banks with little riparian vegetation. Silt was very heavy and larger substrate was embedded.* [11]
- *Cedar Creek at County Road 46: A large amount of silt was present and the riparian vegetation had recently been removed in a clear-cut operation.* [11]
- *Flat Creek at Flat Creek Road: No riparian vegetation was present, silt was heavy.* [11]

B. FLOODING

Silt and sediment, which finds its way into river basins can, over surprisingly short periods of time, significantly diminish the hydraulic and hydrological characteristics of water bodies. Silt and sediment act to alter the cross-sectional area of a stream or river, reducing the hydraulic capacity of the original streambed and its overbanks, thus forcing floodwaters over a broader path. When floodwaters are diverted by this and other means, both floodways (the section of a stream which carries the rivers flood discharge and floodplains (areas adjacent to rivers which become inundated with backwater resulting from high water elevations in the floodway) can be forced into previously non-flood-prone areas, sometimes with disastrous results.

C. DEGRADED WATER RESOURCES

Pollution from inadequately treated effluent (waste discharge) of industrial plants and/or sewage treatment plants can eliminate, or reduce the density and diversity, of riverine species. Effluents may be toxic to some species or may result in decreased dissolved oxygen concentrations, increased acidity and conductivity, and other changes in water chemistry, which may adversely affect aquatic species. Large industrial plants are generally located on larger main-stem rivers because of their greater assimilation capacity (the capacity of a body of water to assimilate pollutants without environmental harm). When that assimilation capacity is exceeded, large river biotic communities are adversely impacted. In the past two decades, effluents from such industries have had less impact on the aquatic ecosystem because of the implementation of pollution control standards established by State and Federal water quality laws. In some stream/river segments, however, such improvements may have been negated by increases in the number of discharges. [1]

Although more closely regulated than ever, industrial and municipal discharges may continue to threaten several populations of imperiled species in the Basin. Aquatic species vary in their sensitivities and reactions to effluent components. Stressors that have minimal effects on adults may prove limiting to reproduction, juveniles, and/or host fish. Current State and Federal water quality standards are assumed to be protective for all species. However, there is an almost total absence of toxicity data on listed and candidate species in the Basin. The Environmental Protection Agency (EPA) is working with the U.S. Fish and Wildlife Service (Service) to identify appropriate surrogates for imperiled aquatic species that can be used in toxicity studies to better define protective water quality standards and criteria. [1]

Documented Impairment

- *In 1989, the Geological Survey of Alabama initiated a study in the Big Sandy Creek drainage in order to characterize hydrologic conditions and biological communities prior to the discharge of coalbed methane produced waters and to document any changes in these parameters after discharge began. Water-quality, fish, and invertebrate samples were collected. In general, the fish and benthic invertebrate faunas of the system were found to be diverse and abundant.*

After produced water discharge began in April 1990, concentrations of total dissolved solids increased significantly over pre-discharge levels. Produced waters discharged into Big Sandy Creek were found to be higher in total dissolved solids, chloride, and bicarbonate compared to produced waters from the middle and northeast portions of the Black Warrior River basin. No adverse impact to the diversity or abundance of the fish and invertebrate communities inhabiting Big Sandy Creek due to the discharge of produced waters was detected.

- *Water quality degradation is the biggest threat to the continued existence of the Black Warrior Waterdog (Necturus alabamensis). Bailey (1995)* [12] *considered water quality degradation to be the primary reason for the extirpation of this species over much of its historic range in the upper Black Warrior River system.* [13]

Sources stated include:

- Point and nonpoint pollution - *"Pollution is generated from inadequately treated effluent from industrial plants, sanitary landfills, sewage treatment plants, and drain fields from individual private homes. Poultry and cattle feedlots are other major contributors of pollution to the drainage. Large population centers of Birmingham, Tuscaloosa, and Jasper contribute substantial runoff to the Basin. The watershed occupied by these three cities contains more industrial and residential land area than any other river basin in the state."* [13]
- Surface mining - *"Runoff from coal surface mining generates pollution through acidification, increased mineralization, and sediment loading. Impacts are generally associated with past activities and abandoned mines…"* [13]
- Forestry operations and highway construction *"are also sources of nonpoint pollution when BMPs are not followed to protect streamside management zones."* [13]
- The flattened musk turtle is threatened by disease, overcollecting, and by water pollution from mining, forestry, agriculture, and industrial and residential sewage effluents. [14]
- Fish diversity drops off markedly in the lower Mulberry and Locust Fork basins (Mettee et al., 1996). This is most likely the result of industrial and

urbanization impacts in the lower Locust Fork Watershed and coal mining impacts (primarily abandoned mines) in the lower Mulberry Fork watershed. [15]

- *Given the large amount of siltation present at most sites within Cedar and Tyro Creeks, indications of pollution and nutrient enrichment, and the lack of any turtles captured or observed in our sampling, these creeks are unlikely to harbor populations of S. depressus (Flattened Musk Turtles). Given that S. depressus has been collected in the North River at the mouth of Cedar Creek and may yet persist at this site, consultation with USFWS may be warranted.* [11]

D. DECREASED BIOLOGICAL PRODUCTION

Sediment is the most abundant pollutant in terms of quantity. Sedimentation occurs when heavy rain events wash soil particles from land to water. Turbidity is the measure of suspended sediment in the water. Turbidity from sedimentation causes a myriad of problems for aquatic species. Suspended sediment, especially particles from clayey soils, impedes light penetration. This impedance can cause an increase in water temperature, thus greatly affecting sensitive aquatic species.

The reduced sunlight also interferes with feeding by predators that hunt by sight (such as many sport fish) and can hinder reproduction for species that select mates by sight (such as sunfish). In addition, turbidity can clog gills and can smother fish nests and eggs. Other forms of pollution, such as nutrients and toxins, can also be carried via soil particles; further degrading the waterbody. Additionally, sedimentation could result in a reduction of reservoir capacity, hindering recreation use and potentially causing flooding.

Documented Impairment

- On August 17, 2003, the *Birmingham News* reported that the vermillion darter populations, only known to Turkey Creek in Jefferson County, have decreased dramatically. In 1998, an estimated 1,800 to 3,000 darters lived in a 7.2-mile stretch near the headwaters of Turkey Creek. A recent population count by Samford University found about 250 of the fish remaining in a dwindling habitat. Dr. Blanchard, a Samford professor said that a possible cause is sediment washed into the creek. [4]

- During 1997, the Geological Survey of Alabama sampled 60 stream sites using the Index of Biological Integrity (IBI) Level I Wadeable stream technique. Thirty-three (33) of the 60 sites were sampled by both GSA and ADEM personnel. Results of the IBI analyses indicated that over half (55%) of the 60 sites sampled, scored "POOR-FAIR, or worse, relative to biological condition." Over half of the samples from Locust Fork indicated POOR biological condition or worse while slightly over 25 percent of the samples from Mulberry Fork indicated the same. Only a few samples from the lower Black Warrior system indicated POOR biological conditions there. Samples from the upper Black Warrior and Sipsey Fork indicated FAIR to GOOD biological condition. Figure 41 shows the stream segments sampled which received a fair, poor, or very poor IBI score. [16]

Figure 41:

Black Warrior River Sampling Results on Index of Biological Integrity

VERY POOR	
Location	County
Village Creek @ Co. Hwy 45 near Maytown	Jefferson
Fivemile Creek @ Brookside	Jefferson
Fivemile Creek @ Upper Coalburg on Co. Hwy 77	Jefferson
Ward Creek @ Co. Hwy 140	Jefferson
Eightmile Creek @ Mount View	Cullman
POOR or POOR-FAIR	
Big Prairie Creek @ Ala Hwy 25	Hale
Cottonwood Creek @ Co. Hwy 12	Hale
Gabriel Creek off unnumbered road	Hale
Binion Creek @ unnumbered road	Tuscaloosa
Village Creek on Co. Hwy. 45 @ Power Plant nr. West Jefferson	Jefferson
Crooked Creek @ Co. Hwy. 144	Jefferson
Turkey Creek @ Pinson on Turkey Creek Road	Jefferson
Gurley Creek near Trafford	Jefferson

Sand Valley Creek @ unnumbered road near Gurley	Blount
Longs Branch @ Co. Hwy. 22 near County Line	Blount
Calvert Prong @ Moss Bridge	Blount
Calvert Prong @ Co. Hwy. 33	Blount
Hendrick Mill Branch @ Co. Hwy. 15	Blount
Blackburn Fork @ Co. Hwy. 27	Blount
Little Warrior River @ Co. Hwy. 20	Blount
Graves Creek @ unnumbered road off Ala. Hwy. 79	Blount
Whippoorwill Creek @ unnumbered road .5 mi. County off Co. Hwy. 14	Blount
Big Mud Creek @ Co. Hwy. 21	Blount
Locust Fork @ Co. Hwy. 36	Blount
Locust Fork near Walnut Grove	Etowah
Locust Fork @ Dee Nix Road	Etowah
Wolf Creek near West Corona	Walker
Mill Creek @ Carbon Hill	Walker
Clear Creek near Co. Hwy. 28	Winston
Clear Creek near Sutton Cemetery	Winston
Rock Creek near Addison	Winston
Sullivan Creek near Arkadelphia	Cullman

- 1998, the Geological Survey of Alabama sampled the Locust Fork watershed for biological integrity (Shepard et al., 1998). According to their report, a total of 55 stations were sampled, with 30 in tributaries in the Locust Fork, and 25 in the main channel. Of the tributary stations, 21 were ranked as very poor or poor, 8 as fair, and 1 as good; of the stations in the main channel, 4 were ranked as good, and 19 were ranked as fair. There were no stations that qualified as being ranked excellent.

  Tuskaloosa darters were found only in the upper Sipsey Fork system, the Brushy Creek system, and Blackwater Creek. The other two target species were not found at any sampling station. The fish fauna was generally more impaired than in the Locust Fork. Twenty-nine of the 68 sampling stations were ranked as poor, one was very poor, 33 were fair, and only six were good.

- ADEM periodically conducts monitoring activities in streams of the Bankhead National Forest, using the Index of Biological Integrity (IBI). The streams samples in 2002 rated from fair to fair/poor condition, reflecting historical, not current, impacts. The current explanation for the stream conditions is that the region was in extreme drought conditions during 2000 and 2001. These effects were in do doubt compounded by the fragmentation of contiguous aquatic habitat by the construction of reservoirs within the Black Warrior Waterways. [8]

Figure 42:

2002 INDEX OF BIOTIC INTEGRITY (IBI) RATINGS
BANKHEAD NATIONAL FOREST
(BLACK WARRIOR RIVER WATERSHED)

Sample Site/Watershed	ADEM IBI Rating
Sipsey Fork/Lower Sipsey	Fair
Brushy Creek/Lower Brushy	Fair-Poor
Inman Creek/Upper Brushy	Fair-Poor
Thompson Creek/Upper Sipsey	Fair

Source: USDA Forest Service, Draft Environmental Impact Statement: Forest Health and Restoration Project*, June 2003*

- Fish sampling was conducted on three stations in the lower reaches of Hurricane Creek in 1998 and 2000. Fish IBI's at these stations indicated poor biological condition of the fish assemblage. Micro invertebrate assessments on Hurricane Creek indicated a change in condition from good (1996) to impaired in 2000. [18]

  Fish sampling in the Middle Hurricane Creek Watershed was conducted in the 1980's and in 1998/2000. Fish IBI's in 1998 and 2000 upstream of the Little Hurricane Creek confluence indicated poor biological condition. Microinvertebrate assessments on Hurricane Creek below the confluence with Kepple Creek indicated a slight decline in the benthic community from good (1996) to fair (2000). Macroinvertebrate data in 2000 on Kepple Creek indicated fair condition at the mouth and significant impairment upstream. [18]

  Fish sampling was conducted at two sites in North Fork Hurricane Creek. Low fish IBI scores indicated poor condition. Fish IBI scores on Hurricane Creek above the North Fork confluence indicated fair biological condition in the 1980's and good condition in 1998. The benthic Macroinvertebrate community was rated as severely impaired in both the 1996 and 2000 assessment on North Fork Hurricane Creek. [18]

- The EPA is reviewing the need for using additional surrogate species to test for impacts of pollution on listed aquatic species in recognition of the greater sensitivity of listed species to common pollutants. The U.S. Army Corps of Engineers, Natural Resources Conservation Service, Federal Energy Regulatory Commission, and other agencies have reviewed and revised programs, projects, and permits to protect listed species in the Basin. [3]

E. HUMAN HEALTH THREATS

The State of Alabama has an abundance of clean rivers and lakes. These waters present sport fishermen with great recreation, while providing subsistence fishermen with an abundance of good food. However, fishermen need to be aware of the benefits and risks of fish consumption practices. Certain toxic chemicals have been found in some lakes and rivers in Alabama and can accumulate in fish tissue. When chemical concentrations are elevated in fish, they can pose health risks to people who eat them. [19]

The Alabama Department of Public Health issues fish advisories to inform fishermen which species of fish in which water bodies may present an elevated health hazard. They also explain the potential health hazards associated with eating certain contaminants. Finally, the advisories tell how to reduce contamination ingestion by changing the way fish is prepared. The advisories are designed to provide sufficient information to permit individuals to make an informed choice on whether or how great a risk to take from consuming fish that may be contaminated. [19]

Current Alabama fish advisories may be found on the Alabama Department of Public Health website at http://www.adph.org/EPI/Apr_.PDF. *See Section 10: Current Research and Future Research Needs.*

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EFFECTS OF IMPAIRMENT

6 Total Maximum Daily Loads and Tier 1 Waterbodies

The Clean Water Act requires each state to provide a list of polluted waterbodies and to set priorities for their clean up. Streams, lakes and reservoirs qualify for this list when they are too polluted or otherwise degraded *(See Appendix E for 303(d) Pollutant List Definitions)* to support their designated and existing uses. *(See Appendix E for Alabama Water Use Classifications and Standards)* The impaired waters list is also called the 303(d) list, named after the section in the Clean Water Act, which requires reporting of the list.

Water quality monitoring data is collected and compared with state water quality standards. If any standard is in violation, the waterbody is placed on the state's 303(d) list. Once a waterbody is placed on the list, a Total Maximum Daily Load (TMDL) is developed. A TMDL establishes a "pollution budget" for each pollutant causing water quality impairment. This budget is determined by calculating the maximum amount of pollutants a waterbody can adequately handle by using models to predict how various pollutants affect water quality and provides the maximum loading target in order for the waterbody to meet water quality standards and use classification. The TMDLs in Alabama are developed consistent with a specific schedule mandated by a 1998 EPA lawsuit. [2]

A. TMDL CALCULATION

The TMDL addresses both point and nonpoint source pollution, identifies specific pollutants (e.g., pesticides, pH, ammonia, etc.) and links them to their sources (e.g., urban runoff, abandoned mine lands, failing septic systems etc.) Calculations are based on the pollutant loading from point sources, plus the pollutant loading from nonpoint sources - with an added margin of safety. [3] *See Figure 43*.

Figure 43:

TMDL EQUATION

Pollutant Load from Point Sources (NPDES)
+ Pollutant Load from Nonpoint Sources
+ Margin of Safety

TMDL=The maximum amount of a specific pollutant allowed by the water quality standards for that pollutant

Once developed, the TMDL is open for public comment, then sent to EPA for approval. The EPA can either approve or object to a state's 303(d) list and any TMDL developed by the state. If the EPA rejects the list, or the states do not adopt a TMDL to address the problem, then EPA will establish a new 303 (d) list and/or prepare a TMDL on the state's behalf. ADEM prepares a new list every two years for submission to EPA. [2]

B. TMDLs IN THE BLACK WARRIOR RIVER BASIN

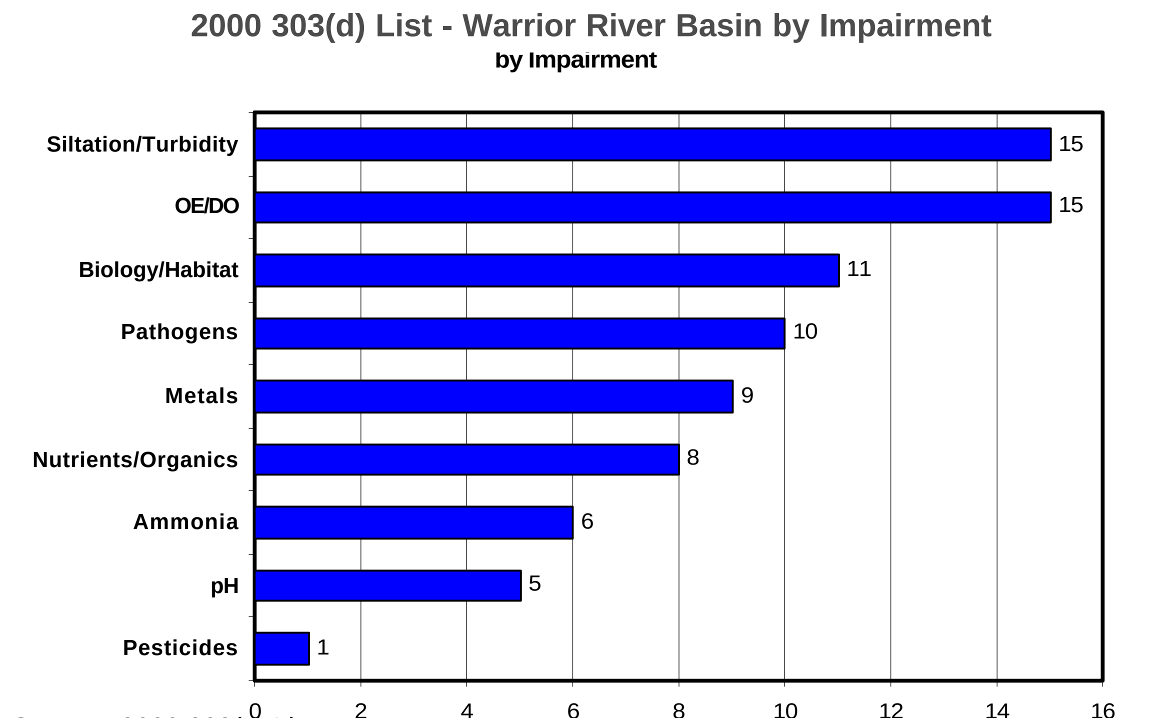
Most states have lacked the resources to do TMDL analyses, which involve complex assessment of point and nonpoint sources in order to ascribe and quantify environmental effects for particular discharge sources. Baseline water quality monitoring data for the analyses (to identify impaired waters and pollution sources) is limited. EPA has both been reluctant to intervene in the states and has also lacked resources to do so itself. Thus, there had been little implementation of the provision which was enacted in 1972. Only in 1992 did EPA issue regulations requiring states every 2 years to list waters that do not attain water quality standards and establish TMDLs to restore water quality. [1]

Black Warrior River TMDL Statistics (2000 303(d) list)

- 35 impaired stream segments
- 476.2 impaired stream miles
- 81 TMDLs to be developed

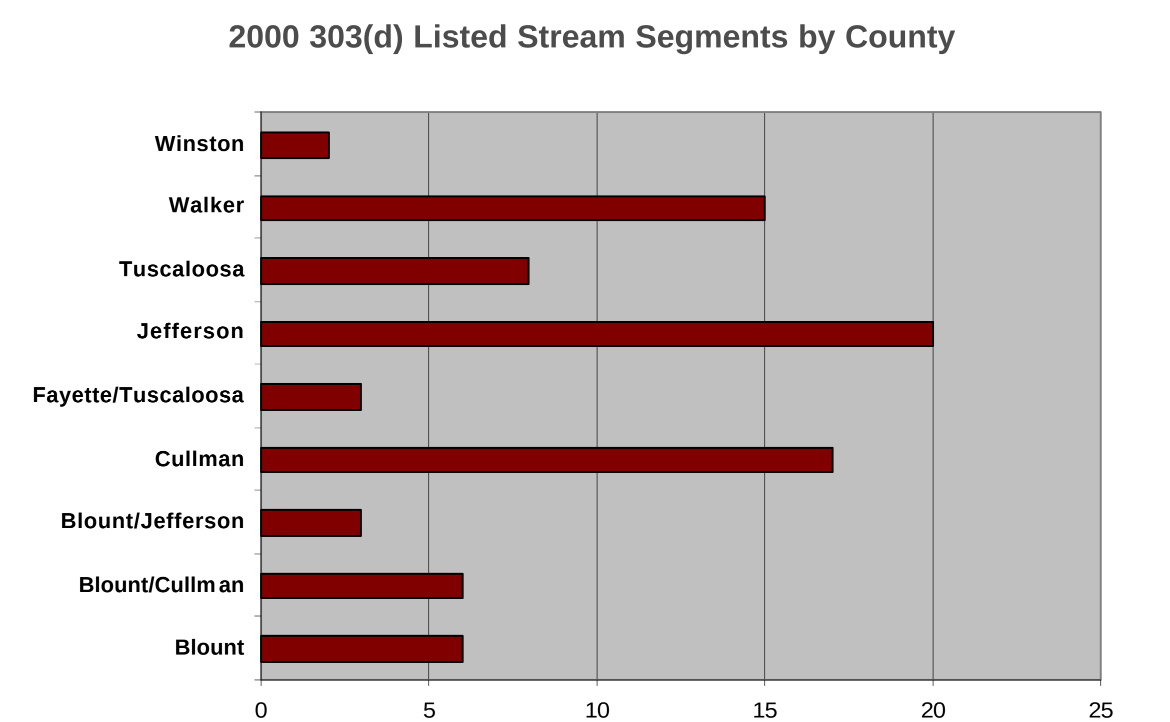
Using the 2000 303(d) list, siltation, organic enrichment and habitat alteration are the most prevalent water quality impairments. *(See Figure 44.)* Figure 45 ranks counties by the number of TMDLs to be developed. *See Appendix E for a Map of 303(d) Listed Streams in the Black Warrior River Watershed.* Jefferson, Cullman and Walker Counties, respectively, have the highest number of TMDLs to be developed. Figures 46, 47 and 48 show the types of impairment by county. Jefferson County has the greatest number of diverse types of impairments.

Figure 44:



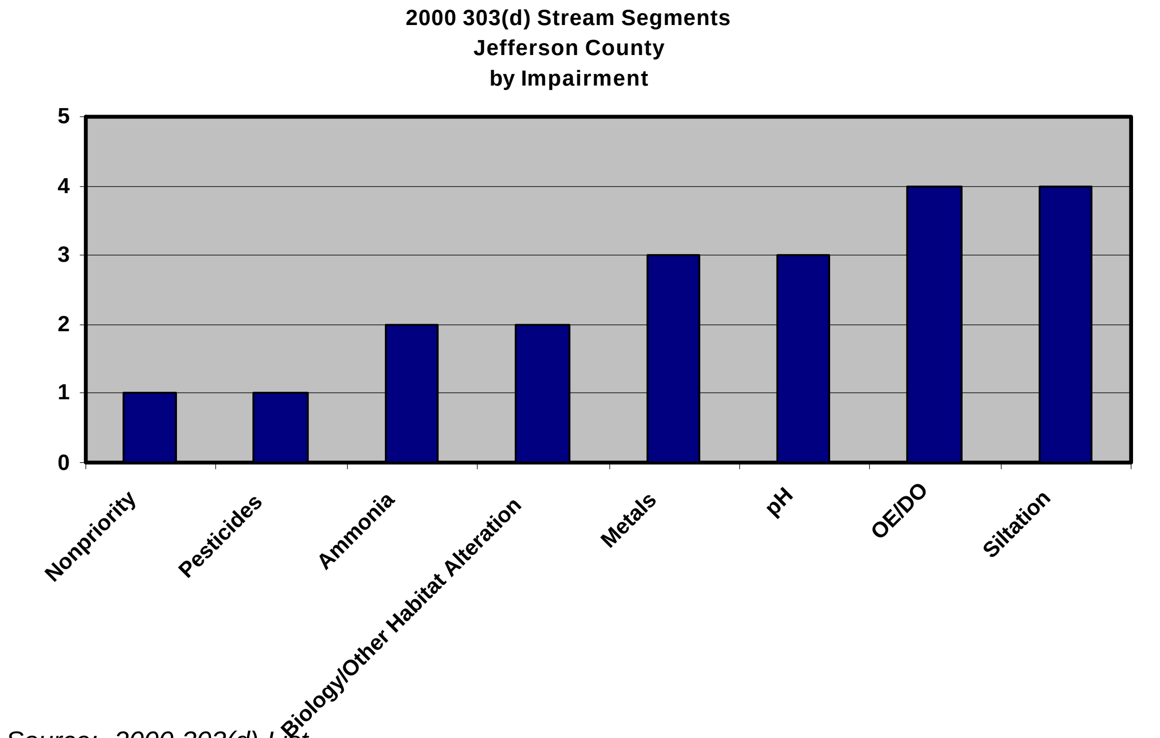
Source: 2000 303(d) List

Figure 45:



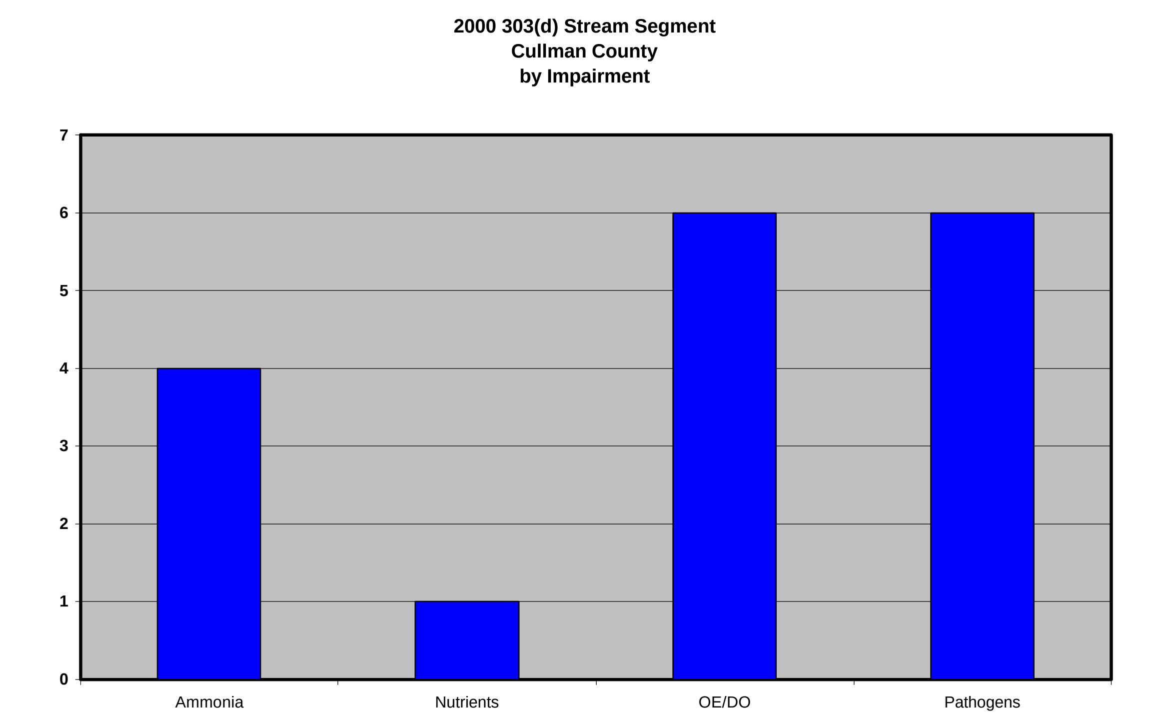
Source: 2000 303(d) List

Figure 46:



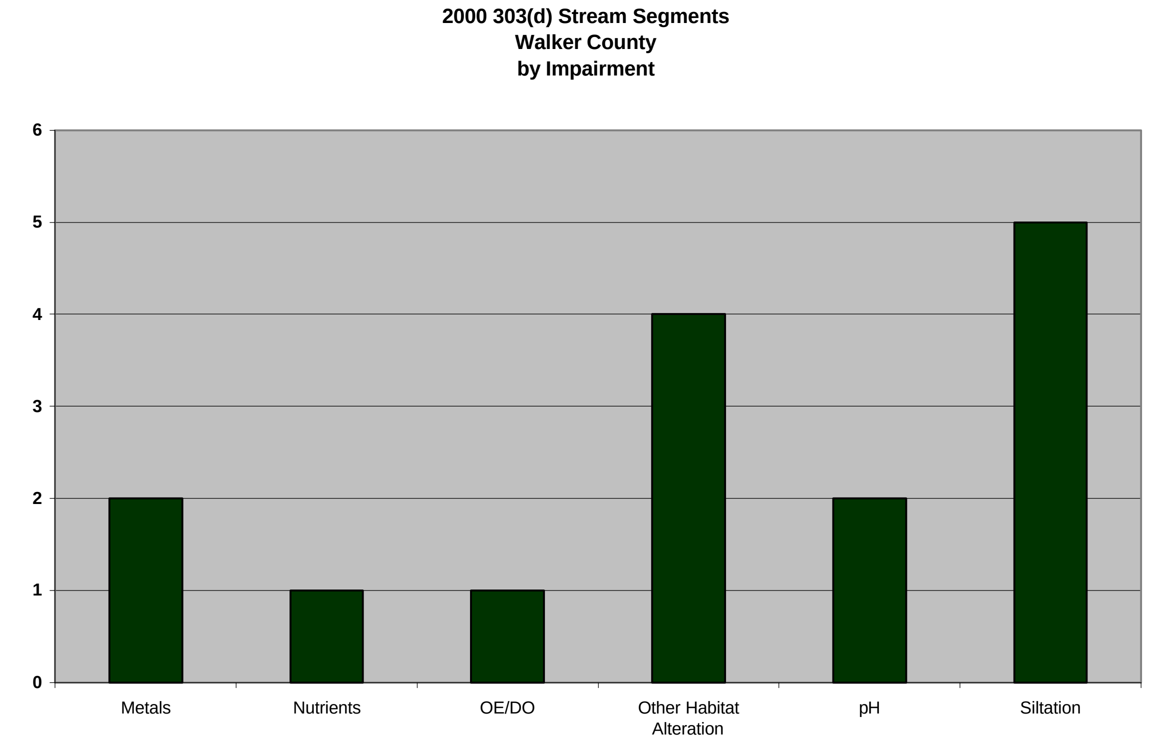
Source: 2000 303(d) List

Figure 47:



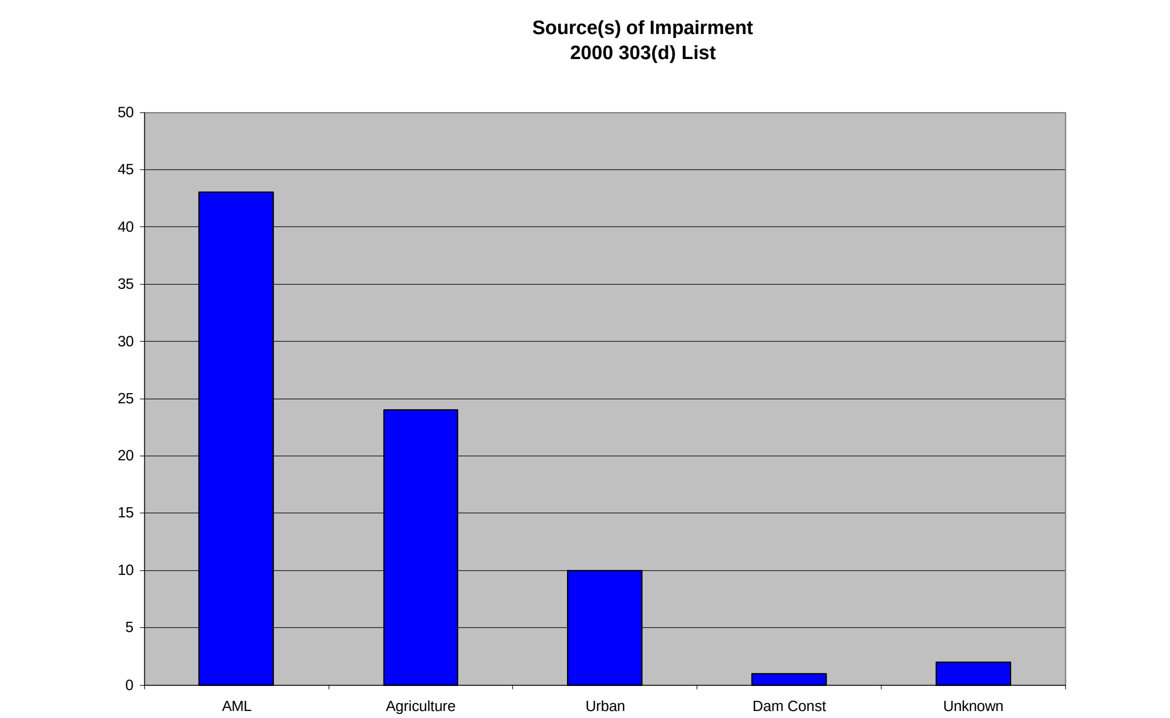
Source: 2000 303(d) List

Figure 48:



Source: 2000 303(d) List

Figure 49:



Source: 2000 303(d) List

The 303(d) list of impaired waters reported to EPA for 2002 is included in Appendix E. Figure 50 lists the TMDLs that have been developed or proposed for stream segments within the Black Warrior River Basin, as of September 2003.

Figure 50:

Proposed TMDL's Within the Black Warrior River Basin as of February, 2003

Waterbody Name	County	Pollutants of Concern	Identified Source
Bayview Lake	Jefferson	Ammonia Siltation OE/DO	Abandoned surface mining, Urban runoff, Storm Sewers, Industrial and Municipal Activities
Camp Branch	Jefferson	pH Siltation and Other Habitat Alteration	Abandoned surface and sub-surface mining, landfills
Village Creek	Jefferson	Metals pH Siltation	Abandoned subsurface mining, Urban runoff, Storm Sewers, Industrial and Municipal Activities
Crooked Creek	Cullman	Low Dissolved Oxygen Ammonia as Nitrogen Pathogens	Septic systems, Urban runoff, Agricultural runoff, Land application of animal manure, Access to streams by livestock, Wildlife
Duck River	Cullman	Low Dissolved Oxygen	Municipal Activities, Wildlife, Agricultural Runoff
Graves Creek	Blount	Low Dissolved Oxygen	Industrial Activities, Agricultural runoff, Wildlife
Long Branch	Cullman	Low Dissolved Oxygen / Ammonia as Nitrogen	Septic systems, Urban runoff, Agricultural runoff, Access to streams by livestock, Wildlife
Rock Creek	Winston	Low Dissolved Oxygen Pathogens	Septic systems, Urban runoff, Agricultural runoff, Land application of animal manure, Access to streams by livestock, Wildlife
Thacker Creek	Cullman	Low Dissolved Oxygen Ammonia as Nitrogen Pathogens	Septic systems, Urban runoff, Agricultural runoff, Land application of animal manure, Access to streams by livestock, Wildlife

C. TIER 1 WATERBODIES WITHIN THE BLACK WARRIOR RIVER BASIN

The EPA and Alabama State Water Quality regulations require surface waters to be classified into three categories. The benefit of this classification prevents further degradation of our water resources. This classification should not be confused with 303(d) list of "impaired" waterbodies or the designated water use classification of a waterbody. *(See Appendix E for a list of Water Use Classifications within the Black Warrior River Basin.)*

- Tier 1 applies to all waters and provides a baseline level of protection. It requires that existing uses *(See Appendix E for a list of Water Use Designations within the Black Warrior River Watershed)* of a water body, and the water quality necessary to protect the existing uses, be maintained and protected [40 CFR 131.12(a)(1)]"

- If the existing water quality is better than necessary to support propagation of fish, shellfish, wildlife and recreation, it can be designated as Tier 2.

- Tier 3 is the highest level of protection and applies to waters identified by the State as outstanding national resource waters (ONRWs). The Sipsey Fork within the Bankhead National Forest is the only waterbody within the Black Warrior River Watershed designated as ONRW.

Tier 1 waters are those of "average" quality. A tier 1 designation is a minimum water quality standard for all water. Degradation of Tier 1 water can occur as long as it continues to meet existing use designation. Tier 2 waters are those of "higher" quality. Tier 2 water quality may not be degraded unless an appeal is made. The appeal must demonstrate severe economic or social hardship associated with maintaining the antidegradation goals of the Tier 2 standard. Tier 3 waters are those surface waters of exceptional quality whose quality may never be degraded. No appeal for exemption from water quality standards is permitted.

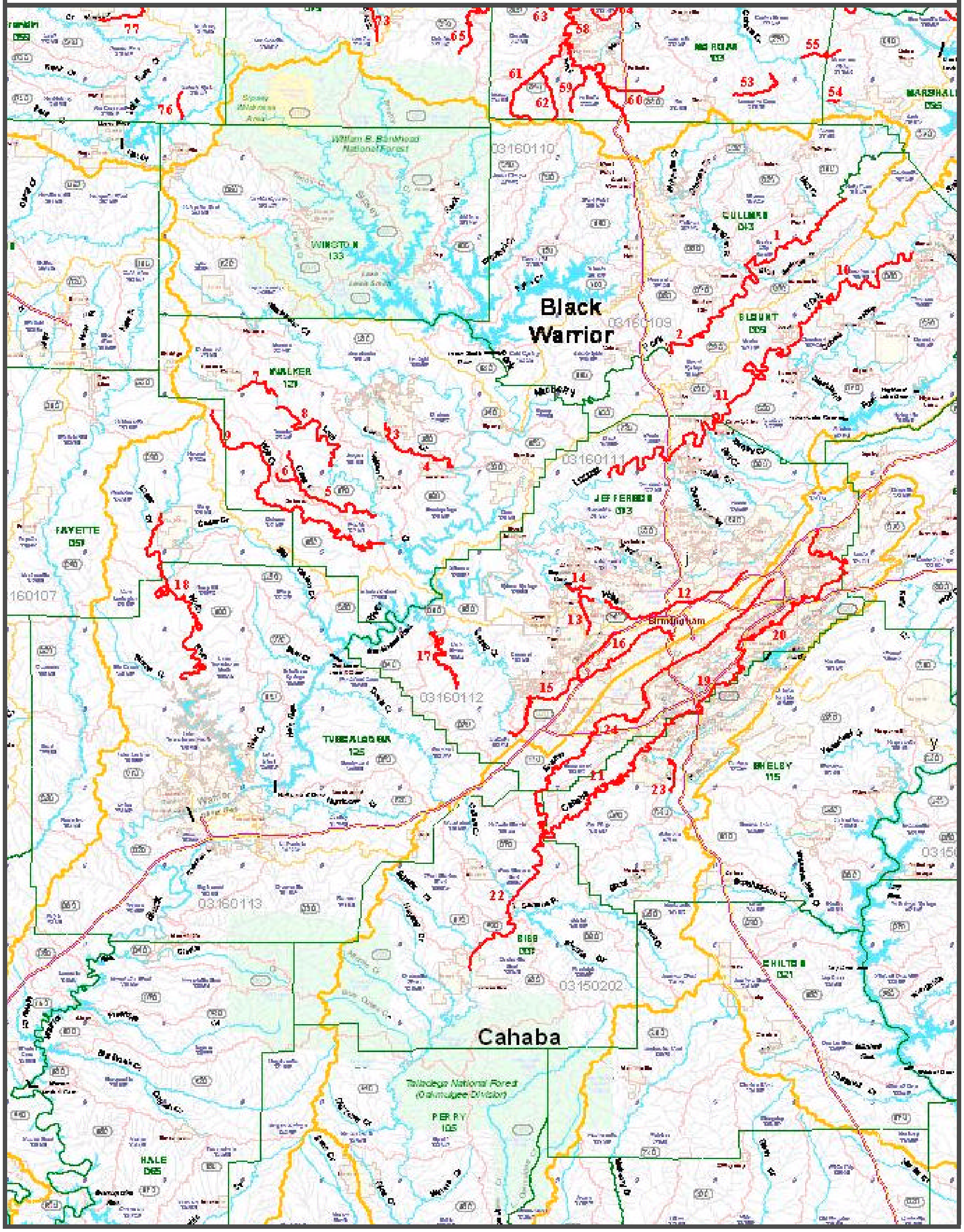
Economic Analysis of Designating Outstanding National Resource Waters in Tennessee: Theory and An Application in Monroe County

Dept. of Agricultural Economics, Dr. Paul M. Jakus Dr. Matthew N. Murray, Professor, Paula Dowell, Graduate Research Assistant, Center for Business and Economic Research, University of Tennessee

March 2000

Figure 51:

TIER 1 WATERBODIES WITHIN THE BLACK WARRIOR AND CAHABA RIVER WATERSHEDS



SOURCE: Alabama Department of Environmental Management

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7 Water Quality Initiatives

Although the effects of modem human activities on the aquatic ecosystem may appear overwhelming, their potential impacts have been reduced by numerous mandated and voluntary conservation measures. Industrial and municipal compliance with State and Federal water quality regulations has substantially improved the quality of many receiving waters. Regulatory compliance by the surface mining industry has reduced detrimental mine drainage. Farms and ranches have applied new knowledge and improved technology to reduce agricultural erosion, protect wetlands, and refine fertilizer and herbicide applications. Voluntary forestry Best Management Practices (BMPs) have been developed and are being implemented by many commercial and private interests. Programs and manuals are continuously being developed or refined by State and private interests to improve and to encourage the application of BMPs for construction, forestry, agriculture, and animal waste disposal that are more protective of water quality. [1]

The Basin's citizens are also seeking to protect watershed quality and values by forming grass roots organizations. Community action groups such as the Friends of the Locust Fork River, Five Mile Creek Action Committee, Friends of Mulberry Fork, Valley Creek Society, Village Creek Society, Alabama Rivers Alliance, and others advocate proper stewardship of the Basin's aquatic resources. The Mobile River Basin Coalition, a group of concerned business, environmental, and government representatives, has organized to promote effective stewardship of the ecosystem's natural resources through education, dialogue, and voluntary individual and community actions. [1] The Black Warrior Clean Water Partnership is comprised of government agencies, citizen groups, citizens, environmental advocacy groups, and industry to discuss water quality issues within their sub-basins.

A. FEDERAL INITIATIVES

Environmental Protection Agency(EPA)

CWA Section 319

In May 1996, EPA and the states reached agreement to upgrade section 319 programs to prevent polluted runoff to address nine key elements, including, among others: [2]

- Establishing short- and long-term goals and objectives
- Strengthening working partnerships with all appropriate public- and private-

sector groups
- Focusing on impaired waters and waters threatened by new sources and activities
- Implementing better-focused programs to address these problems
- Working to promote consistency of federal programs among state and tribal nonpoint source programs
- Using monitoring and feedback loops to ensure continued progress.

An essential feature of effective nonpoint source programs will be the coordination and integration with other closely related state managed water quality programs. The strengthening of partnerships will ensure that all appropriate programs, authorities, and resources are used effectively and consistently to solve shared problems. [2]

Clean Water Initiative

The Clean Water Initiative of the Clinton Administration includes the Clean Water Action Plan. This plan includes actions designed to increase aid to states and communities for combating nonpoint source pollution. Most of this is done through existing programs and increased coordination among agencies. The action plan has four main tools that will used to achieve its objectives:

1. Watershed Approach-Alabama is already actively researching and protecting surface water resources using the watershed approach.
2. Strong federal and state standards for water quality and the effects of nonpoint-source pollution.
3. Natural resource stewardship. To encourage federal natural resource and conservation agencies to assist state and local organizations to protect and restore watersheds.
4. Education of citizens and government officials about watershed health, drinking water, and fish.

Long-term objectives of the Clean Water Action Plan are to restore 75 percent of U.S. watersheds to fishable/swimmable condition by the year 2005, and to ensure that at least 95 percent of the population served by community water systems receives drinking water meeting all health-based standards. [3]

Watershed Information Network

The Watershed Information Network (www.epa.gov/win) organizes information and services for watershed practitioners. The network provides information about major laws governing water resources and links to watershed partners, including federal and state agencies and local watershed groups. It provides descriptions, application procedures, and deadlines for funding and technical assistance programs.

Watershed Academy

The EPA provides an educational resource that offers many on-line training modules. Individuals can use the modules at their own pace to learn about topics including ecology, watershed planning, and best management practices. (www.epa.gov/owow/watershed/wacademy)

Pollutant Trading

One way in which EPA is encouraging improved watershed management is within-watershed pollution credit trading. Entities that reduce pollutant levels below required levels can sell or trade credits to other entities in the same watershed. EPA expects this practice to create economic incentives as well as facilitate compliance with water-quality regulations while causing a minimum of financial hardship. [2]

U.S. Department of the Interior

Office of Surface Mining

The Surface Mining Control and Reclamation Act of 1977 (SMCRA) created the Office of Surface Mining (OSM) in the U.S. Department of the Interior. SMCRA provides authority to OSM to oversee the implementation of and provide Federal funding for State regulatory and abandoned mine lands programs that have been approved by OSM as meeting the minimum standards specified by SMCRA. These programs are administered by the Alabama Surface Mining Commission (ASMC) and the Alabama Department of Industrial Relations (ADIR). [4]

OSM's role is to focus on on-the-ground reclamation success and end results than on processes. It emphasizes assisting the State in improving its regulatory and abandoned mine lands programs by identifying needs and offering financial, technical, and programmatic assistance to strengthen the State programs. [4]

OSM/ADIR Recent Initiatives (1997-2002)

- The Alabama Department of Industrial Relations completed a project to treat acid mine drainage (AMD) being discharged from a 240 acre abandoned surface mine into Weldon Creek, a tributary of Hurricane Creek (Tuscaloosa). This project was unique because a new technique was used to treat the AMD by placing alkaline kiln dust, or crushed limestone in a pit through which the headwaters of the creek flowed. The cost of the project was shared by the Alabama Drivers Alliance through OSM Watershed Cooperative Agreement Program funding, the City of Tuscaloosa under a Supplemental Environmental Project initiative, and ADIR. [4]

- Blue Creek Gob AML Project in Jefferson County was nominated for a national reclamation award. The project successfully met the challenge of correcting an assortment of public safety hazards and environment problems (including AMD) stemming from 40 acres of abandoned coal refuse or gob at a remarkably low cost. This was accomplished under the AML Enhancement Rule by allowing the contractor to extract and sell marketable coal from the refuse in return for grading the site at no cost to the State. [4]

- ADIR received $60,000 from the ADEM under Section 319(h) Grants Program to implement BMPs on an abandoned mine site in the Black Warrior River watershed. The Barney AMD Project, funded through the Clean Streams Initiative, was the recipient of the funding. The project was reclaimed in 2002. *(See Appalachian Clean Streams Initiative Projects.)*

- ADIR engaged in a partnership with the BFO, the City of Tuscaloosa, ADEM, and the State Attorney General's office, to funnel almost $250,000 in environmental fines to the Hurricane Creek AMD Remediation and the Cypress Creek Projects.

- ADIR entered into a cooperative agreement with the USDA NRCS to utilize $77,000 in unused Rural Abandoned Mine Program funds to (1) construct, equip and maintain the ECOBUS, a mobile training facility designed to improve public awareness of water quality issues; (2) to improve AMD remediation at the Cane Creek Project and add more sedimentation controls at the Cypress Creek Project; and (3) continue a study on aquatic communities below the Cane Creek Project by Auburn University.

- On July 19, 2002, ADIR provided the U.S. Army Corps of Engineers (COE) with a letter supporting reclamation of the Edgewater Gob site. Once approved, the COE and ADIR will share the cost of executing the reclamation plan.

- In a cooperative partnership with OSM and Clark Atlanta University, ADIR constructed a demonstration bioremediation pond at the Cane Creek AMD Remediation Project and purchased two 100-gallon tanks to be used for mixing and culturing iron-eating bacterial strains. The experiment was completed in June 2000, and was successful in elevating the pH and removing metals. *(See Appalachian Clean Streams Initiative Projects.)*

- ADIR provided funding for a unique research study on the "Effects of Reclamation on Aquatic Communities" at the Cane Creek AMD Project site.

- ADIR assisted Auburn University as a sponsor in developing a Rapid BioAssessment Technique for evaluating acid mine drainage impacts on aquatic communities at abandoned coal mine sites.

- ADIR assisted the U.S. Geological Survey (USGS) in its technical review of arsenic gob piles and streambed sediments in Alabama. In the summers of 1999 through 2000, the USGS with ADIR's assistance conducted extensive water quality and soils sampling in the Black Branch and Cane Creek watersheds.

Appalachian Clean Streams Initiatives

The Appalachian Clean Streams Initiative (ACSI) was developed in August 1994 as a "non-regulatory effort aimed at remediation of existing sources of Acid Mine Drainage often found at abandoned and bond-forfeited sites. This is an on-going effort to develop State, local and Federal partnerships to clean up polluted streams using watershed-based planning efforts, and focusing the energies and resources of citizens, communities, and corporations. A major goal of the clean-up plan is to increase information exchanges and to eliminate [duplicate] efforts among State, local and Federal government agencies that are working in this arena." ACSI is supported by the Title IV Abandoned Mines-Office of Surface Mining, Environmental Protection Agency. This Initiative includes projects in 11 Appalachian States.

In Alabama, efforts are focused on the Coal Valley watershed, which feeds into the Mulberry Fork of the Black Warrior River. *(U.S. Geological Survey Programs in Alabama. U.S. Geological Survey Fact Sheet FS-002-96) See Figure 52 for OSM Appalachian Clean Streams Initiative Projects within the Black Warrior River Basin*

Figure 52:

APPALACHIAN CLEAN STREAMS INITIATIVE PROJECTS WITHIN THE BLACK WARRIOR RIVER BASIN

PROJECT NAME	LOCATION	RECEIVING STREAM(S)	STATUS
Cane Creek	Near Oakman, Walker County	Cane Creek, Lost Creek, Mulberry Fork	Completed
Barney AMD	Near Cordova, Walker County	Main Stem of the Black Warrior River	Completed
Peabody Washer	Near Samantha, Tuscaloosa County	Main Stem of the Black Warrior River	In reclamation
Dean's Ferry	South of Hayden, Blount County	Locust Fork	Approved for Reclamation

SOURCE: Provided for the Black Warrior River Management Plan. Office of Surface Mining, August, 2003.

U.S. Fish and Wildlife Service

Critical Habitat Proposed for Freshwater Mussels

The U.S. Fish and Wildlife Service is proposing that portions of rivers and streams, totaling some of 1,093 miles in Alabama, Georgia, Mississippi, and Tennessee, be designated as critical habitat for 11 federally listed freshwater mussels. All 11 mussels were listed March 17, 1993, under the Endangered Species Act (ESA). The final determination of critical habitat will be made my March 17, 2004. *Also see Section II-F: Description of Watershed - Environmental Importance - Critical Habitat.*

Mobile River Basin Aquatic Ecosystem Recovery Plan

The Mobile River Basin Aquatic Ecosystem Recovery Plan was prepared by the Service's Jackson, Mississippi Field Office, and released for public review in September 1994. In December 1994, the Alabama Department of Economic and Community Affairs, Office of Water Resources, requested a meeting among the Basin's stakeholders and the Service to discuss the draft recovery plan, its implementation, private and State concerns with the plan, the Endangered Species Act, and the Service's past and future actions within the Basin. Participating stakeholders included State and Federal government agencies, environmental organizations, landowners, and numerous business and industry representatives. Bimonthly meetings were conducted over the next 18 months to exchange information concerning the values and status of the Basin's animal and plant life, human uses and values of its rivers and watersheds, and current regulations and programs to protect and manage the Basin's resources. During these discussions, participants agreed to form the Mobile River Basin Coalition to provide a forum for all interest groups who have a stake in the Basin. Among other activities, the Coalition has worked with the Service [1]

The Recovery Plan was developed to address the immediate recovery objectives of 22 aquatic species endemic to the Mobile River Basin of which the Black Warrior River Basin is a sub-basin. The Plan acknowledges that irreversible changes to extensive portions of the Basin have occurred to meet human needs, and these changes have resulted in natural resource losses. It emphasizes the uniqueness and value of the Basin's imperiled native species and the aquatic and riparian habitats on which they depend. The Plan identifies the threats currently affecting these habitats and their biota. It also recognizes that humans and their activities are integral components of the ecosystem, and that recovery strategies and actions must allow for sustainable economic growth and other human needs. [1]

U.S. Geological Survey

As the primary Federal science agency for water-resource information, the U.S. Geological Survey (USGS) monitors the quantity and quality of water in the Nation's rivers and aquifers, to assesses the sources and fate of contaminants in aquatic systems, develops tools to improve the application of hydrologic information, and ensures that its information and tools are available to all potential users. [5]

Projects Within the Black Warrior River Basin

In 2003, the USGS began a study of the Five Mile Creek Basin to provide sufficient water quality, habitat, and biological community data to describe baseline conditions. Additionally, the study will assess the effectiveness of proposed streamside management zones and restoration efforts as a result of the Sloss SEP *(See Section 7: Water Quality Initiatives-Industry-Sloss)* and the Five Mile Creek Greenway Partnership *(See Section 2: Description of Watershed-Land Use).*

In partnership with Auburn University and the Black Warrior Cahaba River Land Trust, the water quality monitoring and assessment program will provide information to support an integrated watershed management plan. The program will also provide a database for selected chemical, biological, and physical parameters. The database will be assessed (1) to determine the baseline conditions related to ecosystem and human health in each watershed; (2) to identify potential contaminant sources that could affect ecosystem and human health; and (3) to help select stream reaches for implementation of ecological and habitat restoration efforts based on these stressors.

Major USGS Initiatives:

<u>Cooperative Water Program.</u> The Mission of the USGS Cooperative Water Program is to provide reliable, impartial, and timely information needed to understand the Nation's water resources through a program of shared efforts and funding with State, Tribal, and local partners to enable decision makers to wisely manage the Nation's water resources. [5]

For more than 100 years, the Cooperative Program has been a highly successful cost-sharing partnership between the USGS and water-resource agencies at the State, local, and tribal levels. Throughout its history, the Program has made important contributions to meeting USGS mission requirements, developing meaningful partnerships, sharing Federal and non-Federal financial resources, and keeping the agency focused on real-world problems. [5]

<u>National Streamflow Information Program -- NSIP</u>. The National Streamflow Information Program (NSIP) provides information on the quantity and timing of the streamflow in the Nation's rivers. It is a vital asset that safeguards lives and property and helps to ensure adequate water resources for a healthy environment and

economy. The U.S. Geological Survey operates and maintains approximately 7,000 streamgages, which provide long-term, accurate, and unbiased information that meets the needs of many diverse users. [5]

The USGS's National Streamgaging Network consists of a core of USGS funded and operated streamgages, streamgages operated by the USGS but funded in cooperation with other agencies, and streamgages funded and operated by other agencies that provide data appropriate to meet NSIP goals. Although the National Streamgage Network is operated primarily by the USGS, it is funded by a partnership of 800 agencies at the Federal, State, Tribal, and local levels. [5]

The USGS National Streamflow Information Program (NSIP) is designed with five components, one of which is to provide a "backbone" or core of streamgages that are of such critical importance to the National Streamgage Network that their operation should be assured with Federal funds. NSIP was created in response to Congressional and stakeholder concerns about (1) a loss of streamgages, (2) a disproportionate loss of streamgages with a long period of record, (3) the inability of the USGS to continue operating high-priority streamgages when partners discontinue funding and (4) the increasing demand for streamflow information due to new resource-management issues and new data-delivery capabilities. [5] *See Figure 62.*

National Water Quality Assessment Program -- NAWQA. USGS implemented the National Water-Quality Assessment (NAWQA) Program to support national, regional, and local information needs and decisions related to water-quality management and policy. Shaped by and coordinated with ongoing efforts of other Federal, State, and local agencies, the NAWQA Program is designed to answer: What is the condition of our Nation's streams and ground water? How are the conditions changing over time? How do natural features and human activities affect the quality of streams and ground water, and where are those effects most pronounced? [1]

By combining information on water chemistry, physical characteristics, stream habitat, and aquatic life, the NAWQA Program aims to provide science-based insights for current and emerging water issues and priorities. NAWQA results can contribute to informed decisions that result in practical and effective water-resource management and strategies that protect and restore water quality. [5]

Toxic Substances Hydrology (Toxics) Program. The U.S. Geological Survey (USGS) Toxic Substances Hydrology (Toxics) Program was initiated in 1982. The goal of the Program is to provide scientific information on the behavior of toxic substances in the Nation's hydrologic environments. Contamination of surface water, ground water, soil, sediment, and the atmosphere by toxic substances is among the most significant issues facing the Nation. Contaminants such as excessive nutrients, organic chemicals, metals, and pathogens enter the environment, often inadvertently, via industrial, agricultural, mining, or other human activities. The extent of their migration and their persistence often are difficult to ascertain. Estimates of the costs and time frames for cleanup of contamination and protection of human and environmental health can best be described as astounding, despite continual efforts by governments and industries worldwide to improve environmental technologies. [5]

The Toxics Program conducts: (1) intensive field investigations of representative cases of subsurface contamination at local releases; and (2) watershed- and regional-scale investigations of contamination affecting aquatic ecosystems from nonpoint and distributed point sources. These investigations occur over a wide range of scales -- from intense point sources, such as leaks or discharges from industrial facilities; to multiple, closely spaced releases, such as domestic septic systems; to relatively uniform releases that occur over broad areas with similar land-use practices, such as agricultural and residential land uses. [5]

The Toxics Program is coordinated with the U.S. Environmental Protection Agency, the U.S. Department of Agriculture, the Department of Defense, the Department of Energy, the Nuclear Regulatory Commission, and other U.S. Department of the Interior agencies to ensure that current and future research priorities are being addressed. The Program complements the water-quality monitoring and assessment programs of USGS and others by identifying new issues and emerging contaminants, and developing the knowledge and methods needed to direct their future activities. Collaboration and information sharing occurs with numerous state and local governments, and non-governmental entities. The long-term cooperation and assistance offered by the Federal, State, and local agencies, and by private entities that administer or own the Program's research sites has been essential to the success of the Toxics Program. [5]

Ground Water Resources Program. The Ground-Water Resources Program encompasses regional studies of ground-water systems, multidisciplinary studies of critical ground-water issues, access to ground-water data, and research and methods development. The program provides unbiased scientific information and many of the tools that are used by Federal, State, and local management and regulatory agencies to make important decisions about the Nation's ground-water resources. [5]

State Water Resources Research Institute Program. The State Water Resources Research Institute (WRRI) Program is authorized by section 104 of the Water Resources Research Act of 1984. It is a Federal-State partnership which:

- Plans, facilitates, and conducts research to aid in the resolution of State and regional water problems
- Promotes technology transfer and the dissemination and application of research results
- Provides for the training of scientists and engineers through their participation in research
- Provides for competitive grants to be awarded under the Water Resources Research Act

The state water resources research institutes authorized by the Act are organized as the National Institutes for Water Resources (NIWR). NIWR cooperates with the USGS in establishing total programmatic direction, reporting on the activities of the Institutes, coordinating and facilitating regional research and information and technology transfer, and in operating the NIWR-USGS Student Internship Program. [5]

National Research Program

The National Research Program (NRP) conducts basic and problem oriented hydrologic research in support of the mission of the U.S. Geological Survey (USGS). Relevant hydrologic information provided by the USGS is available today to assist the Nation in solving its water problems because of a conscious decision made in years past to invest in research. The NRP is designed to encourage pursuit of a diverse agenda of research topics aimed at providing new knowledge and insights into varied and complex hydrologic processes that are not well understood. The emphasis of these research activities changes through time, reflecting the emergence of promising new areas of inquiry and the demand for new tools and techniques with which to address water-resources issues. Knowledge gained and methodologies developed in this program apply to all of the hydrologic investigations of the USGS, to the water-oriented investigations and operations of other agencies, and to the general scientific community. [5]

USGS Environmental Affairs Program

As a Federal agency with special expertise in the earth sciences, the U.S. Geological Survey (USGS) is required to evaluate, review, and prepare technical comments on environmental impact statements (EIS) and associated documents. In addition, through its Environmental Affairs Program (EAP), the USGS has established policies to implement the National Environmental Policy Act (NEPA) and other related acts. Guidance has been developed to ensure USGS compliance with NEPA and associated environmental and hazardous waste laws and regulations. [5]

Other USGS initiatives relating to water quality include the following:

- Branch of Quality Systems. Part of the Office of Water Quality this program manages and operates water-quality quality-assurance projects for the USGS and provides training and coordination on developing quality-assurance programs for the USGS.
- Branch of Geophysics. Part of the Office of Ground Water. This program provides a national focus to the regional and State water resources geophysical activities. Branch of Geophysical Applications and Support
- Chlorofluorocarbon Laboratory. The Reston Chlorofluorocarbon Laboratory provides analytical services for determination of the chlorofluorocarbons (CFCs) CFC-11, CFC-12, and CFC-113, sulfur hexafluoride (SF6), and other gases in air and water samples in support of USGS hydrologic studies to trace the flow of young water (0- to 50-year time scale) and to determine the time elapsed since recharge (ground-water age).
- Cooperative Water Program. The Cooperative Program, a partnership between the USGS and State and local agencies, provides information that forms the foundation for many of the Nation's water-resources management and planning activities.
- Drinking Water Programs. The wide range of monitoring, assessment, and research activities conducted by the USGS to help understand and protect the quality of our drinking-water resources is described on these pages. These

studies are often done in collaboration with other Federal, State, Tribal, and local agencies.

- Ground Water Atlas of the United States. The USGS series of print publications "The Ground Water Atlas of the United States" describes the location, the extent, and the geologic and hydrologic characteristics of the important aquifers of the Nation.
- Hydrologic Instrumentation Facility (HIF). Supports USGS hydrologic data-collection activities through the identification of needs, development of technical specifications, design or development of specialized interfaces, contracts and procurements, testing and evaluation, specialized field applications, repair and calibration, quality control and assurance, and storage and distribution of hydrologic instrumentation.
- National Irrigation Water Quality Program. A Department of Interior program to identify and address irrigation-induced water quality and contamination problems related to Department of Interior water projects in the west.
- National Water Quality Laboratory. Fulfills analytical requirements of the USGS by analyzing environmental samples for inorganic, organic, and radiochemical constituents.
- National Water Summary. A series of publications designed to increase public understanding of the nature, geographic distribution, magnitude, and trends of the Nation's water resources. It often is referred to as the USGS "encyclopedia of water."
- National Water-Use Program. A program examining the withdrawal, use, and return flow of water on local, state, and national levels.
- Water Information Coordination Program (WICP). Purposes of the program are to ensure the availability of water information required for effective decision-making for natural resources management and environmental protection and to do it cost effectively.

U.S. Department of Agriculture

National Resource Conservation Service

The NRCS is a branch of the U. S. Department of Agriculture and has a headquarters in each state. In Alabama, the NRCS headquarters is located in Auburn. The function of NRCS at the local level is to provide technical leadership, delivery of special programs, and overall leadership of each office. Federal cost sharing typically flows through a sister agency called the Farm Services Agency, but any payments to landowners is contingent upon certification by NRCS that practices for which payments are made meet NRCS standards and specifications. The NRCS provides a District Conservationist (DC) to nearly all of the State's 67 SWCDs in Alabama and in most cases also provides at least one technician. The DC and technician work under the direction of a local, five-member District Board of Supervisors, each of whom is a local landowner.

National Forest Service - Bankhead National Forest

The Alabama National Forest was established in 1914 as a result of the Weeks Act, the primary purpose of which was to protect the nation's watersheds and stream courses. During the 1930's, with the help of Civilian Conservation Corp labor, the Forest was replanted to establish a healthy forest cover on previously abandoned cutover lands. This helped to limit chronic erosion, reestablish productive soils, and maintain the forest habitat and riparian corridor. The administrative boundary of the Bankhead Ranger District incorporates the headwaters of the Sipsey Fork- a tributary of the Black Warrior River. Seven 5th level Black Warrior Basin watersheds have land under Forest Service ownership within the administrative boundary. Forest cover is the predominate land use with agriculture the second most common.

Currently, erosion and sedimentation concerns still exist in public sentiment as an issue for the Bankhead National Forest. However, the Forest Service emphasizes the use of strict science based practices (BMP's and Forest Standards) for minimizing such effects that could result from management practices. The NF of Alabama will issue a Soil and Water Standard and Guidelines Monitoring Plan to supervise the compliance and effectiveness of these standards. The National Forest of Alabama has established three basic goals to protect the water resources within its administrative boundary:

- Watersheds will be managed and/or restored to provide resilient and stable conditions to support the quality and quantity of water necessary to protect ecological functions and support intended beneficial uses.
- Maintain or improve water quality to meet State and Federal standards and to provide for the beneficial uses of water.
- Riparian ecosystems, wetlands, and aquatic systems will be managed and/or restored to protect and maintain soil, water, vegetation, fish and wildlife associated resource values.

These goals will be accomplished by using such practices as entering into partnerships with private landowners to address impairment issues, conduct assessments of watershed status, coordinate NPS assessments with ADEM, establish and maintain baseline water monitoring stations for distinct physiographic areas. Additional standards that will be used to minimize impacts to the watershed include the following:

- Implementation of State BMP standards are expected to be minimum protection measures, these will often be over ridden with Forest standards that exceed State BMP.
- Soil disturbing activities will not take place on water-saturated soils.
- Water control structures will be constructed within specified time frames for all temporary roads and skid trails.

The June 2003 USDA-Forest Service *Draft of Environmental Impact Statement: Forest Health and Restoration Project*, addresses forest health and environmental impacts of proposed management activities within eleven 5th level watersheds. Of these watersheds, seven are within the Black Warrior River Basin: Upper Sipsey Fork, Upper Brushy Creek, Upper Rock Creek, Lower Brushy Creek, Lower Sipsey Fork, Clear Creek, and Lewis Smith Lake. Impacts addressed include: silvicultural practices, temporary roads, drum chopping, site preparation and/or prescribed burns, and hand or mechanical planting.

USDA Rural Development

Rural Utilities Service

The USDA-Rural Development Rural Utilities Service (RUS) makes low interest loans combined with grants to public bodies or non profit organizations to provide water and sewer service to citizens in rural areas improving the quality of life and promoting economic development in rural America. Rural is defined as an incorporated town with a population of 10,000 or less or non-urbanized areas that are unincorporated. The program is administered by field offices of the USDA's Rural Development mission area.

The public body or non profit organization must be legally incorporated and will be required to provide evidence that they have the ability to operate the system once it is constructed. An environmental assessment is required as part of the application package and is prepared by an engineer who is selected by the applicant. This engineer also designs the project and the engineering report that is prepared is the basis for the project.

The following programs, affecting water and water quality, are a part of the RUS Water and Waste Water Disposal Program:

- Water and Waste Disposal Direct and Guaranteed Loans. Direct loans may be made to develop water and wastewater systems, including solid waste disposal and storm drainage, in rural areas and to cities and towns with a population of 10,000 or less. Priority is given to public entities, in areas with less than 5,500 residents, to restore deteriorating water supplies, or improve, enlarge, or modify a water facility or an inadequate water facility. Also, preference is given to requests which involve the merging of small facilities and those serving low-income communities. Applicants must be unable to obtain funds from other sources at reasonable rates and terms.

- Water and Waste Disposal Grants. The purpose of the Water and Waste Disposal Grant is to reduce water and waste disposal costs to a reasonable level for users of the system.

- Technical Assistance and Training Grants. The RUS makes grants to nonprofit organizations to provide technical assistance and/or training to associations located in rural areas and to cities and towns with a population of 10,000 or less. Assistance may be provided to identify and evaluate solutions to water and waste disposal problems, to improve the operation and maintenance of existing water and waste disposal facilities, and to assist associations in preparing applications for water and waste disposal facilities.

Figure 53:

USDA RURAL DEVELOPMENT RURAL UTILITIES SERVICE PROJECTS WITHIN THE BLACK WARRIOR RIVER WATERSHED (5 years)

Town of Berry	Water Service	
Town of Akron	Water Service	Sewer
Town of Moundville	Water Service	
City of Cordova	Water Service	
City of Oakmon	Water Service	
Double Springs	Water Service	Sewer
Town of Arley	Water Service	

B. STATE INITIATIVES

Alabama Department of Environmental Management

Office of Education & Outreach

In 1996, ADEM created the Office of Education & Outreach and combined a number of non-regulatory functions. Through the Office of Education & Outreach, ADEM provides speakers for civic clubs, professional groups or other organizations and educational materials for the general public, businesses, teachers and students.

ADEM's Pollution Prevention Unit

ADEM's Pollution Prevention Unit provides assistance on recycling and pollution prevention and facilitates the Waste Reduction & Technology Transfer program. The Nonpoint Source Unit provides assistance on controlling nonpoint source pollution to the agricultural, silviculture, construction, mining and urban communities through education and funding for demonstration projects.

Alabama Nonpoint Source Management Program

The Alabama Nonpoint Source Management Program promotes a cooperative partnership between federal and state agencies, environmentalists, academia, and citizen volunteers to implement voluntary management measures. These partnerships resolve nonpoint source problems affecting Alabama as for example has been demonstrated in the development and implementation of the AFO/CAFO Rule-by-Registration. Federal (USDA) and state cost-share (ARCP) programs provide assistance to landowners for practices that reduce erosion and sedimentation, improve water quality, and enhance wetlands and wildlife habitats. Educational outreach, technology transfer and technical assistance are provided by academia (land-grant universities), NRCS, ASWCC, RC&Ds, ACES, TVA, District Conservationists and ADEM. The Alabama Erosion Control Task Force Citizen (AECTF) addresses erosion and sedimentation through the development of an Erosion Control Guidance Manual, and the Alabama Septage Task Force addresses failing septage and alternative systems through demonstrations and state septage disposal rules and installer certification requirements. Citizen volunteers provide water quality data through Alabama Water Watch and environmental and conservation organizations such as LEAF, Wildlaw, AWWA Citizen Advisory Committee, Alabama Environmental Council, Alabama Rivers Alliance, Alabama League of Environmental Action Voters, Black Warrior River Keeper, and Sierra Club report and inquire about environmental threats and problems.

Brownfields Assessment and Remediation Program

The Environmental Assessment Section of ADEM's Land Division is involved in many aspects of brownfields assessment and remediation across the state. ADEM has been involved in each of the six Brownfield Pilot Projects in the state that were competitively awarded funding by the Environmental Protection Agency. These Pilot projects include Anniston, Montgomery, North Birmingham, Prichard, Selma, and Uniontown. These assessments provide necessary information to these communities so that these properties may potentially be redeveloped.

ADEM also has considerable experience in the assessment of "targeted" brownfield sites. A Targeted Brownfield Assessment (TBA) differs somewhat from the Pilot Brownfield Assessment in that the Department receives funding to conduct assessments directly from EPA, whereas piloted funds are awarded directly to communities or municipalities. Targeted assessments have been conducted in Sylacauga, Tallassee, Birmingham, Alabaster, Triana, Ridgeville, Prichard, Huntsville, and Tarrant. Other sites for targeted assessments are currently in the planning phase.

With the passage of the Small Business Liability Relief and Brownfields Revitalization Act, more commonly known as the Brownfields law, funds were made available to the Environmental Protection Agency for competitive grant awards for assessments, cleanups of Brownfield sites, and Revolving Loan grants. These grants are available to communities and other local entities.

In June, 2003, EPA awarded over $73 million dollars to communities, states, and tribes nationwide. This competitive grant process will also be conducted this fiscal year, with applications due some time in the fall. In addition, Section 128 (a) of this law required additional funds to be made available to only states and tribes for the establishment and enhancement of State brownfield programs, including brownfield inventory, public record, and assessment activities. This year, the State of Alabama was awarded $1 million dollars to meet these goals. ADEM will be working closely with many local and state groups to achieve these goals.

Alabama Clean Water and Drinking Water State Revolving Fund Programs

The Clean Water State Revolving Fund (CWSRF) and the Drinking Water State

Revolving Fund (DWSRF) are low interest loans intended to finance public infrastructure improvements in Alabama. The programs are funded in part with the proceeds of tax-exempt bonds issued by the Alabama Water Pollution Control Authority and the Alabama Drinking Water Authority. Both authorities are composed of the Governor, the Lieutenant Governor, Speaker of the House, Finance Director, and the Director of the Alabama Department of Environmental Management (ADEM.) ADEM administers the CWSRF and DWSRF, performs the required technical and environmental reviews of projects, and disburses funds to recipients.

Projects that strengthen compliance with Federal and State regulations and/or enhance protection of public health are eligible for consideration to receive a SRF loan. If a project qualifies, the engineering, inspection, and construction costs are eligible for reimbursement. Drinking water projects that are primarily intended for future growth are not eligible. See Figure 54 for a list of drinking water and clean water state revolving fund projects located within the Black Warrior River Basin. Among the projects which qualify for funding are:

- Publicly owned water or wastewater treatment facilities
- Sewer rehabilitation
- Interceptors, collectors, and pumping stations
- Drinking water storage facilities
- New/rehabilitated water source wells
- Water transmission/distribution mains

Drinking Water Branch

The Safe Drinking Water Act (SDWA) *(See Section 8: Existing Programs and Mechanisms - Safe Water Drinking Act)* Amendments of 1996 include a provision requiring states to provide an annual report on public water system violations of national drinking water regulations to EPA, and to make a copy of the report available to the public. The 2000 report includes violation data covering January - December 2000.

EPA established the Public Water System Supervision (PWSS) Program under the authority of the 1974 Safe Drinking Water Act (SDWA). Under the SDWA and the 1986 Amendments, EPA set national limits on contaminant levels to ensure safe

Figure 54:

ALABAMA DRINKING WATER STATE REVOLVING FUND PROJECTS WITHIN THE BLACK WARRIOR RIVER WATERSHED

1998	Moundville Water Treatment Facility
	Cullman Water Treatment Plant Expansion
	Northport Water Treatment Plant Expansion
1999	Peterson Water System Storage Tank and Main
	Northport Water Treatment Plan Expansion (Supplemental)
2000	Sumiton Water System Improvements 2000
	Carroll's Creek 1.0MG Storage Tank
2001	Cullman Center Hill Waterline Phase II and I
2002	Birmingham System Improvements

Source: http://www.adem.state.al.us/WaterDivision/SRF/Forms-Reports/dwrpt02.pdf. Alabama Drinking Water State Revolving Fund Program Fiscal Year 2002 Annual Report

ALABAMA CLEAN WATER STATE REVOLVING FUND PROJECTS WITHIN THE BLACK WARRIOR RIVER WATERSHED

1998	Cullman Waste Water Treatment Plant Upgrade (Phase I)
1999	Cullman Waste Water Treatment Plant Upgrade Phase I (Supplemental)
	Northport Snow Creek Sewer Rehabilitation (Supplemental)
2000	None
2001	Parrish Lift Station Improvements
	Cullman Waste Water Treatment Plant (Supplemental)
2002	Cullman Mann Road Pump Station and Sewer Project
	Sumiton Sewage System Improvements
	Tuscaloosa Sewer Improvements

Source: http://www.adem.state.al.us/WaterDivision/SRF/Forms-Reports/cwrpt02.pdf Alabama Clean Water State Revolving Fund Program Fiscal Year 2002 Annual Report drinking water. These limits are defined as Maximum Contaminant Levels or MCLs. Instead of an MCL for some contaminants, treatment techniques are established to control these levels in drinking water.

A public water system is required to monitor and verify that contaminant levels in the water do not exceed the MCLs. If a system fails to have the water tested as required, a monitoring violation occurs. A monitoring violation also includes failing to report test results correctly or using a laboratory to perform the water analysis that is not certified. Water systems must monitor for contaminants and report results on a timetable established by EPA and ADEM. Generally, the larger the population served by a water system, the more frequent the monitoring requirements.

ADEM requires water systems to notify customers by newspaper, public posting or direct mail when MCLs are exceeded or monitoring is not conducted properly. The 1996 Amendments require public notification to include a clear and understandable explanation of the nature of the violation, potential adverse health effects, steps taken by the water system to correct the violation, and possible availability of alternative water sources for use during the violation. In addition, EPA and ADEM require water systems to monitor for unregulated contaminants to provide data as a basis for future regulatory development.

All water systems are required to monitor for various contaminants. Community and non-transient non-community water systems are required to monitor at various frequencies for volatile organic chemicals, synthetic organic chemicals, and bacteriological, inorganic, and radiological contaminants. More than 80 contaminants are regulated. These samples must be analyzed at laboratories that are certified by ADEM. The frequency of monitoring for chemical contaminants is dependent on the type of contaminant and the level at which it has been detected. Bacteriological monitoring is required monthly with the number of samples dependent on the population served. Chemical monitoring can be very expensive costing as much as $6,000 dollars per year for each sampling point. Transient non-community water systems are required to monitor monthly for bacteriological contaminants and annually for nitrates.

ADEM must submit violation data to EPA on a quarterly basis. This data includes

PWS inventory information, enforcement actions taken against violators, exceedance of maximum contaminant levels, monitoring, and treatment technique violations. The annual compliance report that states are required to submit to EPA will provide the total number of violations for four categories. The four categories are MCL violations, treatment technique violations, variances and exemptions, and significant monitoring violations.

Figure 55

FY 2000 PUBLIC WATER SYSTEM VIOLATIONS IN THE BLACK WARRIOR RIVER WATERSHED

System	County	Contaminant	Violation Type
Green County Steam Plant	Green	Nitrate	Major Routine Monitoring Violation
Green County Water Authority	Green	Lead and Copper	Major Routine Monitoring Violation
Mt Hebron-Clinton	Green	Total Coliform	Non-Acute MCL Violation
Norfolk-Southern Railroad	Jefferson	Total Coliform	Major Routine Monitoring Violation
Warrior River Water Authority	Jefferson	Di(2-ethylhexyl) adipate	Major Routine Monitoring Violation
Manasco's Restaurant	Tuscaloosa	Total Coliform	Major Routine Monitoring Violation
Manasco's Restaurant	Tuscaloosa	Total Coliform	Major Routine Monitoring Violation
Curry Water Authority	Walker	Total Coliform	Non-Acute MCL Violation
Providence Water Authority	Walker	Total Coliform	Non-Acute MCL Violation
Natural Bridge of Alabama	Winston	Nitrate	Major Routine Monitoring Violation

Source: Alabama Department of Environmental Management Drinking Water Branch 2000 Annual Report. Public Water Systems Violations. http://www.adem.state.al.us/WaterDivision Drinking/DrinkOth/2000VioRep.htm . Accessed March 12, 2003.

Wellhead Protection Areas Within the Black Warrior River Watershed

The American Water Works Association has instituted a Wellhead Protection Award Program to recognize public water supply systems that have implemented exemplary wellhead protection programs. Up to three systems per state are eligible for the annual award, and they may be self-nominated by an AWWA member, ADEM, EPA, or members of the National Rural Water Association.

Figure 56:

WELLHEAD PROTECTION AREAS WITHIN THE BLACK WARRIOR RIVER WATERSHED

PWS ID	Public Water Supply System	Service Connect.	No. Customers	County	WHPA # Wells
98	Allgood	789	2367	Blount	1
	Blount County			Blount	1
100	Blountsville	1200	3600	Blount	2
101	Cleveland	2565	7695	Blount	2
122	Nectar	1872	5616	Blount	
103	Oneonta	3644	10932	Blount	3
108	Snead	1070	3210	Blount	1
636	Eutaw	1356	4068	Green	5
1428	Forkland	417	1251	Green	
638	Green County Housing Authority FY 2000	200	600	Green	1
645	Greensboro	1349	4047	Hale	3
1509	Hale County	2700	8100	Hale	1
651	Moundville	972	2916	Hale	2
760	Roupes Valley	2800	8400	Jefferson	4
1299	Coker	1220	3660	Tuscaloosa	2

Source: http://www.adem.state.al.us/WaterDivision/Drinking/DrinkOth/status.xls
Updated 5/23/02

Alabama Water Pollution Control Authority

The Alabama Water Pollution Control Authority, created by legislative act, provides aid to public bodies such as counties, cities, and state agencies in financing wastewater treatment facilities. The Authority established a revolving loan fund that provides low-interest loans to cities in need of new or improved sewage treatment systems.

Alabama Department of Industrial Relations

Mining and Reclamation Division

Coal operators are required to reclaim their sites when mining is completed. But it has not always been this way. Prior to passage of the federal Surface Mining Control and Reclamation Act of 1977, which set detailed mining and reclamation standards for coal operators, many mines were simply abandoned, leaving behind thousands of acres of scarred and useless land harboring public safety hazards and environmental problems. Fortunately, the Act also established a reclamation fund to finance restoration of land that had been mined and abandoned prior to 1977 and, consequently, had no responsibility for reclamation associated with it. [1]

Administered in Alabama by the Department of Industrial Relations, the Abandoned Mine Land (AML) Reclamation Program is funded through fees paid to the federal government by today's coal operators at a rate of 35 cents per ton (surface mining) and 15 cents per ton (underground mining). That money is returned to the State, in the form of federal grants from the U.S. Department of the Interior, Office of Surface Mining, to correct problems at old mines such as improperly filled shafts, dilapidated mine buildings and equipment, toxic mine refuse, acid mine drainage, landslides, mine fires, highwalls, gas leaks and subsidence.[8]

Lands that have been mined or affected by mining processes are eligible for treatment under the AML Program if they have been left in an inadequate reclamation status and they were mined prior to August 3, 1977; or meet certain criteria when mined after that date. Some of the above problems can occur suddenly and may be life-threatening. In those instances, the Department of Industrial Relations AML Emergency Program is capable of responding within 24 hours. [8]

The law requires that sites be reclaimed in a specific sequence. Preference is given to projects which are for the protection of public health, safety, general welfare and property from extreme danger resulting from past mining practices. Second priority is for projects which protect public health, safety, general welfare and property from extreme danger resulting from past mining practices. Third priority is for projects which are designed to restore environmental values and conserve soil, water, woodland, fish and wildlife, and agricultural productivity. [8]

The majority of the reclamation work is done by independent contractors under contract with ADIR in accordance with the State Competitive Bid Law. The Department also maintains a cooperative agreement with Walker County Soil & Water Conservation District to perform various types of reclamation services, including emergency work. [8]

Sedimentation from erosion and decrease pH are two common problems associated with abandoned mine lands. Reclamation projects attempt to remediate these problems. Oftentimes, reclamation is successful at controlling erosion. However, pH issues are difficult and expensive to remediate. Statewide, there is estimated $361,631,959 of environmental restoration projects yet to be reclaimed. The majority of these projects are within the Black Warrior River Watershed. Each year, priority projects are identified for funding. However, from the estimate shown above, the needs far outweigh available funding.

Alabama Department of Economic and Community Affairs

Office of Water Resources

The Office of Water Resources administers programs for river basin management, river assessment, water supply assistance, water conservation, and water resources development. Further, OWR serves as the State liaison with federal agencies on major water resources related projects and conducts any special studies on instream flow needs as well as administering environmental education and outreach programs to increase awareness of Alabama's water resources.

Science Technology and Energy Division - Project R.O.S.E.

University of Alabama Research Professor Gary C. April founded Project R.O.S.E. (Recycled Oil Saves Energy) in 1977, a non-profit energy conservation program. The Alabama Department of Economic and Community Affairs Science Technology and Energy Division provides program funding. Project R.O.S.E. strives to conserve energy and preserve a valuable natural resource while protecting Alabama's environment. To accomplish its purposes, the program conducts continuous public education projects, helps establish community oil collection/recycling systems, and coordinates used oil collection and recycling statewide. Project R.O.S.E. focuses on the do-it-yourselfers (DIY) oil changer's relationship to used oil pollution prevention.

The Project R.O.S.E. network collects 8 million gallons of used oil annually. More than 500 service stations, auto part stores, car dealerships, and quick lube facilities throughout Alabama voluntarily serve as collection sites, offering DIYs a responsible alternative to improper oil disposal practices (i.e., dumping in backyards, sewers or storm drains).

In addition to its collection site program, Project R.O.S.E. serves rural municipalities (areas without suitable collection sites) with 55-gallon drum placement/ collection methods and establishes curbside used oil collection programs in metropolitan areas. During the program's history, these various collection methods have saved some one-half billion gallons of oil from polluting Alabama's soil and waterways. The program has also expanded its scope, adapting used oil collection and recycling systems to on-site corporate and marine management applications.

Marina R.O.S.E. evolved as an on-site measure to control the discharge of boat motor oil around recreational waterways (improperly maintained engines and irresponsible owner behavior remain at the core of its pollution problem). Collection sites, typically established at marinas and vessel service facilities, encourage proper boat motor upkeep and remind owners of their water management responsibilities.

Project R.O.S.E's comprehensive approach to used oil recycling has received national recognition. The United States Environmental Protection Agency based its "How to Set Up A Local Program to Recycle Used Oil" booklet on the Project R.O.S.E. model, calling the program "one of the country's most successful organized promoters." *See Appendix F for a list of Used Oil Collection Sites Within the Black Warrior River Basin.*

C. LOCAL INITIATIVES

Soil & Water Conservation Districts

The local Soil and Water Conservation Districts, which are entities of State government, and the Natural Resources Conservation Service (NRCS), a Federal agency, have been "joined at the hip" since 1937. In that year, Congress established the Soil Conservation Service (SCS) and mandated that this new agency would work directly with local Soil Conservation Districts to protect the resource base on farms and ranches throughout the Nation. The old SCS has since become the Natural Resources Conservation Service (NRCS) and most Soil Conservation Districts have included "water" in their names.

The NRCS is a branch of the U. S. Department of Agriculture and has a headquarters in each state. In Alabama, the NRCS headquarters is located in

Auburn. The function of NRCS at the local level is to provide technical leadership, delivery of special programs, and overall leadership of each office. Federal cost sharing typically flows through a sister agency called the Farm Services Agency, but any payments to landowners is contingent upon certification by NRCS that practices for which payments are made meet NRCS standards and specifications. The NRCS provides a District Conservationist (DC) to nearly all of the State's 67 SWCDs in Alabama and in most cases also provides at least one technician. The DC and technician work under the direction of a local, five-member District Board of Supervisors, each of whom is a local landowner.

The Soil & Water Conservation District Board provides direction for local programs and ensures that the District staff fulfill its primary mission of working with landowners to install Best Management Practices (BMPs) to control erosion, protect water quality, and provide other measures necessary to enhance and protect the environment. Both the DC and technician may also gather data to assess resource needs, provide educational programs, conduct tours, and develop other activities in support of the overall resource conservation effort. Each SWCD also has a District Administrative Coordinator (DAC) who is a local (non-Federal, non-state) worker who provides administrative support for the office. In many cases, the DAC takes a lead role in organizing meetings, providing educational programs to schools, and providing special assistance to the DC and the Board.

The State Soil and Water Conservation Committee (SWCC) is the "mother organization" for the 67 SWCDs and is responsible for providing overall administrative leadership to the Districts. The SWCC consists of six District Board members selected from six administrative areas of the state plus representatives from Auburn University's Agricultural Experiment Station, Alabama Cooperative Extension System, and Alabama Business Education. The SWCC meets quarterly while routine day-to-day operations are run by an Executive Director and staff of four. A contract employee handles the grants program and activities related to CAFO registration. The SWCC is responsible for administering the state cost share program, which, in the year 2001, provided more than $2 million to local SWCDs. In addition, the SWCC administers a number of EPA and ADEM grants to Districts, which totaled more than $1 million in 2001.

Additionally, the Soil & Water Conservation districts are responsible for conducting a statewide nonpoint source watershed assessment in cooperation with the NRCS. The last State Nonpoint Source Watershed Assessment was conducted in 1997 and is updated every five years. The next update is scheduled for 2003. *Also see Section X: Current Research and Future Research Needs.*

Figure 57:

Soil & Water Conservation Districts Within the Black Warrior River Basin

Blount County
415 5th Ave., Oneonta, AL 35121-1435
Telephone: 205/274-2363, Ext. 3
Fax: 205/274-2360

Cullman County
PO Box 456, Cullman, AL 35056-0456
Telephone: 256/734-6761 734-6471, Ext. 3
Fax: 256/734-1431

Fayette County
PO Box 307, Fayette, AL 35555-0307
Telephone: 205/932-5993, Ext. 3
Fax: 205/932-4312

Greene County
PO Box 406, Eutaw, AL 35462
Telephone: 205/372-4910 or 372-3271, Ext. 3
Fax: 205/372-0684

Hale County
PO Box 98, Greensboro, AL 36744-0098
Telephone: 334/624-3265 , Ext. 3
Fax: 334/624-8419

Jefferson County
Shelby Bldg., Suite 320, 600 Vestavia Pkwy
Birmingham, AL 35216-3771
Telephone: 205/823-6400
Fax: 205/290-7450

Tuscaloosa County
3831 Palisades Dr. #A,
Tuscaloosa, AL 35405-3426
Telephone: 205/553-1733, Ext. 3
Fax: 205/553-1729

Walker County
Federal Bldg., Room 207, 1710 Alabama Ave.
Jasper, AL 35501-5400
Telephone: 205/384-0606 or 387-1879
Fax: 205/302-0779

Winston County
PO Box 266, Double Springs, AL 35553-0266
Telephone: 205/489-5227
Fax: 205/489-5227

<u>Educational Programs Provided by Soil & Water Conservation Districts.</u> Local Soil & Water Conservation Districts provide a wide variety of educational programs and outreach material. A partial list of educational programs for schools are shown below:

- FAWN (Forestry Awareness Week Now) - Targets 6th grade. Coordinated by the local Forestry Planning Committee in which the SWCD plays the leading role. Involves a "day in the woods" for very comprehensive training in forestry and related disciplines, including water quality.

- Tracks - Targets grades 1-4). An in-classroom program that features animal identification and habitat issues, including forestry.

- Water Festivals - Targets 4th grade. A new program originated by ADEM that involves a field trip to a local college campus for training in water quality in a fun and interactive environment. Goals are for every county in Alabama to hold a yearly event.

- Enviroscape Model - Targets grades 5-6. The enviroscape model uses a large landscape model to teach about point and non-point source pollution.

- Life in a Fishbowl - Targets Headstart to 2nd or 3rd grade. It uses a goldfish bowl with a plastic fish to dramatize the effects of point and non-point source pollution from a fish's point of view.

Cullman County Soil & Water Conservation District

Duck River Watershed Project. The Duck River Watershed Project began in November 1999 and is scheduled as a five-year project. The goal of this project is to achieve and maintain beneficial uses of water, maintain water quality standards, and facilitate removal of Duck River from the 303(d) list. [10] *See Section 6: Total Maximum Daily Loads and Tier 1 Waterbodies for a discussion on the 303(d) list and Appendix E for a list of TMDL's.*

The Duck River Clean Water Action Plan Project provides resources to address significant impacts to water quality from agriculture including sediment, nutrients from fertilizers, animal waste, and pesticide runoff. The project has been advertised in local newspapers and printed flyers have been posted throughout the county in local convenience stores, farm supply stores, and other places frequented by land-users within the watershed. The project coordinator has met with over 60 land users (2001) in the watershed to discuss the project and has contacted most of the poultry farmers to inform them of the requirements of the AFO/CAFO rules, and has begun work on 15 waste management plans. [10]

As of March 2001, approximately 50 land-users have applied for cost-share assistance to implement BMPs in the watershed. Applications have been received for waste storage structures, dead bird composters, incinerators, conversion from cropland to grassland, nearly 10,000 feet of riparian zone fencing with alternative water sources, drystacks, and an application for closure of a liquid waste storage facility. [10]

A sand litter project is also being conducted within the Duck River Watershed. The effects of sand as an alternative to sawdust bedding is currently being monitored since this would result in a major reduction in the total volume of nutrients being applied to the land. The preliminary results show that there is less ammonia, dust, and darkling beetles and is more efficient. [10]

<u>Forestry Awareness Week Now.</u> The Cullman County Soil & Water Conservation District, in cooperation with the Forestry Planning Commission, coordinates this education program to benefit students of the Cullman County School System. This program teaches students about water quality, forestry practices, and our dependence on lumber products in everyday life. [10]

<u>Eightmile Watershed Project.</u> The Eightmile Creek Watershed Project began in 2001 with a goal to achieve and maintain beneficial uses of water, maintain water quality standards, and facilitate removal of Eightmile Creek from the 303(d) list. *See Section 6: Total Maximum Daily Loads for a discussion on the 303(d) list.* This project will provide resources to implement needed best management practices to protect or improve water quality. Examples of BMPs to be implemented include rotational grazing, livestock exclusion, and the development and implementation of a nutrient management plan for poultry producers. [10]

Approximately 20 landowners (2001) have submitted applications for the BMP implementation and technical assistance cost-share program. The majority of landowners need assistance in the management of poultry litter. Additional requests were made for dry stack facilities, watering troughs and fences. [10]

Cost-share funds will also assist with a chemical rinse facility to be located on the Horticultural Experiment Station. This demonstration site will provide a place where local fruit and vegetable growers can learn of the importance of properly rinsing and disposing of empty chemical containers that contained herbicides and pesticides. [10]

- Water Quality Monitoring. Cullman S&WCD provides the use of Lamotte water monitoring kits to certified Alabama Water Watch monitors in Cullman County.
- FAWN (Forestry Awareness Week Now). *See Educational Programs Provided by Soil & Water Conservation Districts.* The Cullman S&WCD organizes yearly FAWN programs supporting approximately 1,200 students.
- Tracks. *See Educational Programs Provided by Soil & Water Conservation Districts.* The Cullman S&WCD visits 20-25 classrooms yearly supporting approximately 800 students.
- Water Festivals. *See Educational Programs Provided by Soil & Water Conservation Districts.* Water festivals have been held in Blount and Cullman counties. Jefferson County S&WCD is planning a festival for Fall of 2003.

Alabama Conservation Partnership

The Alabama Conservation Partnership is made up of the Alabama Association of Conservation Districts, Alabama Soil & Water Conservation Committee, Alabama Association of Resource Conservation & Development Councils, and the USDA-Natural Resources Conservation Service. Their mission is to provide service, leadership, and assistance to all citizens for the wise use, conservation, and development of Alabama's natural resources. Goals of the Partnership directly relating to water quality are as follows:

Improve the quality of water for the maximum benefit of all Alabamians by:

- Assisting poultry and livestock producers in the planning and installation of waste management systems and nutrient management plans
- Provide financial assistance to livestock producers through Alabama Agricultural Conservation Development Commission Program
- Environmental Quality Incentive Programs (EQIP), Section 319, and other programs
- Stress water quality in the conservation planning process
- Stress utilization of animal waste as a method of recycling nutrients and reducing production costs
- Inform the public about costs associated with clean water
- Promote the establishment of riparian forest buffers to protect streams and aquatic wildlife resources

- Promote the development of alternative water supplies to reduce impact of livestock standing in streams or ponds

Manage water supplies to enhance recreation, navigation, and irrigation, and to promote economic development by:

- Assisting landowners in developing farm ponds and lakes for water conservation
- Inform the public about the importance of water conservation
- Develop and support new water conservation technologies
- Promote the use of Alabama's rivers, lakes, and streams to provide recreation to all citizens

Minimize flood damage to agricultural and urban land by:

- Promote non-structural flood control procedures
- Continue implementing structural measures in small watershed projects
- Assist municipalities in floodplain management studies
- Promote the flood risk reduction program and encourage participation in The National Flood Insurance Program (NFIP)
- Promote the repair and rehabilitation of existing watershed structures, and seek federal appropriations for same
- Promote the revival of PL566, with appropriate funding, as the best holistic approach to meeting watershed needs
    - The Watershed Protection and Flood Prevention Act of 1954, Public Law 86-566 (Small Watershed Program) authorizes the Secretary of Agriculture to provide technical and financial assistance to local sponsors for planning and carrying out project actions on watershed less than 250,000 acres. The purposes for PL-566 include flood protection of agricultural lands and rural infrastructure, watershed land treatment, water quality, and agricultural water management. NRCS in cooperation with local Conservation Districts, individual landowners, and others, have installed many structures for flood control and has improved millions of acres of agricultural land.

Alabama Cooperative Extension System

In 1862, Congress passed a law granting land to each state for "agricultural and mechanical" institutions of higher learning. In 1890, Congress granted land to institutions educating Black citizens. In the late 1800s, the school that is now Tuskegee University began using a mule-drawn wagon as a "school on wheels" to teach rural people better ways to grow crops and feed their families.

The land-grant mission and teaching outside the classroom gave rise in 1914 to the national Cooperative Extension Service, whose mission was to "take the university to the people." Alabama is the first state to combine the Extension programs at its 1862 and 1890 land-grant universities. In 1995, the Alabama Cooperative Extension System was formally created, including Alabama A&M University and Auburn University, with Tuskegee University cooperating.

Over the years, Extension's knowledge base and capacity have expanded through partnerships with hundreds of organizations-all the way from local to international groups. Through the work of more than 500 Extension agents and other field-based staff, in addition to specialists in many facets of our six program areas, the Alabama Cooperative Extension System is bringing the research and knowledge of the land-grant universities and the Alabama Agricultural Experiment Station, and the expertise of our many partners, to the people. More information about the Alabama Cooperative Extension System and their programs is available on their website at www.aces.edu. Major components of the Alabama Cooperative Extension System include:

- Agriculture. Today there are roughly 45,000 farms in Alabama. Extension helps Alabama's farmers create and maintain healthy, profitable, and environmentally sustainable operations. Regional Research and Extension Centers in the Tennessee Valley, the Black Belt, the Wiregrass, the Gulf Coast, Sand Mountain, and Chilton area address the specific needs of each region. Home gardening and urban horticulture are also major Extension priorities.

- Forestry and Natural Resources. Alabama is rich in natural resources. Almost two-thirds of the state is covered in forests, and our water resources are the envy of the nation. Forestry, fisheries, and wildlife bring billions of dollars into the state's economy and greatly enhance quality of life. Extension is committed to helping people safeguard and develop these resources.

- Urban and Nontraditional Programs. Two-thirds of Alabamians live in urban areas, and the Extension mission of taking the university to the people includes them as well as rural citizens. Programs include the urban family network, workforce preparation, domestic violence prevention, teen leadership, health issues, and nontraditional agriculture. Eight urban centers and two satellite offices help bring Extension education to the state's city dwellers.

- Family and Individual Well-Being. One of Extension's key roles is helping families and individuals improve their quality of life through food safety, proper nutrition, parenting, family financial management, and community health. Flagship programs include the Expanded Food and Nutrition Education Program (EFNEP), begun in Alabama more than 30 years ago and since adopted by all other states, and the federally mandated Nutrition Education Program (NEP), which focuses on educating food stamp recipients.

- Community and Economic Development. Extension plays a leading role in revitalizing Alabama communities, especially where declining farm populations have resulted in such problems as dwindling revenue bases and youth flight. Extension programs focus on economic and leadership development, environmental quality and community health, and public policy and strategic planning.

- 4-H and Youth Development. Alabama's 4-H program offers young people opportunities to develop their interests and expand their awareness of our world. Extension educators, volunteers, and the young people themselves work together to provide a wide range of hands-on, minds-on experiences that develop each individual's four H's-head, heart, hands, and health.

Water Quality Programs of the Alabama Extension System include:
- Animal Waste Management
- Alabama Water Quality Curriculum, Grades 4-12
- CSREES Alabama Water Quality Program
- Environmental Education
- Environmental Facts
- Environmental Quality & Community Health Education

- Forestry & Wildlife Sciences Extension Programs
- Integrated Pest Management
- Irrigation/Water Resources
- Urban & Community Forestry Financial Assistance Program

Figure 58:

County Extension Offices

Blount County Extension Office
Blount County Office Building
415 Fifth Avenue East, Suite A
Oneonta, AL 35121
Phone: (205) 274-2129 Fax: (205) 274-7018

Cullman County Extension Office
402 Arnold St., NE
Suite G-1
Cullman County Extension Office Office Building
Cullman, AL 35055
Phone: (256) 737-9386 Fax: (256) 737-9549

Fayette County Extension Office
650 McConnell Loop
Fayette, AL 35555
Phone: (205) 932-8941 Fax: (205) 932-5718

Greene County Extension Office
P.O. Box 228
Eutaw, AL 35462
Phone: (205) 372-3401

Hale County Extension Office
701 Hall St
Greensboro, AL 36744
Phone: (334) 624-8710 Fax: (334) 624-8807

Jefferson County Extension Office
2121 Bldg, 8th Avenue North, Ste 1700
Birmingham, AL 35203-2387
Phone: (205) 325-5342
Fax: (205) 325-5690

Tuscaloosa County Extension Office
Tuscaloosa County Courthouse Annex
2513 7th Street
Tuscaloosa, AL 35401-
Phone: (205) 349-4630
Fax: (205) 752-2349

Walker County Extension Office
1501 North Airport Rd
Jasper, AL 35504
Phone: (205) 221-3392
Fax: (205) 221-6916

Winston County Extension Office
P.O. Box 69
Double Springs, AL 35553
Phone: (205) 489-5376
Fax: (205) 489-3521

Alabama Erosion Control Task Force (AECTF)

The AECTF occasionally offers workshops on erosion and sediment control. Usually, these are offered when there is a request from a local sponsor such as a municipality or a watershed management group. In such cases, the local entity provides the meeting place, advertises the training event, and guarantees a minimum level of participation.

Chamber of Commerce

Chamber of Commerce of West Alabama Challenge 21 Initiative

The Challenge 21 Initiative is a partnership between the Chamber of Commerce, federal and state agencies, local initiatives, and the University of Alabama designed to promote comprehensive planning for a sustainable society. COMPASS (Comprehensive Planning for a Sustainable Society) is a broad-based project to development and implement an environmentally responsible ecologically compatible plan for community improvement in Tuscaloosa County. The project will provide a local planning model, utilizing citizen input, to address concerns of properly managing growth and change so as to achieve a sustainable quality of life throughout the region.

Regional Planning Commissions

Regional planning is provided in large measure, through the Regional Councils through the State. Regional Councils are authorized to undertake comprehensive regional planning and to assist counties and local governments in their planning. Regional Councils have no regulatory authority. The influence of the Regional Councils is primarily through consensus building, infrastructure planning and funding, resource allocation, grants and funding, and in assisting local governments when assistance is requested.

- Regional Planning Commission of Greater Birmingham. The Birmingham Regional Planning Commission (BRPC) is an association of local governments within Blount, Chilton, Jefferson, Shelby, St. Clair and Walker Counties. BRPC is now over 30 years old, having been formed in 1963. In 1969, the Alabama Legislature authorized the creation of the Regional Councils and designated RPCGB as such for the Greater Birmingham Area. The region includes the state's largest Metropolitan Statistical Area (MSA) and a total population of around a million people. On February 16, 2000 the Birmingham Regional Planning Commission officially changed its name to the Regional Planning Commission of Greater Birmingham (RPC). [12]

  The Regional Planning Commission of Greater Birmingham is an advisory planning agency. The RPC provides technical assistance and makes recommendations to local governments, which are both its customers and its governing Board. The activities of the RPC benefit the local governments in the Region in several ways. In many instances, the activities of the RPC are prerequisite to the eligibility for Federal project construction funds for local governments. Although not an exclusive benefit to any one government, these certification activities are considered a major responsibility of the RPC. These activities result in substantial benefits to the region and help assure eligibility for public and private funding when member governments need financial assistance for projects such as transportation, economic and community development. Funds contributed by member governments are matched with various Federal and State grants which enable the RPC to undertake the following activities. Many of these services are provided as part of the overall operations of the RPC Staff; others are provided on a contract for fee basis negotiated to benefit RPC member governments. [12]

Jefferson County Department of Environmental Protection

The Jefferson County Department of Environmental Protection develops and administers public education and awareness programs to achieve and maintain federal air quality standards for Jefferson County; pursues cases against illegal dumpers; directs Jefferson County's mosquito abatement program; enforces the state scrap tire law; coordinates the County's Environmental Management System; and administers other environmental quality programs as directed by the County Commission. (Also see Additional Data and Monitoring)

D. INDUSTRY INITIATIVES

ISO Certification

ISO 14000 is similar to ISO 9000 in that both are developed by the International Standards Organization to standardize and promote the development of international manufacturing, trade, and communication standards. The 9000 standard relates to manufacturing where as the 14000 standard relates to the Environment and meeting environmental requirements and regulations.

There are some companies within the Warrior Basin that are either certified to the ISO 9000 or the ISO 14000 standards. Some companies although not certified to the standards are developing Environmental Management Systems patterned after the standard so that they will be in the position to be certified should the occasion arise. At present, certification is market driven and does not require everyone to go through that process. However companies such as Gulf States Paper are developing an

Environmental Management system not only to be prepared for the future certification, but in the mean time reap the following benefits:

- Improve compliance with legislative and regulatory requirements and provide public information
- Reduction in liability/risk
- Show environmental leadership
- Pollution prevention and Waste reduction
- Improve profits
- Improve internal management methods
- Work with shareholder groups
- Community goodwill/ be a good neighbor
- Lower insurance cost
- Attract high quality work force
- Reduce cost of operation through EMS

Associated General Contractors of America-Alabama Branch (AGCA)

In response to Stormwater Phase I and II, the AGCA has developed a workshop for construction contractors to address suitable and efficient installation of BMPs for erosion control. Successful completion of the course allows one to become a Qualified Credentialed Inspection Profession (QCIP). The certification is a result of a joint memorandum of agreement between ADEM and the AGCA. The QCIP becomes qualified to assist an engineer and/or professional, help install the BMP plan, and sign off, verifying the correct installation. A QCIP must inspect the entire worksite and record findings on a monthly basis. They must also inspect the site and BMPs after every rain event that measures ¾" rainfall or more in a 24-hour period of time. The QCIP is able to sign off on every inspection and is responsible for having all corrective maintenance records on site at all times. In addition to informing contractors concerning the new regulations, components of the NEMO program are also used.

Alabama Power

Hydro Relicensing

Alabama Power's hydroelectric projects are operated under licenses issues by the Federal Energy Regulatory Commission (FERC). The operating licenses for the

Warrior River project, which includes the Smith and Bankhead developments will expire in 2007. While 2007 may seem far away, Alabama Power must compete with a multi-year application process and file applications for new operating licenses with FERC by July 31, 2005, in order to continue generating electricity and operating the reservoirs beyond 2007. This process is called "Relicensing." [13] The Relicensing process addresses not only the generation of electricity, but also the natural resources that are present and which may be affected - both positively and negatively - by the projects' operation. FERC is required, by federal law, to consider both power and nonpower issues in Relicensing hydroelectric facilities. [13]

Successfully completing the Relicensing process will involve identifying and resolving project issues to the satisfaction of many different stakeholders who have an interest in the project. Stakeholders include Alabama Power, FERC, federal and state resource agencies, local governments, national and local interest groups, home and boat owners' associations, and individuals. To involve stakeholders in the Relicensing process and to help identify and resolve issues, Alabama Power has developed the Alabama Power Cooperative Approach (APCA). The APCA promotes and facilitates active participation of stakeholders in the relicensing process. [13]

An issue that affects the Black Warrior River Basin as it directly relates to the hydro relicensing process is low dissolved oxygen at Bankhead Dam. This stream segment is listed on the 303(d) impaired list for dissolved oxygen. Alabama Power is currently testing several methods to increase dissolved oxygen for this segment. ADEM has requested that this segment be delisted and the outcome is currently pending.

Flood Control through Reservoir Level Management

Water is managed, and flooding better controlled, at hydro facilities through storage and delayed release of excess water. Alabama Power's reservoirs on the Black Warrior help manage potential flooding. [13]

Shoreline Permitting to Protect Natural Beauty

Alabama Power maintains a Shoreline Permitting Program to protect the natural beauty of shorelines. All shoreline property within the hydroelectric project boundaries has specific uses and is managed accordingly.

Significant portions of the shoreline areas are privately owned but either adjoin or are subject to the company's property rights for flood-prone areas, scenic easements and shoreline buffer strips. The permitting program provides a proactive, ongoing plan for shoreline development by private property owners, commercial developers and local communities. [1] Under the Hydro Relicensing Project, streamside management zones are being studied to protect water quality by providing a buffer for polluted runoff.

Renew our Rivers

Alabama's rivers are cleaner thanks to Alabama Power's award-winning Renew the Coosa river cleanup program. The program began in May 2000, after employees from Alabama Power's Plant Gadsden became concerned about litter in and on the banks of the Coosa River. Expanded this year to include 11 lake cleanups on the Coosa, Tallapoosa and Black Warrior Rivers, Renew Our Rivers is the Southeast's largest organized river-system cleanup and one of the largest of its kind in the nation. [14] Annual cleanups are scheduled in the Black Warrior River Basin on Smith Lake (sponsored by the Smith Lake Environmental Preservation Society) and Bankhead Lake (sponsored by Project R.O.W. - Reclaim Our Waterways, a partnership between federal and local agencies, industries, local businesses and citizens.

Nature's Treatment

Wetlands can provide an environmentally friendly wastewater treatment option. Alabama Power is testing a three-acre, man-made wetlands area at Plant Gorgas to manage water run-off. [14]

Aquatic Habitat Enhancement

In 1992, Alabama Power Company became the first utility in the country to sign a Memorandum of Agreement with the Bass Anglers Sportsman Society (B.A.S.S.). The agreement provides a framework for B.A.S.S. and the company to work together on cooperative projects. Both are working with the Alabama Department of Conservation to implement a habitat enhancement program using discarded Christmas trees. Projects are underway on Weiss, Martin and Smith Reservoirs. [2]

Fish Spawning Support

In the spring, APC (in cooperation with ADCNR personnel) stabilizes Smith Lake levels for a two-week period during the bass spawning season. By reducing water level fluctuations in the Lake during this period, a stable spawning habitat is provided for these fish, and the chances of nest and egg desiccation are reduced. On large reservoirs such as Lewis Smith, stabilization of water levels during spawning season can markedly increase the chances for successful spawn and the subsequent production of a successful year class of fish. This is an important factor to ensure the success and sustainability of the fishery. [15]

Trout Fishery

Downstream of Smith Lake, the ADCNR (in cooperation with the USFWS and APC) stocks rainbow trout seven times a year, making it the only viable cold water fishery in Alabama. APC monitors the water below the tailrace to study where the trout are located. Through the monitoring efforts, APC determined that the trout fishery extends over 12 miles down the river. A quick release, in the form of a sluice pipe, was also installed below the dam to make it easier for the fish to be released into the tailrace. In addition, fish attraction devices were installed to provide refuges for fish released into the tailrace. APC has conducted studies in the tailwater to help obtain information that will assist ADCNR in developing the best management practice for the "put and take" trout fishery in the Smith tailwater. [15]

Animal Nesting Boxes

APC works with the USFS to place nesting boxes along the shoreline of Smith Lake. Waterfowl, song birds, owls and other small animals use the boxes as nesting and roosting sites. [15]

Homebuilders Association of Alabama (HBA)

The HBA offers an erosion control course for its members. Successful completion of the course allows one to become a Qualified Credentialed Inspection Professional (QCIP). The certification is a result of a joint memorandum of agreement between ADEM and the AGCA. The QCIP becomes qualified to assist an engineer and/or professional, help install the BMP plan, and sign off, verifying the correct installation. A QCIP must inspect the entire worksite and record findings on a monthly basis. They must also inspect the site and BMPs after every rain event that measures ¾" rainfall or more in a 24-hour period of time. The QCIP is able to sign off on every inspection and is responsible for having all corrective maintenance records on site at all times. In addition to informing contractors concerning the new regulations, components of the NEMO program are also used.

Sloss Industries

As a part of a wide-ranging plan to improve the water quality of Five Mile Creek, Sloss Industries announced (May 5, 2003) the initiatives outlined below. In total, the land being donated by Sloss is valued at approximately $2.6 million.

- Sloss will donate 326 acres of land along a three-mile section of Five Mile Creek to an approved conservation land trust. This will ensure that the land is maintained in its natural condition.
- The company will facilitate development of a Greenway Master Plan for the creek with the help of local stakeholders. The Master Plan will inventory existing conditions, identify areas for habitat restoration and provide a community-based blueprint for the future of the greenway.
    - The plan also calls for the creation of a Five Mile Creek Stakeholders Greenway Advisory Committee. The committee, which will include property owners and representatives from municipalities, planning organizations and environmental and recreational interest groups, will make recommendations to Sloss about designing the greenway master plan.
- Sloss will plant 25,000 trees along the creek and monitor the trees for four years through the services of a professional forester.
- As part of a consent order, an enforcement action resulting from negotiations by Sloss and ADEM, Sloss has agreed to pay a civil penalty of $675,000 to address past environmental violations.
- Sloss has committed to spend more than $1.5 million to improve the treatment of its wastewater. [16]

Wal-Mart Stores, Inc.

The case of Wal-Mart vs. EPA was the first federal government enforcement action taken against a national company for multi-state violations of stormwater management requirements. The settlement, announced June 7, 2001, resolves Wal-Mart Stores Inc. and 10 of the store's contractors of violations of storm water requirements under the Clean Water Act's National Pollutant Discharge Elimination System (NPDES). The alleged violations occurred at 17 Wal-Mart Stores construction sites in Texas, New Mexico, Oklahoma, and Massachusetts. The settlement commits Wal-Mart to a comprehensive environmental management plan to increase compliance at each of the store's construction sites nationwide through additional inspections, training, and record keeping. It is expected that this agreement should substantially reduce costs born by local communities and states each year to ensure the safety of their drinking water, lakes, and rivers.

Wal-Mart Stores builds dozens of retail stores annually. Several have been built and more are currently under construction within the Black Warrior River Watershed. Each site usually involves large construction projects with the potential for discharges of pollutants directly to waters of the US or indirectly through discharges to public storm water collection systems. Wal-Mart hires general contractors to oversee construction at each site.

The agreement requires Wal-Mart to implement storm water management plans to increase compliance at each of its construction sites nationwide by additional site inspections, record keeping, reporting, and training. Specifically, Wal-Mart is required to:

- Produce a video on storm water control best management practices to be shown to contractors at each construction site prior to the commencement of any excavation or construction
- Require contractors to certify that all appropriate storm water controls are in place before construction begins
- Designate a storm water coordinator to be responsible for oversight of storm water compliance by Wal-Mart and its general contractors for all store construction sites covered by the agreement
- Require in its construction contracts at each Wal-Mart-owned store construction site that the general contractor designate its site superintendent as its storm water coordinator
- Review with the general contractor, as part of the awarding of a construction contract, a specific checklist of storm water requirements,
- Hold an annual storm water seminar for contractors and others involved in the Wal-Mart storm water program
- Inspect storm water controls weekly and correct any problems found within seven days
- Report to EPA all discharges of pollutants resulting from the absence or failure of erosion or sediment controls at its site following a rain event of 0.5 inches or more

- Conduct sampling at its sites to monitor and analyze the level of pollutants in its storm water discharge and to report this information to EPA,
- Have an independent audit conducted at some of its construction sites to assess, among other things, the success of its compliance plan and compliance with storm water regulations [11]

E. FORESTRY

Alabama Forestry Commission (AFC)

Established as a state agency in 1924, the mission of the Alabama Forestry Commission is three-fold: to Protect the Forests from all harmful agents; to Service and Help Landowners to carry out responsible forest management on their property, using professional technical assistance so as to benefit themselves, their land and society; and to Educate the General Public about the value of forests in insuring both a healthy economy and environment.

In continued efforts to promote the use of Best Management Practices (BMPs) for Forestry to protect and improve water quality, the AFC updated and reprinted Alabama's Best Management Practices for Forestry guideline book. More than 1,200 copies have been distributed to loggers, forest industries, private landowners, universities, and other interested groups. Educational programs and tours have been held to highlight the benefits of using BMPs by landowners, loggers, foresters, and others when conducting forest management activities. [17]

The AFC has also worked with the Alabama Department of Environmental Management (ADEM) to address water quality complaints associated with forestry operations. Commission personnel respond to water quality complaints received by ADEM, Alabama Forestry Initiative Line (1-800-206-0981), and the public, where forestry operations are cited as a potential cause. When responding, AFC personnel notify the appropriate landowner and seek permission to visit the site and determine if a forestry practice is involved and if BMPs were properly used during the operation. The majority of complaint cases are resolved through educational efforts. [17]

Additionally, the AFC conducts random checks of forestry activities and evaluates the implementation of BMPs. If BMPs are not followed, Commission personnel works with the landowner, timber harvesters, and timber buyers to educate them on the proper use and benefits of BMPs and outline specific, voluntary measures that can be used to successfully resolve problems associated with the operation in question. [17]

As noted in the Alabama Forestry Commission's 2000-2001 Annual Report, AFC personnel conducted 169 random BMP monitoring reports to assess the BMP implementation rate on harvesting operations across the state. These random surveys are alternated between the Northern and Southern half of the state. These efforts appear to be effective. For the years 2000-2001, random surveys of the Northern Region showed BMPs were properly applied during the timber harvest operation on approximately 87 percent of the sites monitored. [1] For the years 2001-2002, 95 percent of the sites monitored (213) in the Southern Region showed BMPs were properly applied during the timber harvest operation. [18]

The AFC State Lands Section is responsible for the management of three state forests totaling some 340 acres. In addition, the section manages, under cooperative agreements, 9,005 acres of forested lands belonging to the Alabama Department of Corrections (15 facilities), 4,250 acres belonging to the Alabama Department of Conservation and Natural Resources (19 state lakes), and 5,657 acres belonging to the Alabama Department of Mental Health (8 tracts). These 18,912 acres of forestland are managed under TREASURE Forest guidelines. Additionally, these lands are used as demonstration areas for various forestry and allied practices. [17]

To assist landowners in managing their property, the Forestry Commission helps administer cost-share programs. An example is the Alabama Agricultural and Conservation Development Commission Program, which provides cost-sharing for practices aimed at erosion control, agricultural water quality improvement, and improving forest resources. This is one of several programs, which may partially reimburse landowners who plant trees or do timber stand improvements. [19]

As a member of the Alabama Forestry Planning Committee, the AFC supports the TREASURE forest program (see Alabama Forestry Planning Committee below) including conducting week long TREASURE Forest training sessions for its employees. These workshops are designed to educate AFC employees on the TREASURE Forest program. For 2001-2002, a total of 74 foresters, county managers, and wildlife biologists completed the training. Specific water quality objectives of the TREASURE Forest program include:

- Reduction of erosion by following Best Management Practices
- Soil and water protection education/demonstration
- Litter control
- Reduction of environmental impact of recreational activities
- Maintaining native species for biodiversity and habitat

Figure 59:

TREASURE FORESTS IN THE BLACK WARRIOR RIVER WATERSHED

County	Sites	Acreage
Blount	7	1,018
Cullman		
Jefferson	9	1,669
Walker	15	3,368
Tuscaloosa	39	100,268
Greene	29	31,274
Hale	28	21,132

Source: Brigetta Giles, Stewardship Coordinator, June 13, 2003

Alabama Forestry Planning Committee (AFPC)

Members of the Alabama Forestry Planning Committee are state-level leaders of government agencies and private organizations with an interest in forest resources. They organized in 1971 to cooperatively address forest resource challenges by delivering programs to private landowners.

The State Planning Committee's effectiveness has increased through the years with the addition of subcommittees and county groups. Three standing subcommittees are appointed by the State Planning Committee to develop and manage programs on their behalf. The subcommittees are Forest Resources, TREASURE Forest, and County Outreach. Subcommittee members are selected by members of the State Planning Committee and can include members from non-State Planning Committee organizations.

The TREASURE Forest Subcommittee promotes and administers the TREASURE Forest program, including an awards program for outstanding TREASURE Forests. The TREASURE Forest program began in 1974 and encourages landowners to manage their forests for timber, wildlife, outdoor recreation, aesthetics, and environmental enhancement. Since 1975 more than 1,681 landowners have been certified as TREASURE Forest owners. Outstanding TREASURE Forests that also manage for educational values, and make themselves available for that purpose, are recognized with the Helene Mosley Memorial TREASURE Forest Award, which was initiated in 1978.

The TREASURE Forest program provides training to landowners to properly manage their forestlands. They provide training workshops and mentoring programs to landowners. Examples include the Teacher's Conference Workshop, Forests Forever, and Project Learning Tree (PLT) programs, where teachers from across the state gain valuable information from a variety of resource professions to use in their classrooms.

Alabama Forestry Association

The Alabama Forest Products Association (AFPA) was formed on May 6, 1949 by a small group of conservation minded individuals that depend on a well-managed and healthy forest. Most of these early pioneers were small, independent sawmill owners. They saw the need to promote good forest management and defend their livelihood from impending government regulation and increased competition from other states and countries.

In February 1972, the AFPA was renamed the Alabama Forestry Association (AFA) to better illustrate the diversity of its membership. Other milestones since then include establishment of ForestPAC, the AFA's official political action committee in 1980; the naming of the Alabama Pulp & Paper Council as an AFA affiliate in 1990; the founding of the Alabama Logger's Council in 1992; and the adoption of the Log a Load for Kids program in 1992 to help Alabama's ill, injured and abused children.

The Alabama Forestry Association has grown substantially from its beginnings in 1949 to include a majority of the forestry industry in the State. Today, it is the host for the Sustainable Forestry Initiative program in Alabama.

Sustainable Forestry Initiative (SFI). There are currently 13 major forest product companies that are members of the Nation SFI program that are active in forest management and product manufacture in the state. The SFI program requires each member company to participate in the following environmental practices:

- Developed plans and policies that will support sustained productivity of the forest
- Regenerate harvested areas promptly
- Protect water quality
- Protect wildlife habitat
- Minimize visual impacts of harvesting
- Protect special and unique sites
- Maintain or enhance biodiversity
- Ensure good utilization, and avoid wasting forest resources
- Promote sustainable forestry among a wide audience, not just industrial landowners
- Publicly report their progress toward SFI objectives
- Solicit input and create opportunities for public involvement in the design and implementation of SFI.

Currently, these companies require professional logger training for harvest operations on controlled lands and timber sales from third parties. Each company submits to an annual environmental audit to determine progress in keeping their commitment to the SFI program standards. Also, these companies audit harvest activities from timber sales that supply their facilities. Companies that perform these types of audits include nationally recognized auditing firms.

There is a strong educational opportunity for landowners and loggers, which is sponsored through the SFI program. This information is available to loggers and landowners from education websites, videoconferences, and continuing education workshops. Additionally, the Sustainable Forestry Committee distributes information to landowners through two websites: www.alabamaforestry.org/sfi and www.pfmt.org. Printed material available is specific to renewable forestry practices that includes working with loggers and best management practices

PLM Loggers. PLM Loggers are professional loggers that have completed a basic 40 hour training program for business management forestry and silviculture management that includes best management practices for water quality and safety training. PLM loggers and continuing education programs can be found at www.alaforestry.org/plm. The number of PLM Loggers within the Black Warrior River Basin are shown in Figure 60.

Figure 60:

PLM Loggers within the Black Warrior River Watershed

County	PLM Loggers
Blount	22
Cullman	
Jefferson	15
Walker	34
Tuscaloosa	66
Greene	16
Hale	22

Source: Information submitted by Bill Jones, Alabama Forestry Association for the Black Warrior Watershed Management Plan

Tree Farm. Tree Farm, a national program recognizes landowners that manage their forest resources in a responsible manner. This program requires on-site inspection by a forester every five years to evaluate forest management progress. Additional information about the American Tree Farm System may be found at www.treefarmsystem.org. Current Tree Farm data for the Black Warrior River Basin is included in Figure 61.

Figure 61:

Tree Farm Data for the Black Warrior River Watershed

County	Tree Farms	Acres
Blount	57	6,541
Cullman		
Jefferson	4	9,195
Walker	27	15,642
Tuscaloosa	34	71,274
Greene	16	21,447
Hale	20	11,581

Source: Information submitted by Bill Jones, Alabama Forestry Association for the Black Warrior Watershed Management Plan

Project Learning Tree. Project Learning Tree (PLT) is an award winning, broad-based environmental education program for educators and students in PreK- grade 12. PLT helps students learn how to think, not what to think, about the environment. PLT, a program of the American Forest Foundation, is one of the most widely used environmental education programs in the US and abroad. Through PLT, students across the nation have learned environmental content that correlates to national and state standards in science, social studies, language arts, math, and other subjects, and strengthened their critical thinking, team building, and problem solving skills.

Alabama Forests Forever. The goal of the Alabama Forests Foundation "Forests Forever" Campaign is to educate the public about Alabama's forests and show how proper forest management can balance the need to protect the environment with the need to produce products made from trees.

Private Forest Management Team (PFMT). Private landowners own 75 percent of the commercial forest land in Alabama. Recognizing the increasing demands on forests for recreation, water quality protection, endangered and protected species and other activities, the PFMT was established. The PFMT is a coordinated effort among forest landowners; public, private and forest landowner support organizations; and industrial and agency natural resource management organizations.

Forestry Awareness Week Now (FAWN). FAWN provides and opportunity for elementary children to spend a day in the woods with professional foresters from public and private organization. Students learn about the history of forestry, wildlife, forest management, forest products, soils, and water quality. The Cullman Soil & Water Conservation District holds an annual FAWN event.

American Forest & Paper Association (AF&PA)

The American Forest & Paper Association (AF&PA) was founded January 1, 1993, evolving from predecessor groups dating as far back as the mid-1800s. Immediately prior to the founding of AF&PA, the forest products industry was represented by two organizations-the National Forest Products Association (NFPA) and the American Paper Institute (API)-each independent institutions with some common membership. NFPA and API represented distinct sectors of the industry, with the former being the agent for the forest and building products industries while the latter represented pulp, paper, and paperboard manufacturers.

In July 2002, AF&PA published: State Water Quality Programs and Forestry: An Environmental Management Systems Approach to State Forestry Best Management Practices Programs that describes the essential components of state forestry management processes and control programs to address water quality. There are eight key components of state forestry best management practices programs that AF&PA and 20 other state and regional product associations support as part of an effort to document forestry's commitment to water quality protection. The key procedural components of the program include:

- State BMP Compliance Survey
- State BMP Effectiveness Monitoring Survey
- Education, Training and Technical Assistance
- Memorandum of Understanding Between Appropriate Agencies or Other Similar Institutional Arrangements
- Review of State BMPs
- Adequate Funding
- Coordination with USDA Programs

F. NONPROFITS

Alabama B.A.S.S. Federation

www.albassfed.org

Mission: To promote quality water standards, fishing, conservation, and sportsmanship.

Source: Alabama Rivers Alliance Directory

Alabama Mussel Catchers Association

1316 7th Avenue SE Decatur, AL 35601

Phone: (205) 351-0562

Mission: To promote clean and healthy waters in the Tennessee River Basin and other Alabama watersheds, and to educate citizens on the inherent value of renewable natural resources.

Region and river(s), lake(s), watershed(s) of concern: Tennessee River, Alabama River, Coosa River, and Warrior River

Source: Alabama Rivers Alliance Directory

Alabama Rivers Alliance (ARA)

The Alabama Rivers Alliance was formed out of the efforts of its predecessor - the Alabama State Rivers Coalition. The Alabama State Rivers Coalition was formed in 1993 and led by the Cahaba River Society, Alabama Chapter of the Sierra Club, Lake Watch of Lake Martin, Alabama Citizen Action, Friends of the Locust Fork River, and Alabama Environmental Council. The following is a discussion of current ARA initiatives affecting the Black Warrior River Watershed.

ADEM Reform Coalition. At an "ADEM Reform Summit" convened in September 2002, representatives from more than twenty-five Alabama grassroots and statewide organizations met to discuss the problems of agency leadership, lack of enforcement, limited public participation and inadequate resources at ADEM. A diverse and representative coalition of public health, environmental justice, faith-based, small rural and larger urban environmental groups, the ADEM Reform Coalition began development of a set of reforms necessary to create an agency with the mission, mandate, capacity and leadership to truly protect the health and safety of Alabama's citizens and environment.

At the heart of ARC's reform efforts is the fundamental belief that ADEM should stop managing the environment and start protecting it. The Blueprint for ADEM Reform also sets out four main goals to achieve the vision of a new and improved environmental protection agency in Alabama: leadership, enforcement, resources, and public participation. These goals are fundamental to the overall reform of ADEM and the effective implementation of all environmental laws and regulations. ARC anticipates that this citizen-authored platform will initiate and inform a statewide dialogue among the public, elected officials, government, industry, community leaders and the media, and help guide those legislative, administrative and other efforts necessary to reform this vitally important agency.

This Blueprint for ADEM Reform is intended as a first step toward creation of a new environmental agency, one that is accountable to all the people and that will inspire public trust and promote a cleaner and healthier environment in Alabama. A copy of this document is available online at http://www.alabamarivers.org/BlueprintforADEMReform.pdf.

Featured Watershed-The Black Warrior Watershed. In 2002, ARA published The Black Warrior Watershed: An Ecological Portrait providing useful information concerning the Black Warrior Watershed.

www.911environment.org. www.911environment.org is a new web page for reporting observed water pollution problems in Alabama. The web page is a joint project of the Alabama Rivers Alliance, World Wildlife Fund and Alabama Environmental Council. Problems noticed within any watershed in the State of Alabama may be reported. The Alabama Rivers Alliance will receive the information from all reports you send, and forward them to the appropriate environmental agencies and personnel as well as to other environmental and watershed groups with an interest in your area. They will then work with our sister organizations to do all we can to ensure that ADEM follows up to address any violations of water quality laws.

Alabama Water Watch

www.alabamawaterwatch.org

See Section 10: Current Research and Future Research Needs.

Alabama Wildlife Federation

www.alabamawildlife.org

The Alabama Wildlife Federation (AWF) is the oldest and largest non-profit conservation organization in Alabama. The AWF was established by sportsmen in 1935 to promote the conservation and wise use of our wildlife and natural resources and to ensure a high quality of life for future generations of Alabamians. Its mission is "To promote the conservation of Alabama's wildlife and related natural resources, as a basis for the social and economic prosperity of present and future generations, through wise use and responsible stewardship of our wildlife, forests, fish, soils, water, and air."

Conservation Education - Discovering Our Heritage. The Discovering Our Heritage (DOH) program acts as the vehicle that educators can use to integrate existing environmental education programs into one comprehensive course of study. It organizes existing environmental education materials and programs into a structured, comprehensive format and provides pre-planned lessons that guide the teacher throughout the scholastic year. The teacher can manipulate this program so that it conforms with his/her pre-existing lesson plans and projects.

The DOH environmental education program allows educators to teach basic and traditional subjects-history, science, geography, mathematics, and the language arts-in a sound, balanced curriculum with a priority aim of improving student academic performance. It also emphasizes experiential learning, direct student involvement and the study of real issues in the community to develop "real-world" problem-solving skills. In addition, a strong component of the program is the close active collaboration between the school, parents, and the community at large, which facilitates a higher acceptance of the program.

Alabama Outdoor Classroom Program. The Alabama Outdoor Classroom program provides on-site, technical assistance and support to educators, administrators, students, and community members who wish to create a viable wildlife habitat and outdoor classroom on their school grounds with the aid of trained volunteers. In addition, they provide in-service teacher training workshops to assist the integration of the outdoor classroom into the faculty's daily lesson plans.

Audubon Society

Birmingham Chapter www.birminghamaudubon.org

The Walter Coxe Research Fund. The purpose of the Birmingham Audubon Society's Walter F. Coxe Research Fund is to provide small grants in support of scientific research projects that are clearly applicable to environmental issues affecting Alabama. Although any relevant field of research may be considered, priority is given to projects involving natural history or field biology, and those performed in Alabama or by individuals or institutions affiliated with Alabama. Preference is also given to proposals from undergraduate or graduate students, or from others not having access to normal mainstream funding.

Audubon Society - Tuscaloosa Chapter

www.ag.auburn.edu/grassroots/astc/

Mission: Dedicated to the education and preservation of Alabama's wilderness habitats.

Region and river(s), lake(s), watershed(s) of concern: Sipsey Swamp

Initiatives within the Black Warrior River Watershed include the provision of Audubon Adventures (an environmental studies curriculum) to over 80 fourth grade classes in Tuscaloosa County (county, city, and public school systems).

Source: Alabama Rivers Alliance Directory

The Bankhead Monitor

www.wildalabama.org

Mission: To inspire individuals and groups to preserve restore and enjoy Alabama's native ecosystems, biodiversity, and cultural heritage.

Region and river(s), lake(s), watershed(s) of concern: All watersheds

Primary river issues/threats: forestry/agricultural practices; strip mining; toxic dumps; dams

Source: Alabama Rivers Alliance Directory

Black Warrior Clean Water Partnership

The Partnership is a coordinated effort by public and private stakeholders to develop a watershed management plan for the Black Warrior River Basin. In accord with the national Clean Water Action Plan, local stakeholders (citizens, businesses, industry, and other commercial, public and private interests) are encouraged to participate. A key component of the Partnership is to bring people together from across the basin to discuss ways to utilize a watershed approach to implement watershed restoration strategies aimed at safeguarding water quality.

Benefits of the Partnership include:

- Improved Water Quality - providing a healthier, more productive water resource for everyone to use and enjoy.
- Broad-based Communication - promoting the sharing of information and the creation of a broad awareness of resource availability through networking with others facing the same challenges.

- Collaboration in decision-making - bringing together local interests in identifying funding, prioritizing projects, and implementing watershed management plans.
- Coordination between community-based groups, municipalities, and industries - preventing the duplication of efforts and allowing the streamlining of limited resources.
- Consolidation of Data and Information - within a communications and technical assistance network so that a more complete account of the Warrior River's water quality is available.

Black Warrior-Cahaba Rivers Land Trust

The Black Warrior-Cahaba Rivers Land Trust (The Land Trust) is one of the newest land conservation organizations in Alabama. The Land Trust's mission is to improve water quality and provide public recreation by preserving sensitive streamside buffers and critical uplands within the Black Warrior and Cahaba River watersheds. The Land Trust is a 501(c)(3) not- for-profit corporation governed by a twelve member Board of Directors. They have adopted a business oriented, partnership approach to conservation efforts, working cooperatively with private landowners, local citizens, business interests, elected officials, government agencies and other conservation organizations to achieve their mission. The Land Trust strives to couple watershed protection efforts with recreational and educational opportunities for the public via the installation of low impact nature trails and interpretive signage where compatible on lands acquired. They believe education, combined with public accessibility, will instill a strong conservation ethic among the community that can only serve to enhance and promote river conservation.

Resource, Conservation & Development Councils (RC&D)

Resource Conservation and Development Councils help plan and carry out activities that increase conservation of natural resources, support economic development and enhance the environment and standard of living in local communities. Established in 1960 as a pilot program by the USDA to perform a number of conservation and development activities, the program focused on geographic areas where major economic and social downturns had occurred. Today, local RC&D councils continue to serve local communities through a locally led process where volunteers work together to plan how they can actively solve environmental, economic and social problems facing their community. The Black Warrior River Watershed currently houses three RC&D Councils: Cawaco RC&D, Tennessee Valley RC&D, and Tombigbee RC&D.

Cawaco RC&D. The CAWACO Resource Conservation and Development Council serves five counties within Alabama: Blount, Chilton, Jefferson, Shelby and Walker. The original Council was comprised of ten members representing the sponsors from the five counties within the Council's Area. One at-Large member from each of the counties was added in the mid-eighties. In 1993, the Council granted 501(c)(3) recognition from the U.S. Internal Revenue Service. In 1997, another At-Large member from each of the five counties was added to better represent the varied demographics, increase capacity among the board, and to provide specific skills to the Council. Today, the Council is comprised of these 20 voting members. Cawaco RC&D administers the ADEM Section 319 grant for the Black Warrior Clean Water Partnership Program.

Tennessee Valley RC&D. The Tennessee Valley RC&D Council is located in north Alabama. It is comprised of eight counties: Limestone, Madison, Jackson, Lawrence, Morgan, Marshall, DeKalb, and Cullman.

The Tennessee Valley RC&D Council aggressively approaches innovative ways to promote environmental utilization and development of the natural and human resources in its area. Major projects are animal waste composting; cooperating with The University of Alabama in Huntsville and Alabama A&M with monitoring of constructed wetlands; sponsoring watershed workshops; environmental/educational programs for minorities, especially Spanish immigrants; and supporting County Commissions in developing county parks.

Tombigbee RC&D. The Tombigbee RC&D Council is located in west central Alabama and includes the counties of Lamar, Fayette, Pickens, Tuscaloosa, Bibb, Greene, Hale, and Sumter. The Council's goal is to improve the economic and social condition of these eight counties through the wise use and development of the areas natural and human resources. Major accomplishments are area-wide crawfish production projects, Fayette County Agricultural Center, River Road Observation Deck in Tuscaloosa, and animal waste disposal demonstrations.

Forever Wild

Forever Wild was created to help preserve Alabama's natural heritage and to increase opportunities for public outdoor recreation and education. Funding for Forever Wild is derived primarily from state royalties on offshore natural gas leases belonging to Alabama. Funding for property acquisition will be available through fiscal year 2012-2013. [21]

The Board of Directors for the Forever Wild Land Trust has established a methodical and consistent process for tract selection. The Board endeavors to acquire the best properties available to it within reasonable purchase terms. Efforts are made to select tracts of land evenly from among the northern, central and southern districts of the state and from among four targeted land uses: Nature Preserves, General Outdoor Recreational Areas, Wildlife Management Areas (for public hunting) and extensions of existing State Parks. [21]

The only completed purchase within the Black Warrior River Watershed is the Sipsey Sullivan Tract. Containing 2,998 acres of bottomland hardwood forest and swamplands along the flood plains of the Sipsey River, the Sipsey River Tract was purchased to provide outdoor recreational opportunities for the public, to protect the biodiversity of the property's natural communities and to provide opportunities for ecological education and research. [21]

This tract lies in the middle of the Sipsey River watershed which was selected by the Alabama Environmental Council as one of Alabama's 10 Natural Wonders. This bottomland wetland site is vegetated predominantly by an oak forest type, interspersed with tupelo-cypress stands in the many sloughs, ox-bow lakes and ponds. These attributes, and the Sipsey River itself, provides great opportunities for canoeing, fishing, bird watching, nature study and exploring during most of the year. An extensive trail system provides good access throughout the tract for hiking, bicycling and horseback riding. Camping is permitted in designated areas only. During hunting seasons, all other recreational activities are curtailed. [21]

On June 20th, 2003, the Birmingham News reported that the state Forever Wild Board voted to buy 466 acres around Turkey Creek. This decision will provide protection of water quality, endangered species (vermilion darter and watercress darter), and historical and geological sites. [22]

Globe Program

Administered through the McWane Center, the Globe Program is a worldwide hands-on, primary and secondary school-based education and science program. For Students, GLOBE provides the opportunity to learn by:

- Taking scientifically valid measurements in the fields of atmosphere, hydrology, soils, and land cover/phenology - depending upon their local curricula
- Reporting their data through the Internet
- Creating maps and graphs on the free interactive Web site to analyze data sets
- Collaborating with scientists and other GLOBE students around the world

For Teachers, GLOBE provides assistance through:

- Training at professional development workshops
- Teacher's guides, "how-to" videos, and other materials
- Continuing support from a Help Desk, scientists, and partners
- Contact with other teachers, students, and scientists worldwide.

Using Alabama Water Watch protocol, the Globe Program is actively working with school systems within the Black Warrior River Basin. Students are introduced to the issue of water quality and pollution in river systems through a hands-on scientific investigation using 9-10 different chemical, biological and physical water quality indicators. Students must use observation, questioning, analysis and synthesis skills in the process of developing research questions and testable hypotheses. Students then carry out a cooperative field research investigation of water quality in the river or stream, with number of sites, dependent upon length and focus of the program, to prove the validity of their hypotheses. Once, they have found the water quality index of their site(s), they share their findings with each other and draw conclusions and recommendations as to how to work to improve water quality.

Alabama Chapter of the Nature Conservancy (TNC)

For twelve years, the Alabama Chapter of The Nature Conservancy has acted as a champion of protection for Alabama's remarkable natural heritage. It is the only state conservation organization dedicated exclusively to protecting endangered plants and animals by protecting the lands and waters they need to survive. The Chapter accomplishes its mission using a pragmatic, non-confrontational approach, which includes planning based on scientific research and inventory and partnerships with businesses, individuals and the government. Already, the organization has protected more than 120,000 acres of Alabama's forests, swamps, marshes, seashores and mountains-home to more than a thousand rare plants and animals. Specific TNC initiatives within the Black Warrior River Watershed include:

Watercress Darter Conservation Project. On March 21, 1964, Dr. Ronald Brandon and Dr. Ronald Altig collected three specimens of an undescribed darter while dipnetting salamanders from Glenn Springs at Bessemer, Jefferson County, Alabama along Jefferson County Route 20. The specimens were given to W. M. Howell, then a graduate student in Ichthyology at the University of Alabama at Tuscaloosa. Howell recognized that the darter was closely related to the gulf darter, Etheostoma swaini, but differed from that species in details of body proportions, development of lateral line and cephalic sensory canals, certain fin-ray counts, and habits. The darter was subsequently described by Howell and Caldwell (1965) as the watercress darter, Etheostoma nuchale.

Despite five years of subsequent collections of other springs and creeks in the Birmingham-Bessemer area, various ichthyologists were unable to find specimens at other localities. Thus, in 1970, the U.S. Department of Interior's Office of Endangered Species officially recognized the watercress darter as an "endangered" species.

From May of 1977 through April of 1978, scientists conducted surveys that led to the discovery of two new populations of watercress darters: one at Thomas Spring in Bessemer and the other at Roebuck Springs, east of Birmingham. Because the work in 1977 -78 was so thorough, scientists feel that additional populations are unlikely to be discovered.

In the early eighties, U. S. Fish & Wildlife Service developed a recovery and habitat acquisition plan for the species and subsequently acquired 8.5 acres of critical habitat at Thomas Spring in Bessemer. This acquisition established the Watercress Darter National Wildlife Refuge, one of the smallest and most urban national wildlife refuges in the country. The U. S. Fish & Wildlife Service contacted TNC requesting their help in acquiring 16 additional acres critical to the survival of this species. TNC acquired the additional acreage March 2001.

Source: Provided by Steve Northcutt, The Nature Conservancy of Alabama.

Turkey Creek Watershed Conservation Project. Most people are unaware of the remarkable array of aquatic and other wildlife in and along the Turkey Creek watershed. Although a complete inventory of the watershed has not yet been completed, cursory inventories have identified an incredible diversity of wildlife, including several species listed on the federal endangered and threatened species list. The Vermillion Darter and Watercress Darter are two such examples. Other globally imperiled species include the recently described Rush Darter and the Eared Coneflower. The last remaining population of the Vermillion Darter is found within the main stem of Turkey Creek. Turkey Creek has been identified by The Nature Conservancy as an irreplaceable priority site for conservation within the Cumberlands and Southern Ridge and Valley Ecoregion.

As part of the U.S. Fish Wildlife's recovery plan for the Watercress Darter, the species was introduced into springs that flow into Turkey Creek. The Watercress Darter is known from only two other small populations in Jefferson County, Alabama. Successful recovery of these two fish species must include conservation of the Turkey Creek watershed. Located just 20 minutes outside of Alabama's largest city (Birmingham), their natural habitat is under constant threat from urban sprawl. Conservation action to protect this area must occur within the immediate future or it is likely the opportunity to protect this unique watershed will be lost forever.

Source: Provided by Steve Northcutt, The Nature Conservancy of Alabama.

Bankhead National Forest. TNC is pursuing appropriations from the Land and Water Conservation Fund (LWCF) for the U.S. Forest Service to acquire tracts that are considered in-holdings in the Bankhead National Forest. These tracts provide crucial buffer for the headwaters of the Black Warrior River Watershed. The TNC is also participating in the Bankhead Liaison Panel, a group of stakeholders formed to provide advice and management recommendations to the U.S. Forest Service.

Source: Provided by Steve Northcutt, The Nature Conservancy of Alabama.

Mobile River Basin Aquatic Ecosystem Recovery Plan

The Mobile River Basin Coalition has been involved with a wide range of activities and initiatives. An original pursuit of the Coalition was to provide input to the U.S. Fish and Wildlife Service toward the development of a recovery plan for threatened and endangered aquatic species in the Mobile River Basin. Subsequently, the Coalition's focus has broadened to include providing a forum to learn about a wide range of programs which impact the aquatic resources of the Basin, and sponsoring a recent aquatic restoration workshop in Montgomery, Alabama. The purpose of the Coalition is to work together to develop and promote good management of the Basin's rivers and streams. Their website (www.ag.auburn.edu/alcfwru/coalition) provides additional information about the organizational structure and mission of the Coalition.

G. CITIZEN GROUPS

Bayview Lake Cleanup Association

200 52nd Ave., Fairfield, AL 35604

Phone: 205-787-6902

Interests: To clean-up Bayview Lake and turn into a state park

Specific Issues: To raise public awareness and control litter and pesticide contamination in lake.

Source: Alabama Grassroots Clearinghouse

Black Warrior Riverkeeper

www.blackwarriorriver.org

The Black Warrior Riverkeeper is the first citizen-based organization dedicated to defending all 6,392 square miles of the Black Warrior River Watershed. The Riverkeeper keeps polluters in line by patrolling the watershed, analyzing permits, and working with citizens, in addition to various other strategies. If a polluter is found or suspected of violating the law, then the Riverkeeper investigates them and brings evidence to the Board of Directors, comprised of attorneys, scientists, and business people. The Board of Directors, in cooperation with over 100 similar "Keeper" organizations, creates solutions to these problems. Black Warrior Riverkeeper was founded in November, 2001, by Roger Conville and David Whiteside. The Black Warrior Riverkeeper and around 100 other "Keeper" groups are aligned under the

Waterkeeper Alliance, with Robert F. Kennedy, Jr., as the president.

Initiatives of the Black Warrior Riverkeeper organization include:

- Fundraising for a Village Creek Documentary
- Black Warrior Riverkeeper, Alabama Rivers Alliance, and Legal Environmental Assistance Foundation (LEAF), issued a letter of intent to sue Sloss Industries for multiple violations of the Clean Water Act, by illegally dumping cyanide into Five Mile Creek.

Five Mile Creek Action Committee (FMAC)

www.fivemilecreek.com

FMAC is incorporated as a Non-profit corporation in Alabama. As participants in the State of Alabama's "Adopt-A-Stream" and the Alabama Water Watch programs, Five Mile Action Committee actively promotes the cleanup and improvement of water quality in the Five Mile Creek Watershed of the Black Warrior River in Jefferson County.

The mission of Five Mile Action Committee is to ensure a high standard of water quality, to improve the intrinsic values of the creek, and to promote public awareness of the Five Mile through ongoing educational and recreation programs.

The FMAC website contains a wealth of information concerning the history of Five Mile Creek, permits, water quality testing results, maps, and a list of threatened and endangered species.

Friends of Hurricane Creek

www.hurricanecreek.org

The Friends of Hurricane Creek are actively involved in improving and preserving the water quality of Hurricane Creek. Activities include letters to the editors, public relations campaigns, and contact with elected officials. The current concern is the construction of the Eastern Bypass by the Alabama Department of Transportation, which crosses Hurricane Creek. Alternative and more cost-effective solutions to this site have been submitted and rejected.

Friends of Locust Fork

www.flfr.org

In January, 1991 The Birmingham News revealed that the Birmingham Water Works Board (BWWB) was planning to build a municipal water supply reservoir on the Locust Fork River. The dam would be located just inside the Blount County, Alabama line. The article also stated that BWWB had been buying land in Blount County secretly through a third party. A small group of concerned citizens of Blount County met to discuss the proposed reservoir and how it would affect the natural integrity of this free flowing river and the lifestyle of the community surrounding it.

After discussing the issue and the secretive actions of BWWB, it was unanimously decided that the river should be protected. The Friends of the Locust Fork River (FLFR) was formed and officers were elected. The official fight to save the Locust Fork River was initiated. In just a few short months, the support of other local environmental organizations was secured. Membership in the FLFR has steadily increased since our beginning in 1991 from the original founding members to approximately 900 from various parts of the U. S.

Mission Statement: As Friends of the Locust Fork River, we join together to actively preserve the natural integrity of the river in its free-flowing state, and to that end, the lifestyle of the community which surrounds it. It is the position of the FLFR that with efficient management of its water resources and the implementation of a comprehensive water efficiency program, the Birmingham Water Works Board will have ample water supply well into the next century.

Initiatives of the Friends of Locust Fork include:

- Build public awareness of the values of the river through public meetings.
- Sponsor a monthly river crossing cleanup.
- Establish volunteer water quality monitoring points along the river.
- Sponsor an annual river festival to spotlight the beauty of the river.
- Sponsor annual river cleanup during National River Cleanup Week.
- Publish a quarterly newsletter.
- Establish a speakers bureau for:
  - Educational presentations at schools and other educational events.
  - Informational speeches at civic, environmental organizations and other groups.

- Provide recreational opportunities that promote the importance and beauty of the river.

Friends of Mulberry Fork

PO Box 1161, Hanceville, AL 35077

Phone: 205-625-4745, Fax: 205-625-4746

Friends of Mulberry Fork River is a non-profit, benevolent group that seeks to protect the river and its basin, while advocating wise use and recreational activities.

Specific Issues:

- Concerned about the proposed impoundment of Duck River, a tributary of Cullman River
- Concerned with the water quality in and around the Mulberry Fork River
- Establish public access points for recreation on Mulberry Fork River

Source: Alabama Grassroots Clearinghouse

Lake Tuscaloosa Preservation Association

http://www.laketuscaloosa.org/

The Lake Tuscaloosa Preservation Association is composed of citizens from throughout the area who are concerned with preserving the quality and beauty of the lake area compose. The primary mission of the Association is to alert its members via email and through the Internet of events and developing issues that impact Lake Tuscaloosa. The members of the Association then work with local and regional environmental officials and local, state and regional governing bodies to provide support for policy and enforcement efforts designed to protect Lake Tuscaloosa.

Smith Lake Environmental Preservation Committee (SLEPC)

The mission of the SLEPC is to preserve and enhance the water quality of Smith Lake and its tributaries for people, fish, recreation, and wildlife through education and volunteer efforts. With the end goal of knowledge about our water quality, we do participate in the Alabama Water Watch program and monitor about 15 to 20 sites around the watershed. Quarterly educational newsletters are available along with a quarterly membership/educational meeting with speakers from various agencies, professions, etc. Initiatives within the Black Warrior River Watershed include:

- Spring and fall Watershed clean up. The Spring 2003 Smith Lake Clean Up removed 27 tons of garbage from Smith Lake.

- Birmingham Boat Show. Each year the SLEPC has a booth at the Birmingham Boat Show. For 2003, the SLEPC provided information about the Alabama Water Watch program and the Clean Vessel Act along with other introductory material concerning water quality and Smith Lake.
- Alabama Water Watch Two citizen groups, the Smith Lake Environmental Preservation Committee (SLEPC) and Smith Lake Civic Association (SLCA) through the Alabama Water Watch Program have provided invaluable water quality data for the Smith Lake area. There are about ten certified monitors on the lake who have sampled one or more sites about once per month for almost three years. Twenty-nine lake and tributary sites have been monitored since 1996, and information from more than 250 samples has been submitted to AWW for entry into the statewide water quality database.

Smith Lake Civic Association (SLCA)

Two citizen groups, the Smith Lake Environmental Preservation Committee (SLEPC) and Smith Lake Civic Association (SLCA) through the Alabama Water Watch Program have provided invaluable water quality data for the Smith Lake area. There are about ten certified monitors on the lake who have sampled one or more sites about once per month for almost three years. Twenty-nine lake and tributary sites have been monitored since 1996, and information from more than 250 samples has been submitted to AWW for entry into the statewide water quality database.

Valley Creek Society

http://hometown.aol.com/pvalleycreek/index.html
4215 Big Oak Trail, Adger,AL 35006
PHONE:(205) 481 - 4762
EMAIL: pvalleycreek@aol.com

Mission: Protecting the environmental integrity of Valley Creek, a tributary of the Black Warrior River. Promoting public interest and concern for the biological diversity of the creek.

Specific Issues:

- Removing trash and debris from Valley Creek and its banks.
- Water monitoring
- Access points along the creek for paddlers
- Fish consumption

Village Creek Human and Environmental Justice Society

www.home.bellsouth.net/p/PWP-villagecreek

Mission: To improve the quality of life along the 44 miles of Village Creek from its headwaters in Roebuck to the Locust Fork of the Black Warrior River. Five major categories of the mission are:

- Restoration
- Public Health
- Conservation
- Education
- Recreation

DOCUMENTATION OF SOURCES

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21. Alabama Department of Conservation and Natural Resources, Forever Wild Program. http://www.dcnr.state.al.us/Lands/forever_wild_program.htm. Accessed July 1, 2003.
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8 Existing Programs and Mechanisms

The methods currently in use or available for use in the Black Warrior River Watershed include both regulatory and non-regulatory approaches. Regulatory methods utilize legal means and administrative rules established by Federal, State and local laws and codes which include:

- The Clean Water Act (CWA) of 1972, as amended
- The Alabama Water Pollution Control Act (AWPCA), Code of Alabama, 1975, as amended;
- The Alabama Environmental Management Act (AEMA), Code of Alabama, 1975;
- The Alabama AFO/CAFO Rule-by Registration [ADEM Administrative Code, Chapter 335-6-7 (1999.)

For certain activities or development in the Watershed, permits issued by the appropriate regulatory agency including local, state, and federal agencies are required for initiation and completion of the projects. [1]

The non-regulatory or voluntary approach includes educational outreach and training, technical assistance, technology transfer, and traditional federal and state cost-share assistance programs and incentives. The non-regulatory methods involve public and private management practices such as incentive programs, private stewardship, and citizen involvement. [1] Incentive programs offered by government agencies provide money on a grant or cost-share basis to assist management programs. Tax incentives are also available that reduce the tax burden on property within the watershed that is managed in an environmentally sound manner.

A. FEDERAL REGULATIONS

Clean Water Act (CWA)

Growing public awareness and concern for controlling water pollution led to enactment of the Federal Water Pollution Control Act Amendments of 1972. As amended in 1977, this law became commonly known as the Clean Water Act. The Act established the basic structure for regulating discharges of pollutants into the waters of the United States. It gave EPA the authority to implement pollution control programs such as setting wastewater standards for industry. The Clean Water Act also continued requirements to set water quality standards for all contaminants in surface waters. The Act made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions. It also funded the construction of sewage treatment plants under the construction grants program and recognized the need for planning to address the critical problems posed by nonpoint source pollution.

Subsequent enactments modified some of the earlier Clean Water Act provisions. Revisions in 1981 streamlined the municipal construction grants process, improving the capabilities of treatment plants built under the program. Changes in 1987 phased out the construction grants program, replacing it with the State Water Pollution Control Revolving Fund, more commonly known as the Clean Water State Revolving Fund. This new funding strategy addressed water quality needs by building on EPA-State partnerships.

Full text of the Clean Water Act may be found at http://www4.law.cornell.edu/uscode/33/ch26.html.

- <u>National Pollutant Discharge Elimination System (NPDES) Permits</u>

  The NPDES requirements were established by the Federal Water Pollution Control Act (1972) to control point source discharges to streams. The Alabama Department of Environmental Management (ADEM) administers the NPDES program in Alabama. ADEM's Municipal Branch regulates the storm water permits for municipalities and the industrial wastewater discharge falls under the authority of ADEM's Industrial Branch.

  The NPDES permitting system sets effluent limitations for discharges of treated municipal, industrial, and mining wastes. Construction sites over five acres in size are also included under the mining provisions of this program. The NPDES program also requires that permitted facilities submit discharge-monitoring reports (DMR) to ADEM. The DMR contains data for all parameters and monitoring frequency specified by the NPDES permit. *Also see State Regulations-NPDES.*

- <u>Nonpoint Source Discharge Regulations</u>

  The U.S. Congress enacted Section 319 of the Clean Water Act in 1987 to provide for the assessment of water quality impacts due to nonpoint source (NPS) water pollution. Section 319 also provides for the implementation of programs to address NPS water pollution.

ADEM is responsible for the administration of Section 319 in Alabama. This responsibility involves the use of funds for NPS pollution education and demonstration projects. There are no present limitations for NPS pollution discharges. The responsibility of NPS pollution education and control lies within the agencies that oversee the activities of each NPS category.

There are no effluent limitations for NPS discharges and Best Management Practice (BMP) implementation is voluntary. ADEM may also take enforcement action on any site or activity where discharges result in a water quality violation in waters of the State.

- Total Maximum Daily Load (TMDL)

  The Clean Water Act (CWA) contains a number of complex elements of overall water quality management. Foremost is the requirement in section 303 that states establish ambient water quality standards for water bodies, consisting of the designated use or uses of a water body (e.g. recreational, public water supply, or industrial water supply) and the water quality criteria which are necessary to protect the use or uses. Through permitting, states or the EPA impose wastewater discharge limits on individual industrial and municipal facilities to ensure that water quality standards are attained. However, Congress recognized in the Act that, in many cases, pollution controls implemented by industry and cities would be insufficient, due to pollutant contributions from other unregulated sources.

  Under section 303(d) of the Act, states must identify lakes, rivers, and streams for which wastewater discharge limits are not stringent enough to achieve established water quality standards, after implementation of technology-based controls by industrial and municipal dischargers. For each of these waterbodies, a state is required to set a total maximum daily load (TMDL) of pollutants at a level that ensures that applicable water quality standards can be attained and maintained. A TMDL sets the maximum amount of pollution a waterbody can receive without violating water quality standards, including a margin of safety. If a state fails to do this, the EPA is required to develop a priority list for the state and make its own TMDL determination.

The TMDL itself does not establish new regulatory controls on sources of pollution. However, when TMDLs are established, municipal and industrial wastewater treatment plants may be required to install new pollution control technology. States and EPA enforce the TMDLs through revisions to existing permits, which include the pollutant limits and a schedule for compliance. For waters impaired by nonpoint source runoff, because there are no federal controls over these sources under the CWA, the primary implementation measures are state-run nonpoint source management programs coupled with state, local, and federal land management programs and authorities and financial incentive programs. [2]

TMDL's within the Black Warrior River Basin Watershed are discussed in detail in Section VI: Total Maximum Daily Loads and Tier 1 Waterbodies.

Safe Drinking Water Act (SDWA)

The Safe Drinking Water Act (SDWA) was developed in 1974. The purpose of the law is to assure that the nation's water supply systems serving the public meet minimum national standards for the protection of public health. Under the SDWA, the EPA has the authority to set national health-based standards for drinking water to protect against contaminants that may be present in drinking water.

The 1996 amendments to the SDWA contained extensive provisions for consumer involvement, right-to-know, and source water protection. The Consumer Confidence Reports are the centerpiece of public right-to-know in SDWA. The amendment tightened drinking water standards and established a fund that permits the federal government to lend states more than $1 billion per year to improve water purification systems. [3] *(See Section 7: Water Quality Initiatives - State - Alabama Clean Water and Drinking Water State Revolving Fund Programs.)* Up to 25 percent of the money received by the states can be used for source-water protection, including wellhead protection projects. Other provisions of the law include:

- New risk-based and cost-benefit analysis-based methods of determining

maximum contaminant levels
- Streamlined monitoring requirements for 64 chemicals
- Monies to develop new treatment method
- A study of the incidence of water-borne diseases in the US
- Technical assistance to small public water systems
- Voluntary guidelines for water conservation
- Ground-water protection through underground injection control
- Improvements to water-system operator training
- Technical and financial assistance for water infrastructure

The SDWA requires water systems to notify users within 24 hours of violations of water-quality standards and mandates annual report on the quality of tap water. The 1996 amendments also require that states develop source water assessments for all public water supply sources. Full text of the SDA may be found at http://www4.law.cornell.edu/uscode/42/300f.html. *Also see Section 7: Water Quality Initiatives - State - ADEM - Drinking Water Branch.*

Drinking Water Candidate Contaminate List (DWCC)

EPA published a list of chemicals included on their regulatory priority list. (http://epa.gov/fedrgstr/EPA-WATER/1998/March/Day-02/w5313.html) The list must be updated every five years and EPA must decide whether to regulate at least five contaminants from the first DWCC list. To support decisions about whether to regulate contaminants, EPA must develop a national Contaminant Occurrence Database and may require monitoring for up to 30 unregulated contaminants for this purpose. [3]

Microbial and Disinfection By-Products Monitoring Rule

The EPA promulgated the drinking water Microbial and Disinfection By-Products Monitoring Rule, better known as the Information Collection Rule (ICR). The ICR was designed to gather water-quality and operational data for use in developing the parameters to be addressed by the Enhanced Surface Water Treatment Rule, the Groundwater Disinfection Ruse (now called the Groundwater Rule), and Disinfection By-Products (D-DBP) Rule. These rules were designed to deal with the competing needs of controlling dangerous microbes such as *Cryptosporidium*, and the toxic disinfection by-products that may result from microbial control efforts. Surface-water systems serving more than 100,000 people and ground-water systems serving more than 50,000 people must analyze raw and finished water for pH, temperature, turbidity, total organic carbon, protozoa, viruses, and selected disinfection by-products and disinfection residuals. [3]

Enhanced Surface Water Treatment Rule (ESWTR)

The ESWTR was developed to provide protection from the microbe *Cryptosporidium*, which is not addressed in the current Surface Water Treatment Rule (SWTR). Under the ESWTR, a maximum contaminant level goal (MCLG) of zero will be set for *Cryptosporidium* and a sanitary survey required every five years.

Groundwater Disinfection Rule

The Groundwater Disinfection Rule, now called the Ground Water Rule, would establish disinfection requirements, if necessary, for public water systems using ground water. Studies have focused on occurrence of microbes in ground water, state ground-water requirements, best management practices in widespread use, and vulnerability and risk assessment for microbial contamination of ground-water systems. A multi-barrier approach, including source-water protection involving best management practices and wellhead protection, is preferable to disinfection only.

Endangered Species Act

The ESA was passed in 1973 for the purpose of conserving "the ecosystems upon which endangered and threatened species depend" and to conserve and recover listed species. Under the law, species may be listed as either "endangered" or "threatened". Endangered means a species is in danger of extinction throughout all or a significant portion of its range. Threatened means a species is likely to become endangered within the foreseeable future. All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened. [3]

The law is administered by the U.S. Department of the Interior - U.S. Fish and Wildlife Service (FWS) and the Commerce Department's National marine Fisheries Service. The FWS has primary responsibility for terrestrial and freshwater organisms, while the National Marine Fisheries Service's responsibilities are mainly for marine species such as salmon and whales. [3] *Full text of the Endangered Species Act may be found at http://endangered.fws.gov/esa.html and information on endangered* *species may be found at http://endangered.fws.gov/wildlife.html#Species*

U.S. Army Corps of Engineers'

The Corps of Engineers' Regulatory Programs include Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. The Mobile District of the U.S. Army Corps of Engineers has regulatory authority over US COE issues within the Black Warrior River Basin. Issuance of federal Section 404 permits (CWA Section 401) state water quality certification are coordinated with ADEM, USFWS, NMFS, and other federal and state agencies with joint notice public comment opportunities. If the activity results in a point source discharge, the state's 401 water quality certification may require permit conditions sufficient to ensure that the nonpoint source discharges do not violate state water quality standards including antidegradation requirements. [4]

- Section 10 of the Rivers and Harbors Appropriation Act of 1899

  Under Section 10, a Corps' permit is required to do any work in, over or under a Navigable Water of the U.S. Waterbodies have been designated as Navigable Waters of the U.S. based on their past, present, or potential use for transportation for interstate commerce. These waters include many of the larger rivers and lakes, such as main channel of the Black Warrior River.

  § 401. Construction of bridges, causeways, dams or dikes generally; exemptions

  It shall not be lawful to construct or commence the construction of any bridge, causeway, dam, or dike over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for (1) the bridge or causeway shall have been submitted to and approved by the Secretary of Transportation, or (2) the dam or dike shall have been submitted to and approved by the Chief of Engineers and Secretary of the Army. However, such structures may be built under authority of the legislature of a State across rivers and other waterways the navigable portions of which lie wholly within the limits of a single State, provided the location and plans thereof are submitted to and approved by the Secretary of Transportation or by the Chief of Engineers and Secretary of the Army before construction is commenced. When plans for any bridge or other structure have been approved by the Secretary of Transportation or by the Chief of Engineers and Secretary of the Army, it shall not be lawful to deviate from such plans either before or after completion of the structure unless modification of said plans has previously been submitted to and received the approval of the Secretary of Transportation or the

Chief of Engineers and the Secretary of the Army. The approval required by this section of the location and plans or any modification of plans of any bridge or causeway does not apply to any bridge or causeway over waters that are not subject to the ebb and flow of the tide and that are not used and are not susceptible to use in their natural condition or by reasonable improvement as a means to transport interstate or foreign commerce.

- Section 404

  Under Section 404, a Corps' permit is required for the "discharge of dredged or fill material" into waters of the U.S. Many waterbodies and wetlands in the nation are waters of the U.S. and are subject to the Corps' Section 404 regulatory authority.

  The permit process requires consideration of public interest with respect to conservation, general environmental concerns, and water supply.

Watershed Protection and Flood Prevention (Title 16, Chapter 18, USC 1001)

Erosion, floodwater, and sediment damages in the watersheds of the rivers and streams of the United States, causing loss of life and damage to property, constitute a menace to the national welfare; and it is the sense of Congress that the Federal Government should cooperate with States and their political subdivisions, soil or water conservation districts, flood prevention or control districts, and other local public agencies for the purpose of preventing such damages, of furthering the conservation, development, utilization, and disposal of water, and the conservation and utilization of land and thereby of preserving, protecting, and improving the Nation's land and water resources and the quality of the environment

Wild and Scenic Rivers (Title 16, Chapter 28, Section 1271)

It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Congress declares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes.

The Sipsey Fork of the Black Warrior River Watershed has been designated as a "Wild and Scenic River." A total of 61.4 miles have been identified (Wild-36.4 miles, Scenic-25.0 miles.) The designated reach has been identified as follows:

> From the confluence of Sandy Creek upstream to the confluence of Thompson Creek and Hubbard Creek. Hubbard Creek from its confluence with Thompson Creek upstream to Forest Road 210. Thompson Creek from its confluence with Hubbard Creek upstream to its origin. Tedford Creek from its confluence with Thompson Creek upstream to section 17, T8S, R9E. Mattox Creek from its confluence with Thompson Creek upstream to section 36, T7S, R9W. Borden Creek from its confluence with the Sipsey Fork upstream to its confluence with Montgomery Creek. Montgomery Creek from its confluence with Borden Creek upstream to the SW 1/4 of section 36, T7S, R8W. Flannigan Creek from its confluence with Borden Creek upstream to section 4, T8S, R8W. Braziel Creek from its confluence with Borden Creek upstream to section 12, T8S, R9W. Hogood Creek from its confluence with Braziel Creek upstream to section 7, T8S, R8W.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. To meet this requirement, federal agencies prepare a detailed statement known as an Environmental Impact Statement (EIS).

Nonindigenous Aquatic Nuisance Prevention and Control Act

The Nonindigenous Aquatic Nuisance Prevention and Control Act was passed on November 29, 1990, and subsequently amended by the National Invasive Species Act of 1996. The purposes of the Nonindigenous Aquatic Nuisance Prevention and Control Act are:

1. to prevent unintentional introduction and dispersal of nonindigenous species into waters of the United States through ballast water management and other requirements;
2. to coordinate federally conducted, funded or authorized research, prevention control, information dissemination and other activities regarding the zebra mussel and other aquatic nuisance species;
3. to develop and carry out environmentally sound control methods to prevent, monitor and control unintentional introductions of nonindigenous species from pathways other than ballast water exchange;
4. to understand and minimize economic and ecological impacts of

nonindigenous aquatic nuisance species that become established, including the zebra mussel; and

5. to establish a program of research and technology development and assistance to States in the management and removal of zebra mussels. [5]

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

Congress enacted CERCLA, commonly known as Superfund, in 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment.

CERCLA:

- Established prohibitions and requirements concerning closed and abandoned hazardous waste sites;
- Provided for liability of persons responsible for releases of hazardous waste at these sites; and
- Established a trust fund to provide for cleanup when no responsible party could be identified.

The law authorizes two kinds of response actions:

- Short-term removals, where actions may be taken to address releases or threatened releases requiring prompt response.
- Long-term remedial response actions, that permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening. These actions can be conducted only at sites listed on EPA's National Priorities List (NPL).

CERCLA also enabled the revision of the National Contingency Plan (NCP). The NCP provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants. The Black Warrior River Watershed has the possibility of releases that would be subject to the CERCLA requirements.

Resource Conservation and Recovery Act (RCRA)

The primary goals of RCRA are to protect human health and the environment from the potential hazards of solid and hazardous wastes. RCRA helps to conserve energy and natural resources, to reduce the amount of waste generated, and to ensure that wastes are managed in an environmentally sound manner. RCRA regulations include requirements for hazardous waste tracking, labeling, treatment, storage, and disposal.

Past and present activities at RCRA facilities have sometimes resulted in releases of hazardous waste and hazardous constituents into soil, ground water, surface water, and air. Under the RCRA Corrective Action program, EPA and authorized states require owners and operators of RCRA facilities to conduct investigation and cleanup of these hazardous releases. The Black Warrior River Watershed has several facilities that are subject to the RCRA regulations including landfills.

B. STATE REGULATIONS

Laws regulating ownership and use of water in Alabama are not well defined. However, the "reasonable use" rule generally applies to groundwater use in Alabama. This rule recognizes the right of a landowner to a reasonable and beneficial use of the waters upon or beneath his or her land, provided the waters are not wasted and do not cause injury to other. [6]

The use and ownership of surface water and submerged lands are based on the distinction between navigable and nonnavigable waters. The legal title to waters and streambeds of navigable waterways is retained by the state, in trust for the people of Alabama. The legislature has authority to make laws pertaining to the use of public waters and lands underlying them and to establish authorities that can regulate use of these waters. [6]

Title to nonnavigable waters and streambeds may be vested in private owners, subject to the rule of "reasonable use." Under this rule, a landowner may not divert, dam, or otherwise alter the course of a stream flowing across his or her land, unless these operations neither deprive upstream or downstream owners of their right to use the water nor adversely affect the lands of other owners. [6]

Permits may be required from appropriate state and federal agencies prior to construction of impoundments. The title to land bounded by a nonnavigable watercourse includes the bed of the stream to the center of the main channel, unless the landowner's instrument of title limits the boundary to the bank or to another designated point. [6]

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

National Pollutant Discharge Elimination System (NPDES)

The EPA no longer issues permits pursuant to the CWA in Alabama because ADEM has developed rules and procedures of sufficient stringency to ensure compliance with the CWA; accordingly ADEM administers its own permit program and enforces the Alabama Water Pollution Control Act (AWPCA). [6]

Alabama NPDES program exceeds the scope of EPA's program in two significant respects. First, while the CWA governs only the discharge of pollutants that occurs from a point source, the AWPCA allows ADEM to regulate more types of pollutant discharges, including nonpoint source pollution. ADEM regulates nonpoint source pollution by requiring Alabama businesses to adopt Area Wide Waste Treatment Management Plans and by requiring NPDES permittees to adopt "best management practices". [6]

Second, the AWPCA permits ADEM to regulate a greater variety of waters than the EPA can regulate under the CWA. The CWA only prohibits the discharge of pollutants into the "navigable waters of the United States," which does not include groundwater. In contrast, the AWPCA permits ADEM to regulate all waters contained wholly or partially within the state of Alabama, including groundwater. The AWPCA attempts to regulate discharges into nearly all of the waters within the state by defining "waters" to include: "all waters of any river, stream, watercourse, pond, lake, coastal, ground or surface water, wholly or partially within the state, natural or artificial." (Ala. Code §22-22-1(b)(2). However, the AWPCA also creates a limited exception for pollutant discharges into "waters which are entirely confined and retained completely upon the property of a single individual, partnership or corporation unless such waters are used in interstate commerce." [6]

State Indirect Discharge Permits (SID) allows ADEM to regulate dischargers of pollutants and non-domestic wastewater into publicly owned treatment works. The SID permit program seeks to improve water quality much in the same manner as the NPDES program. SID permit holders may only discharge pollutants in amounts, concentrations and rates that satisfy specified categorical pretreatment standards, general pretreatment standards, and local limits. [6]

Animal Feeding Operation/Concentrated Animal Feeding Operation (AFO/CAFO) Program

The ADEM AFO/CAFO Program sets requirements on the construction, operation, and closure of AFO/CAFOs. The program was adopted in 1999 and strictly prohibits the discharge of animal waste to surface or ground waters (ADEM Administrative Code Rule 335-6-6.03.) The rules were originally developed over a three-year period with input from the agricultural community, interested state and federal resource agencies, EPA Region 4 and environmental groups.

Under these rules, discharges of animal waste to surface or ground waters are strictly prohibited. AFO/CAFOs are inspected on a routine basis as Departmental resources allow, when complaints are received, or other information is available indicating potential unpermitted discharges. [7] The program imposes buffer requirements as well as other management provisions to protect water quality. All animal-feeding operations must fully implement and maintain comprehensive waste management system practices that meet or exceed the guidelines of the U.S. Department of Agriculture - Natural Resource Conservation Service (USDA-NRCS). The Black Warrior River Watershed has AFOs that are subject to the requirements of the AFO/CAFO Program.

Source Water Assessment Program (SWAP)

(Also see Safe Drinking Water Act)

ADEM requires all public water systems to have a current water supply permit before they may provide water for human consumption. Administered by the Water Supply Branch of ADEM's Water Division, the Source Water Assessment requires public water supply system using a ground or surface water source to assess their source waters. The purpose of the assessment is to locate and identify all real and potential contaminants that could conceivable enter the source water and determine the possible impact they could have on the raw water quality. The status of a water system's SWAP is to be included in the annual Consumer Confidence Report.

A surface water source assessment consists of five (5) steps:

- Watershed and source water protection area delineation
  Determination of the topographic boundary of the land and water area upstream of intakes from which all water falling within the watershed discharges, or has the potential to, pass the treatment plant's intake.

- Contaminant source inventory
  Consists of the location and identification of real and potential contaminants existing within and near the source water protection area (SWPA)

- Susceptibility analysis
  Consists of determining the relative probability of identified contaminants entering the source water to the extent that the quality of the raw water reaching the plant is significantly degraded.

- Contingency plans
  Plans required for systems whose intakes are subject to catastrophic contamination events or highly susceptible contaminants. The purpose of the plan is to develop a course(s) of action(s) for the water system to take to maintain at least a minimum supply of water to customers until the contaminant passes, is contained, removed, or neutralized.

- Public awareness
  Requirement for water systems to inform the public about the quality of the raw water serving their water treatment plant and its potential for contamination. This may be accomplished through the system's Consumer Confidence Report, by making assessment results available to the public, and by presenting assessment information at public meetings.

A groundwater (wells and springs) source assessment consists of four steps:

- Source water assessment area delineation *(See watershed and source water protection area delineation above.)*
- Contaminant inventory *(see Contaminant source inventory above)*

- Susceptibility analysis
- Public awareness

Storm Water Phase I and Phase II

Stormwater runoff is one of the leading causes of water quality problems. Under the Stormwater Phase II program, EPA expanded controls of stormwater runoff to cover smaller cities (with populations under 100,000) and for small construction sites (under five acres.) The regulations provide a flexible approach that builds on the programs that are already in place as a way to adjust coverage as appropriate to protect water quality.

Phase I communities must obtain a NPDES stormwater permit and implement storm water pollution prevention plans (SWPPPs) or storm water management programs (both using Best Management Practices (BMPs). Municipalities within Jefferson County developed the Jefferson County Storm Water Management Authority. *(See Section 7: Water Quality Initiatives)*

Phase II stormwater regulation promotes the use of best management practices, such as preventing illicit sewage connections and providing information to the public about pollution prevention measures they can undertake to minimize stormwater impacts as part of a municipal stormwater program.

The benefits of controlling stormwater runoff are numerous. The reduction in flow and movement of sediment reduces stream bank erosion, stream channeling and modifications to stream habitat from shallower waters.

ADEM regulations require that appropriate, effective management measures for the control of pollutants in stormwater runoff be fully implemented and maintained for all construction and land disturbance activities regardless of permit status or size of the disturbance to prevent/minimize discharges of pollutants to waters of the State of Alabama. Discharges of pollutants resulting from failure to implement effective management measures are considered unpermitted discharges to state waters. Unpermitted discharges constitute violations of the Alabama Water Pollution Control Act, Code of Alabama 1975 § 22-22-1 through 22-22-14, as amended, and the Alabama Environmental Management Act, Code of Alabama 1975, §22-22A-16, as amended, for which civil penalties of up to $25,000 per day for each violation may be imposed.

Certain construction and land disturbance activities greater than 5 acres, or that are a part of a larger common plan of development or sale that may eventually exceed 5 acres, require NPDES stormwater permits (40 CFR Parts 122-124). Under new Phase II stormwater rules, effective March, 2003, land disturbance activities greater than 1 acre will require NPDES permit coverage.

Stormwater Phase II areas within the Black Warrior River Watershed are listed below. Some Phase II stormwater communities were listed in the legislation that created the stormwater program, while others were designated because the community was identified as an urbanized area in the 1990 census. Other communities may be listed for a variety of reasons including projected future growth, existing water quality impairments, or special water quality concerns or problems. ADEM is required to evaluate areas with stormwater systems that have populations of 10,000 or more and population densities of 1,000 or more per square mile and determine which will be designated as a Phase II area.

Phase II Communities
- Birmingham
- Northport
- Sylvan Springs
- Tuscaloosa

<u>Stormwater Regulations Within the Black Warrior River Basin.</u> Appendix C - 19 summarizes the presence and source of regulation currently in place among the 31 cities and 11 counties polled in the Black Warrior River Watershed. For example; Table 3, which describes Stormwater regulations in place for Watershed cities, shows a total sample of 31 municipalities, and that of those with populations between 10,000 and 24,000, 40 percent have some form of local regulatory ordinance or regulating/review body with regard to stormwater management and hydrological review.

Local regulation may exist if the form of local government-administered management, cooperative management in the form of a shared resource among participating local governments (e.g., Stormwater Management Authority, Inc. serves Jefferson County and other subscribing municipalities in the Greater Birmingham area), or consultants such as engineers (hydrologists) contracted by local governments to serve as their reviewing entity. For less- populated areas, regulation may exist solely in the form of federal regulation, generally administered through state agencies such as ADEM.

The extent and nature of locally administered regulations varies widely among the cities and counties sampled. The extent of regulation afforded a locality and is primarily a function of the population and level of development taking place there. Because the watershed traverses in and out of dense, highly developed areas, less-populated areas often are exposed to rainfall-related watershed impairment, which out-strips their regulatory capacity. [8]

Water Supply Branch

The Water Supply Branch of the Water Division of ADEM regulates public water supplies. Public water systems include community, nontransient noncommunity, and noncommunity supply systems. A community water system is defined as a water supply system that has at least 15 service connections for year-round residents or regularly provides water to at least 25 year-round residents. A nontransient noncommunity water system is defined as a public water supply system that serves at least 25 of the same individuals a minimum of six months per year. A noncommunity water system is a public supply system that does not meet the requirements of either a community water system or a nontransient noncommunity water system.

More than 600 community water systems, 200 noncommunity water systems and about 100 nontransient noncommunity water systems are permitted in Alabama. A list of public water suppliers within the Black Warrior River Watershed is included in Appendix B. Self-supplied industrial/commercial and agricultural users of ground water generally are not regulated by the state. [1]

Alabama Department of Economic and Community Affairs - Office of Water Resources (ADECA-OWR) Programs

Certificate of Use Program. The Alabama Water Resources Act mandates that the Alabama Water Resources Commission adopt rules and regulations governing the use of water in the State. The Act also makes water use reporting a condition of maintaining a Certificate of Use. The Certificate of Use contains the following information:

- Water source;
- Primary uses of water;
- Estimated or actual amount, in gallons, of waters of the state that is used on an average daily basis;
- Estimated maximum capacity, in gallons, of waters of the state that could potentially be withdrawn or diverted within any single day;
- Duration of the Certificate of Use; and
- Frequency of water use reporting.

Alabama Water Resources Act. The Office of Water Resources (OWR) in coordination with other agencies will conduct critical use studies to determine if certain areas should be designated as capacity stress areas. Each critical use study includes an analysis of alternatives to address quantitative water resources problems identified during the critical use study.

At a minimum the critical use study includes an assessment of a no-action alternative, a conservation alternative, a water resources development alternative, and a restrictive use alternative. Within each area of the state for which a critical use study is proposed the OWR shall consult with all persons holding a certificate of use within such area as well as all appropriate federal, state, or local government agencies within such area prior to the completion of the critical use study.

Upon the completion of a critical use study the OWR submits a final report of the critical use study to the commission to protect the quantitative water resources of such area. The commission shall review the critical use study submitted by the OWR and determine if the implementation of water use restrictions in such area is needed (ADECA-OWR, Chapters 305-7-7 and 305-7-11).

Alabama Department of Agriculture and Industries

Alabama Pesticide Act. The Alabama Department of Agriculture and Industries implements the Alabama Pesticide Act (Alabama Code Section 2-27-1 et seq.) The Act requires all pesticides to be registered and, "Before any person is authorized to purchase and use restricted-use pesticides for application or use thereof, such person shall meet certain qualifications to be prescribed pursuant to rules and regulations…designed to satisfy the requirements of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA.)

Alabama Surface Mining Commission

The Alabama Surface Mining Commission is responsible for regulating coal mining activities that may affect the quality of water. Act 99-579, effective October 1, 1999, ushered in several much-needed amendments to Alabama's surface mining law. Operators are now required to slope highwalls, leave a 50-foot setback of undisturbed material, test soil, and revegetate the site.

In FY 2000, 355 permits (53 new and 302) renewals were issued to operators for the surface mining of non-fuel minerals in Alabama. This was a slight decrease from FY 1999. Meanwhile, a large number of unpermitted surface mining operations are known to exist in the State, and efforts continue, with limited staff, to gain compliance in as many of those situations as possible.

State Oil and Gas Board

The State Oil and Gas Board regulates oil and gas exploration and development activities that may affect the quality of water.

State Department of Conservation and Natural Resources (DCNR)

DCNR enforces water-safety traffic laws of waterways and impoundments and regulates activities that may affect the quality of water in wildlife refuges and game management areas.

Alabama Department of Economic and Community Affairs (ADECA)

ADECA and the Office of Water Resources is responsible for water-use planning.

Alabama Agricultural Nonpoint Source Financial Assistance Act of 1988

The Alabama Agricultural Nonpoint Source Financial Assistance Act of 1988 was enacted to assist in controlling the contamination of water in Alabama's lakes, streams, rivers, aquifers, and estuaries. The act provides for the Alabama Soil and Water Conservation Committee and Soil and Water Conservation Districts to administer a federal cost-share program established by the legislature in 1986. The program provides financial assistance to land user to control soil erosion, prevent water pollution and improve forests.

C. VOLUNTARY PROGRAMS

USDA Programs - Natural Resource and Conservation Service

Conservation Reserve Program (CRP). The CRP program, administered by the USDA Farm Service Agency, was established as a conservation provision of the Farm Bill to encourage and assist farm producers willing to set aside highly erodible, riparian, and other environmentally sensitive lands from crop production for a 10 or 15-year period. Producers may enroll in the CRP program according to U.S. Department of Agriculture (USDA) program rules. If a landowner's CRP bid is accepted, a Conservation Plan of Operation is developed. In addition to an annual CRP payment, USDA will provide a 50 percent cost-share to establish the selected conservation practice. Landowners may receive a maximum of $50,000 annually in CRP payments.

Wetlands Reserve Program (WRP). This voluntary USDA program for restoring wetlands is administered by NRCS with technical assistance from the FWS. Participating landowners can establish conservation easements of either permanent or 30-year duration, or can enter into restoration cost-share agreements where no easement is involved. NRCS and FWS assist private landowners with site selection and development of restoration plans for the site. Up to 100 percent of the cost of restoring the wetland is provided by the USDA.

Environmental Quality Incentives Program (EQIP). This USDA program is administered by NRCS. EQIP works primarily in locally identified conservation priority areas where there are significant problems with natural resources. High priority is given to areas where State or local governments offer financial, technical, or educational assistance, and to areas where agricultural improvements will help meet water quality objectives. Landowners can apply to the program for assistance in solving problems related to animal waste management, erosion, and other environmental problems. EQIP will provide up to 60 percent cost-share for restoration. A landowner may receive up to $50,000 annually in EQIP payment.

Wildlife Habitat Incentives Program (WHIP). WHIP is a voluntary program for landowners who want to develop and improve wildlife habitat on private lands. Participants work with NRCS to prepare a wildlife habitat development plan. USDA provides technical assistance and cost-share payments up to 75 percent of the cost of installing the wildlife habitat practices. USDA and the participant enter into a cost-share agreement that usually lasts a minimum of 10 years.

Conservation Security Program. The Conservation Security Program (CSP) is authorized by Title XII, Chapter 2, Subchapter A, of the Food Security Act of 1985, as amended by the Farm Security and Rural Investment Act of 2002. The Natural Resources Conservation Service (NRCS) administers CSP. Under CSP, NRCS is authorized to provide financial and technical assistance to owners and operators of agricultural operations to promote conservation and improvement of the quality of soil, water, air, energy, plant and animal life, and other conservation purposes.

Emergency Watershed Protection (EWP). The EWP program helps protect lives and property threatened by natural disasters such as floods, hurricanes, tornadoes, and wildfires. The program is administered by the USDA-NRCS, which provides technical and financial assistance to preserve life and property threatened by excessive erosion and flooding.

EWP provides funding to project sponsors for such work as clearing debris from clogged waterways, restoring vegetation, and stabilizing river banks. The measures that are taken must be environmentally and economically sound and generally benefit more than one property owner.

NRCS provides up to 75 percent of the funds needed to restore the natural function of a watershed. The community or local sponsor of the work pays the remaining 25 percent, which can be provided by cash or in-kind services.

Forest Land Enhancement Program (FLEW). FLEW is a voluntary landowner program in which State forestry agencies can provide a wide array of educational, technical, and financial services intended to ensure that the nations non-industrial private forests (NIPS) and related resources continue to provide sustainable forest products and safeguard the health of water, air, and wildlife. NIPS owners who wish to participate in the cost-share component of FLEW must complete one or more of the sustainable forestry practices available in their State as described in a forestry management plan.

Farm and Ranch Protection Program (FRAP). The FTP provides funds to help purchase development rights to keep productive farmland in agricultural use. Seventeen states are currently implementing the FTP program. Alabama is not currently implementing this program.

U.S. Fish and Wildlife Service Programs

North American Wetlands Conservation Act. The North American Wetlands Conservation Act (Act) of 1989 provides matching grants to private or public organizations or to individuals who have developed partnerships to carry out wetlands conservation projects in the United States, Canada, and Mexico.

Partners for Fish and Wildlife. The Partners for Fish and Wildlife program is an incentive program that is administered by the Fish and Wildlife Service (FWS). The goal of the program is to restore, improve, and protect fish and wildlife habitat on privately owned land. Funds received cannot exceed $10,000 during one fiscal year and projects with private landowners must be secured by a minimum l0-year habitat development agreement; Landowners can receive up to 100 percent funding for project expenses. The program emphasizes Federal trust resources: e.g. migratory birds, endangered and threatened species, wetlands, flood plains and riparian areas.

U.S. Department of Transportation

Transportation Equity Act for the 21st Century (TEA-21) [Water Quality Protection Provisions]. The Transportation Equity Act for the 21st Century (TEA-21) authorizes over $200 billion to improve the Nation's transportation infrastructure, enhance economic growth and protect the environment. TEA-21 creates new opportunities to improve air and water quality, restore wetlands and natural habitat, and rejuvenate urban areas through transportation redevelopment, increased transit and sustainable alternatives to urban sprawl. Several provisions of TEA-21 create new opportunities for water quality improvements.

TEA-21 creates funding opportunities for a wide variety of water quality enhancement projects and contains additional water-related environmental and planning provisions. The following are the key water-related provisions:

- Transportation Enhancements (TEsl): Funded through a 10 percent set-aside of STY funds, TEsl are projects that improve communities' cultural, aesthetic and environmental qualities. Eligible activities include, for example, bicycle and pedestrian pathways, historic preservation, acquisition of conservation or scenic easements, rails-to-trails projects, and the mitigation of water pollution due to highway runoff.

- Environmental Restoration and Pollution Abatement: Under STY, up to 20 percent of the cost of reconstructing, rehabilitating, resurfacing or restoring a transportation facility may be used to address water pollution or environmental degradation associated with current or past projects. This could include retrofit or construction of storm water treatment systems, nonpoint source best management practices, and riparian or wetland restoration projects.

- Wetlands Restoration: STY and NS funds can be used to help address wetlands losses caused by past Federal-aid transportation projects. In a February 18, 1997 memo from its chief counsel, the Federal Highway Administration indicated that several provisions within Title 23, United States Code, allow states to use funds to "improve or restore wetlands that were affected by past Federal-aid highway projects, even if there is no current Federal-aid project taking place in that vicinity."

- Wetlands Mitigation Banking: TEA-21 establishes a preference for mitigation banks in STY or NS projects that involve natural habitat or wetlands mitigation.

Impacts would have to occur within the service area of the mitigation bank (e.g. watershed), and the bank would have to be approved in accordance the Federal Mitigation Banking guidance and other applicable federal laws and regulations.

- Environmental Streamlining: TEA-21 requires that Federal Agencies work together to streamline environmental review of transportation projects. Currently, projects should be designed to address environmental impacts up-front. Streamlining will speed up reviews under the National Environmental Policy Act and other environmental assessments, including wetlands and storm water permits. The goal of this provision is to integrate the review process and allow State and Federal Agencies to better address important considerations such as analysis of alternatives and cumulative environmental impacts of transportation projects.

- Transportation & Community & System Preservation Pilot: This $120 million pilot encourages States, metropolitan planning organizations and local agencies to plan, develop and implement strategies that integrate transportation and community planning.

- Transportation-Environment Cooperative Research Program: This provision will fund research into the relationship between highway density and ecosystem integrity. It also requires the establishment of an Advisory Board that will make recommendations about environmental research, conservation and technology transfer.

- Clean Vessel Act: TEA-21 continues State grant funding for the construction of pumpout and dump station facilities in marinas. States submit proposals to build these facilities in both coastal and inland waters, and an interagency panel selects proposals offering the greatest benefit to the intended waterway and the general public.

- Regional Metropolitan and Statewide Planning: Certain communities such as Jefferson County have land use planning and zoning authority which can be effective in helping to mitigate non-point source water pollution. Cities have similar kinds of authority. In addition, regional councils represent all of the counties of most of the cities in the watershed. Sub-basin plans can address issues of land use planning, open space protection, and plans for future development, which will be compatible with water quality protection.

TEA-21 consolidates the metropolitan and statewide planning criteria established in 1991. "Protect and enhance the environment" is one of seven broad categories State DOT's and Metropolitan Planning Organizations must consider in preparing long-term transportation plans. This presents an opportunity to look at "sprawl" and to better integrate consideration of watershed plans, wetlands, habitat and open space. [9]

D. TAX INCENTIVES

Conservation Easements

A conservation easement is a legal agreement that property owners may use to place development restrictions on their property. Each easement's restrictions are tailored to the particular property owner's needs and interests and may include limitations on the type or amount of development that may take place. These limitations may be used to protect conservation or historic resources on a parcel of land. If an easement donor wishes to claim tax benefits for the gift, he or she must donate it or sell it for less than fair market value to a public agency or to a conservation or historic preservation organization that qualifies as a public charity under Internal Revenue Code Section 501 (c)(3). An easement may be perpetual or may be a term easement that is written for a specified period of years. Only gifts of perpetual easements, however, can qualify a donor for income and estate tax benefits.

In order to qualify for Internal Revenue Service (IRS) tax-deductibility, an easement must be given exclusively for conservation purposes. The IRS developed several resource categories for tax purposes. These include: Public Recreation and/or Recreation, Significant Natural Habitat, Open Space for Scenic Enjoyment, Open Space Pursuant to Government Policy, and Historic Preservation.

Gift of Remainder Interest

A gift of remainder interest is a charitable contribution of property to a public agency or a conservation or historic preservation organization that allows the owner the right to live on the property until death. Unlike a conservation easement, where the development rights to a property are donated, a donation of remainder interests will donate all or portions of the property itself to the charitable organization upon death of the owner.

Gift by Will (Testamentary Gift)

A charitable contribution of a conservation easement or an outright gift of property can be made by will. The full value of the gift is deductible from estate taxes.

Historic Properties

Federal tax incentives are available for restoration of historic properties which can be especially helpful in preserving town centers and encouraging development in existing communities.

E. OTHER PROGRAMS

Commodity Promotion, Research and Information Act of 1996

The Commodity Promotion, Research and Information Act of 1996, part of the 1996 Farm Bill, authorizes the Secretary of Agriculture, in partnership with agricultural producers, to establish "marketing and promotion orders." The purpose of such orders is to help agricultural producers develop new markets and promote their products. Helping producers meet their conservation objectives is also a stated purpose of establishing marketing and promotion orders. [10]

Marketing and production orders are self-financing. They are funded through deductions or "check-offs" from private commodity transactions with oversight from USDA. Producers, processors, and importers pay the assessments and control how the funds are spent. [10]

To date, most of these check-off funds have been used for marketing, promotion and research. Recently however, producers have been exploring opportunities to use these self-help funds for conservation purposes. The use of marketing and promotion orders to support pollution prevention is a significant opportunity to engage farmers, ranchers, and other sectors of the agricultural production system directly, through self-directed and self-funded activities, in prevention pollution from agricultural lands. [10]

Citizen Involvement

There are currently a number of programs in place for citizens to take an active role in protecting the Black Warrior River Watershed. Watershed education initiatives play a role in energizing and organizing citizen activities. Information and education programs to encourage watershed protection are directed at a diverse group of stakeholders including agricultural producers, builders and contractors, school teachers, students, homeowners, business and community leaders as well as elected officials. *(Also see Initiatives)*

Citizen Complaints

Many water quality impairments are identified through citizen complaints. Complaints may be registered directly to ADEM or through environmental groups such as the Alabama Rivers Alliance (www.911environment.org) or the Alabama Environmental Council (1-800-watchdog or 1-800-982-4364.)

Citizen Suits

Private citizens may also enforce provisions of both the Safe Drinking Water Act and the CWA, as well as permits issued under those acts. Private citizens may commence civil actions against alleged violators of effluent limitations, drinking water regulations or compliance orders, or against the EPA for allegedly failing to perform any nondiscretionary duty under the acts. However, a private citizen must notify the EPA, the alleged violator, and the state in which the violation is alleged to have occurred sixty days prior to commencing the action, except in those cases where a violation of a toxic effluent limitation or a new source performance standard has occurred. This notice allows the EPA or the state to initiate an enforcement action of its own - thus precluding the citizen suit - or to exercise its statutory right to intervene in any action brought under either of the acts. Once a court issues its final order, it also may award litigation costs (including expert witness and attorney fees) to a prevailing or substantially prevailing party. [6]

Private Stewardship

Given the opportunity, landowners will normally incorporate conservation practices into the management of their property. Most landowners are aware of water quality issues but may not have the information needed to minimize nonpoint source pollution. Information and education programs are an important part of any program that relies on private stewardship.

DOCUMENTATION OF SOURCES

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9 Strategy for Protection

STRATEGY FOR PROTECTION

A. Strategies for Protection

1. **Data collection to identify priority watershed areas.**

2. **Reduce nonpoint source pollution from agricultural activities**

3. **Reduce nonpoint source pollution from forestry activities.**

4. **Reduce nonpoint source pollution from abandoned mine lands.**

5. **Reduce nonpoint source pollution from construction, road building and maintenance, and other land clearing activities.**

6. **Reduce nonpoint source pollution from residential sources.**

7. **Reduce pollution from existing and future on-site sewage systems.**

8. **Reduce and/or treat stormwater runoff before entering the watershed.**

9. **Protect groundwater resources through conservation and pollution prevention.**

10. **Seek identification and protection of fish and wildlife habitat through education and incentive programs.**

11. **Cooperate and partner with other Federal, State, local agencies, local citizenry, and advocacy groups to achieve the objectives and strategies described herein**

12. **Raise the level of understanding and awareness of watersheds, their conservation and wise use; and develop long-term support of citizens for watershed planning and management activities.**

1. Data collection to identify priority watershed areas.

Also see Section 10: Current Research and Future Research Needs to identify priority watersheds.

a. Identify existing sampling performed throughout the watershed. Catalog and/or create a directory.

Discussion: Water quality sampling is being performed by industries, drinking water source utilities, government agencies, environmental groups and regulatory groups. By identifying and cataloging all sources of data, a clearer picture of the health of the watershed will emerge and gaps in information will become evident.

Responsible Parties: BWCWP, ADEM

Cooperators: NRCS, ACES, SWCD, ACWP, USGS, GSA, AWW, AWWA, USF&WS, County Environmental Service Divisions, SWMA, NPDES Permitted Industries, Water Treatment Facilities, Drinking Water Utilities, ASMRC, OSM

Potential Funding: 319 Funds, ACWP, ADEM, Public and Private Foundations

Schedule: Ongoing - 12 months

b. Perform additional sampling in areas identified through strategy 1.a.

Discussion: In order to provide a clearer picture of the health of the watershed, sampling should be done in areas where little or no sampling has been performed or additional needs are indicated. The Technical Committee will identify water data needs and will develop a monitoring plan for sampling within the watershed. Monitoring projects will provide the information needed to accomplish the strategies established in this management plan.

Responsible Parties: BWCWP ADEM,

Cooperators: NRCS, ACES, SWCD, ACWP, USGS, GSA, F&WS, AWW, AWWA, Environmental Groups, Civic Groups

Potential Funding: 319 Funds, ACWP, Public and Private Foundations

Schedule: 9 - 18 months from evaluation to implementation. Collection will continue for the life of the partnership.

c. Continue to support organizations collecting data for research within the watershed.

Discussion: Several academic and state groups have performed research on water quality and biodiversity within the watershed. Continued support is necessary to provide a baseline and identify trends within the watershed. Local schools may be utilized for class projects. Continue to support and expand Alabama Water Watch citizens' monitoring program. Explore the potential for passive Isaac Walton League Stream Walks and Visual Assessments.

Responsible Parties: BWCWP, S&WCD, ADEM,
Cooperators: State Universities, GSA, ARA, AWW, AWWA, USGS, and Local Schools
Potential Funding: ADEM 319, Private Sources, National Science Foundation, other public education funds
Schedule: 9 - 18 months

d. Participate in the state's efforts to establish a water quality database and collection of all watershed research and reports. (great idea)

Discussion: The State of Alabama is currently compiling all available water quality data and organizing it by basin. The information will be available through the statewide Clean Water Partnership website. The Black Warrior Clean Water Partnership will compile and maintain a library of all watershed data, including water quality and research reports as well as success stories, and a journal of Watershed restoration activities. The Black Warrior Clean Water Partnership will contribute to the Clean Water Partnership's effort to compile data for the Black Warrior River Basin.
Responsible Parties: BWCWP, Technical Committee
Cooperators: ACWP, Universities, GSA, ADEM, NRCS, ACES, SWCD, ACWP, BWCWP, USGS, GSA, AWW, F&WS, County Environmental Service Divisions, SWMA, NPDES Permitted Industries, Water Treatment Facilities, Drinking Water Utilities
Potential Funding: ADEM, Private and Public Funding
Schedule: 12 - 24 months from plan approval to the initiation of the 'clearinghouse", then for the life of the partnership

e. Develop and maintain a watershed GIS program.

Discussion: Currently, only one county within the watershed is known to have GIS capability sufficient for decision-making. Other GIS databases exist throughout the watershed but they have limited information. Either develop a

database or promote the sharing of information between GIS systems. Support existing GIS and monitoring programs provided by the Geological Survey of Alabama, Regional Planning Commission of Greater Birmingham, The Alabama GIS User's Group, and others to ensure a complete and integrative assessment of all Alabama's water resources
Responsible Parties: BWCWP, Colleges and/or Universities
Cooperators: GSA, ARA, SWMA, OSM, GIS User's Group, ADECA-OWR, County Governments, City Governments
Potential Funding: ADEM, EPA, ACWP, local GIS Partnership
Schedule: Ongoing. 18-36 months to develop and them maintain for the life of the partnership

f. Identify and prioritize subwatersheds with most potential for nonpoint source pollution
Discussion: From data collection findings, identify sub watersheds that are most impacted by agricultural nonpoint source pollution. Remediation efforts, outlined below, should focus on priority watersheds in order to ensure good stewardship of funding.
Responsible Parties: SWCD, NRCS, BWCWP, ACES, ADEM, RC&D Councils
Cooperators: Poultry & Egg Association, Cattleman's Association, Alabama Pulp and Paper Manufacturers Association, Alabama Forestry Association
Potential Funding: EPA, ADEM, Federal, State, and local Grants
Schedule: 12-24 months based on finding. Continue to refine throughout the life of the partnership

2. Reduce nonpoint source pollution from agricultural activities.

a. Involve the agricultural community in watershed planning activities and encourage the establishment of voluntary goals for BMPs within the watershed.
Discussion: Attend meetings of local farm groups such as the Farmers' Federation, Poultry Associations, Cattleman's Association, etc. to discuss water quality and the importance of BMPs. This direct contact with a large diverse group of far operators will be much more effective than attempting to

get them all to attend a watershed stakeholder meeting.

Responsible Parties: NRCS, ACES, BWCWP, SWCD

Cooperators: ALFA, Farmer's Federation, Poultry and Egg Producers Association

Potential Funding: No additional funds necessary

Schedule: Immediately and throughout the planning process

***b. Initiate educational outreach activities with youth involved in agriculture*.**

Discussion: Educational programs for youth involved in agriculture are imperative for agriculture and a healthy watershed. Our plans are to educate the youth and expose them to conservation ideas and practices The outreach program will consist of both presentations and projects to get youth involved in actual applications of BMPs.

Responsible Parties: SWCD, NRCS, RC&D, ACES

Cooperators: ADEM, FFA, Agri-Business Instructors, Landowners, 4H Club, Legacy, Envirothon

Potential Funding: ADEM, Legacy, SWCD, ADAI - Agriculture in the Classroom, agricultural associations

Schedule: Immediately and throughout the planning process.

c. Work with landowners to identify needs and install agricultural BMPs within the watershed.

Discussion: Implementing agricultural BMPs within the watershed will significantly reduce soil erosion, sediment and nutrient loading.

Responsible parties: NRCS, and SWCD

Cooperators: Landowners

Potential Funding: Farm Bill Programs (CRP, WHIP, EQIP, Water Conservation Program, Small Watershed Rehabilitation Program, AACD cost share program) 319 Program, Farm and Ranchland Protection Programs, U.S. FWS.

Schedule: Immediately and throughout the planning process.

d. Coordinate BMP demonstration projects on local farms within the watershed.

Discussion: BMP demonstration projects will promote the understanding and encourage the adoption of BMPs by farmers within the watershed. The projects will demonstrate the effectiveness and feasibility of BMPs on local farms, and will showcase progress of the practices throughout the growing season.

Responsible Parties: NRCS, and SWCD

Cooperators: Landowners

Potential Funding: No additional funding necessary. *See strategy 2.d. above.*

Schedule: 6-24 months from adoption of plan

e. Support initiatives that utilize technical innovations to reduce or reuse poultry litter.

Discussion: Due to pressure to reduce runoff from poultry litter operations, innovative solutions have been proposed. Tennessee Valley RC&D Council hosts a Litter Management Coalition, working with local farmers to reduce or reuse litter and diminish the effects of runoff within the watershed. Current projects include:

- Trucking nutrient rich litter to areas of the state that is nutrient deficient,
- The purchase of new windrow equipment that increases the time litter can stay in houses,
- The use of litter as an alternative fuel source,
- The use of alum in poultry houses to bind phosphorus
- The use of more durable bedding materials (e.g. sand)
- Conversion of litter to pelletized fertilizer
- Use of litter as a livestock feed source
- Installation of more efficient dry stacks

Responsible Parties: BWCWP, ADEM, Tennessee Valley RC&D, NRCS, SWCD

Cooperators: ADEM, FFA, Landowners, Poultry & Egg Producers Association, RC&D, Poultry Companies, ACES, and Universities

Potential Funding: ADEM 319, Legacy

Schedule: 6-24 months from adoption of plan

3. Reduce nonpoint source pollution from forestry activities.

a. Work with forest landowners to educate them concerning the importance of BMPs in reducing nonpoint source pollution before forest harvesting.

Discussion: Work with the forest industry to conduct BMP implementation workshops and seminars for loggers, road builders, site preparation contractors, timber stand improvement contractors, public and private landowners. Distribute BMP educational material to private landowners through large mail outs and distribution through forestry news media.

Responsible Parties: Alabama Forestry Commission, Forestry Planning Committees, Alabama Forestry Association, and Sustainable Forestry Initiative

Cooperators: Auburn University School of Forestry, the Alabama Loggers Council, the Alabama Forestry Association, Alabama Pulp & Paper Council, Alabama Forest Owners Association, Alabama TREASURE Forest Owners Association, Tree Farmer, ADEM

Potential Funding: ADEM 319, Forest Stewards Foundation, U.S. Forest Service, U.S EPA

Schedule: 6-24 months from adoption of plan

b. Involve the forestry community in watershed planning activities and encourage the establishment of voluntary goals for BMPs within the watershed.

Discussion: Attend meetings of forestry groups to discuss water quality and the importance of BMPs. This direct contact with a large diverse group of forest owners will be much more effective than attempting to get them all to attend a watershed stakeholder meeting.

Responsible Parties: BWCWP, Alabama Forestry Commission,

Cooperators: FWPC's, U.S. Forest Service, Alabama Forestry Association, Alabama Forestry Commission, Alabama Loggers Council, ALAWEST, Corporations

Potential Funding: No additional funds necessary

Schedule: 6-24 months from adoption of plan

c. Encourage participation in ISO 14001 Environmental Management Systems and Sustainable Forestry Initiative certifications.

Discussion: ISO 14001 Environmental Management Systems and Sustainable Forestry Initiative programs offer an organization the structure and discipline necessary for effective control of environmental impacts as well as providing public recognition for environmental innovation.

Responsible Parties: Corporations, Forest Stewardship Council

Cooperators: Alabama Logger's Council, AFA

Potential Funding: None Necessary

Schedule: On-going

d. Support initiatives that utilize technical innovations to reduce nonpoint source pollution.

Discussion: Due to pressure to reduce nonpoint source pollution, innovative solutions have been proposed by stakeholders. Demonstration sites need to be developed to support the viabilitiy of these projects.

Responsible Parties: ADEM, ACES, AFC, RC&D, S&WCD

Cooperators: Landowners, Auburn University Engineering Extension (T2)

Funding: ADEM 319, Forestry Commission, Community and Private Foundations

Schedule: 6-24 months from adoption of plan

e. Develop a watershed supplement to the Alabama Forestry BMP (Best Management Practices) Manual.

Discussion: Develop demonstration sites with watershed friendly remediation or protection practices that can be added to the Forestry BMP Manual created and distributed by the Alabama Forestry Commission. Focus will be on innovative, low impact, and effective ways to address sediment and erosion on logging sites in sensitive areas of watershed and in the riparian corridor.

Responsible Parties: BWCWP Forestry Sub Committee, Alabama Forestry Commission, Alabama Pulp and Paper Association

Cooperators: Auburn University School of Forestry, ACES, Alabama Loggers Council, County Forestry and Wildlife Planning Committees

Funding: Alabama Forest Stewards, Alabama Pulp and Paper Association, Forestry and Erosion Control equipment manufacturers.

Schedule: 6-24 months from adoption of plan

4. Reduce nonpoint source pollution from acid mine drainage sites.

a. Work with U.S DOI Office of Surface Mining (OSM)and Alabama's Abandoned Mine Lands Program (AML) to identify acid mine drainage sources.

Discussion: Acid mine drainage is a persistent problem throughout a large portion of the watershed. These counties have had extensive underground and surface mining due to its coal rich deposits in the Warrior Coal Belt. Through surface water quality sampling, additional sites may be located, and depending on the severity, scheduled for remediation.

Responsible Parties: OSM, AML, BWCWP,

Cooperators: AWW, AWWA, Mining Industries, Surface Mining Commission

Potential Funding: Clean Water Initiative Grants, existing State Funding, and U.S. Fish & Wildlife Service

Schedule: 6 months - 18 months for monitoring, 12-24 months for prioritization and remediation planning.

b. Partner with OSM when necessary and effective to reduce acid mine drainage.

Discussion: OSM prioritizes areas of concern for improvement within the watershed. Funds made available through the Clean Water Initiative are available to watershed groups to complete projects relating to acid mine drainage. Partners should be identified to work on these types of projects.

Responsible Parties: OSM, Watershed Groups

Cooperators: ADEM, Mining Industries, ULC

Potential Funding: 319 funding, industries, public and private grant sources, U.S. EPA

Schedule: Ongoing

c. Support initiatives that utilize technical innovations to reduce nonpoint source pollution.

Discussion: Typical remediation involves reshaping and vegetating areas abandoned prior to the "modern" (post 1977 mine reclamation laws). Alternatives with constructed wetlands and bio-remediation hold promise for lower cost and less invasive treatments. The partnership can help assess where treatments are warranted, explore alternatives to standard remediation, and work with research and development groups.

Responsible Parties: AML, OSM, ADEM

Cooperators: ACES, AFC, RC&D, S&WCD, Universities, Environmental Consulting Groups, and Landowners

Funding: ADEM , Forestry Commission, Community and Private Foundations, U.S. EPA.

Schedule: 6-24 months from adoption of plan

5. Reduce nonpoint source pollution from construction, road building and maintenance, and other land clearing activities.

a. Support existing erosion prevention rules, regulations, and education efforts.

Discussion: Regulations and an enforcement structure currently exist to reduce erosion from construction activities. However, due to minimal funding, the manpower necessary to identify poor erosion control practices is lacking.

Responsible Parties: ADEM, State of Alabama, Phase I and II permitees

Cooperators: NRCS, SWCD, county engineers, regional planning commissions, NEMO, Soil & Water Conservation Society (SWCS), Certified Professional in Erosion and Sediment Control (CPESC) Specialist, Auburn University - Engineering Extension "T2".

Potential Funding: U.S. EPA, Legacy, ADEM, Local sources (NPDES permittee funds)

Schedule: 6-24 months from adoption of plan.

b. Identify and rank unpaved roads in the watershed that contributes most to stream sediment loads.

Discussion: Utilize the Watershed Assessment data to identify sub watersheds most impacted by dirt road sediment runoff. Prioritize roads for improvement projects. Work with county commissions and county engineers to develop ranking systems based on standard criteria that include environmental effects. Dirt roads located near 303(d) listed stream segments or in priority areas identified in 1.a. should be given highest priority.

Responsible Parties: County Commissions, ALDOT
Cooperators: NRCS, SWCD, county engineers, regional planning commissions, AWW, NEMO, BWCWP
Potential Funding: DOT, special federal or state appropriations
Schedule: 12-24 months from plan adoption

c. Provide training on sediment and erosion control for public works employees maintaining roads, as well as those involved in road building activities.

Discussion: Hold public workshops as well as private training seminars to target groups. Encourage public works departments and developers to hire trained contractors. Utilize the publications Recommended Practices Manual-A Guideline for Maintenance and Service of Unpaved Roads developed by the Choctawhatchee, Pea and Yellow Rivers Watershed Management Authority (Alabama.) and 2003 Alabama Handbook for Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas (http://swcc.state.al.us). Additional source: Handbook for Controlling Sediment in Urban Areas, (SWCS 20032.)
Responsible Parties: ADEM, Home Builder Associations
Cooperators: County and Municipal Public Work Departments, County and City Engineers and Planners, regional planning commissions, SWMA, SWCS, SWCC, NEMO
Schedule: 6-24 months from adoption of plan

d. Promote the Homebuilders Association of Alabama's (HBAA) Stormwater Certification Program outside of the metro Phase I Area and SWMA's Certification Program within their jurisdiction as well as offer NPS and BMP workshops/educational programs for construction industry.

Discussion: Encourage implementation of NPS control measures during construction through promoting the HBAA Qualified Certified Inspection Program (QCIP), SWMA's Certification Program and offering educational and outreach programs for local governments and builder/contractor groups and their employees. Provide mini-workshops on material addressed. Utilize the Nonpoint Source Education for Municipal Officials (NEMO) to educate and train local city and county officials about NPS and stormwater pollution prevention and treatment.

Responsible Parties: County Homebuilder Associations, ADEM, BWCWP
Cooperators: County and City Officials, engineering and planning departments, regional planning commissions, SWCS, NRCS, IECA, AGC, GBHBA, SWMA.
Potential Funding: EPA, ADEM 319, Legacy, Local
Schedule: 6-24 months from adoption of plan

6. Reduce nonpoint source pollution from residential sources.

a. Develop and distribute a homeowners' informational packet about preventing residential nonpoint source pollution.

Discussion: One household can produce an assortment of nonpoint source pollution from a variety of sources. A homeowners' packet addressing the causes and prevention of NPS pollution will be an efficient and effective way to educate people on responsible homeownership. The packets will include information on septic systems, proper disposal of household wastes, gardening native plant, and low water consumption landscaping tips, and a publication of relevant agencies and phone numbers. These packets will be distributed through local utility companies, realtors associations, extension offices, and public health departments. Pattern after the "Business Partners" series.
Responsible Parties: ADEM, ACES, County Health Departments, RC&D
Cooperators: Real Estate Associations, local utilities, Master Gardeners, Homebuilders Association, NEMO, Project ROSE
Potential Funding: Utilize existing publications. Funding necessary for postage expense.
Schedule: 6-12 months from plan adoption

b. Coordinate pesticide Amnesty Day events for residential hazardous materials disposal.

Discussion: Work with responsible agencies to establish annual Amnesty Day events for residential hazardous materials disposal. Although initial costs may be high due to citizens bringing products stored over several years, costs should decrease in subsequent years. This event may be combined with Agricultural Amnesty Days to maximize efficiency in coordinating the event.

Responsible Parties: Alabama Department of Agriculture & Industries, County Solid Waste Management Departments
Cooperators: ACES, BWCWP, NRCS, S&WCD, Project ROSE
Potential Funding: ADAI, county funds, EPA, foundations, private organizations
Schedule: 6-18 months from plan adoption.

c. Conduct shoreline management presentations to local Lake Protection Associations.

Discussion: Utilize the local Lake Protection Associations to access large numbers of homeowners for generation, implementation and promotion of shoreline management plans. Provide information on the causes and prevention of NPS pollution on and around shorelines. Recruit volunteers for the AWW citizens' monitoring program.
Responsible Parties: BWCWP ACES
Cooperators: Local Lake Protection Associations, ADEM, FERC License holders (APC)
Potential Funding: 319 funding, Legacy
Schedule: 6-18 months from plan adoption.

d. Educate commercial landscapers concerning ways to prevent nonpoint source pollution.

Discussion: It is common for business and river/lakeshore property owners to employ commercial landscapers. Since fertilizer and pesticide runoff are major contributors to the NPS pollution load within the watershed, educating commercial landscapers about ways to mitigate this type of pollution is important. Workshops may be held addressing these issues. The possibility of requiring continuous education for business license renewal may be necessary. Informational brochures may also need to be developed and distributed at the point of sale. Materials will be patterned after the "Business Partners" series of nonpoint source informational materials.
Responsible Parties: BWCWP ACES
Cooperators: ADEM, Homebuilder Associations, NEMO
Potential Funding: 319 Funding
Schedule: 6-18 months from plan adoption.

e. Utilize established garden clubs and civic organizations to reduce residential nonpoint source pollution.

Discussion: Provide technical assistance to homeowners in landscape planning and plant selection, nutrient and chemical applications, shoreline protection and other residential NPS problems. Provide information and assistance on preventing and controlling invasive exotic plant species.

Responsible Parties: ACES, Master Gardener Program, S&WCD

Cooperators: RC&D, ADEM, Legacy, NEMO

Schedule: 12-24 months from plan adoption

f. Work with local governments and landowners to identify needs and install urban and suburban BMPs within the watershed.

Discussion: Implementing BMPs within the watershed will significantly reduce soil erosion, sediment and nutrient loading. Pattern materials after the "Business Partners" series of informational materials.

Responsible parties: Local Governments, NRCS, SWCD

Cooperators: Landowners, Realty Associations, SWCS

Potential Funding: Small Watershed Rehabilitation Program, 319 Program.

Schedule: 12-24 months from plan adoption

7. Reduce pollution from existing and future on-site sewage systems.

a. Using the data provided in strategy 1.a., identify areas with significant impacts from onsite sewage disposal systems (OSDS) (failures, overflows, pollution) and public-owned treatment works (POTW); encourage solutions through education and incentives.

Discussion: Conduct education and outreach to inform residents on proper household septage maintenance. Promote use of alternative onsite sewage treatment systems. Seek support from local pumpers to identify septic tank system failures. Work with engineers, County Health Departments, and State Health Departments to speed up approval process for alternative systems. Seek funding assistance for low-income areas to provide or repair septic tank systems. Encourage pumpers to become certified maintainers of OSDS. Produce and maintain a list of certified pumpers and installers. Utilize the National Technical Information Service's Septic Education Kit to use in workshops, public service announcements and other media. Conduct onsite sewage education workshops in the watershed for the public, local officials, developers, realtors, lenders and school children.

Responsible Parties: County Health Departments, County Commissions, POTWs, local water authorities, Onsite Wastewater Association,ADEM, RC&D

Cooperators: ACES, Alabama Department of Public Health, Alabama Onsite Wastewater Association, SWCD, University of West Alabama - Onsite Waste Water Treatment Education Center

Potential Funding: 319 funding, EPA Rural Hardship Assistance Program, County Commissions, Legacy

Schedule: 12-24 months from plan adoption

b. Reduce septic dumping from boat septic systems.

Discussion: Currently in Alabama there are a number of waterways - including the Warrior River, that lack a mechanism for the appropriate disposal of on-board untreated waste water that includes fecal matter. The Clean Vessel Act established a fund to cost-share the design and installation of marine pump out facilities at public or private locations.

Responsible Parties: DCNR, ADEM

Cooperators: Marina Owners, Boating Distributors, DCNR

Schedule: 12-24 months from plan adoption

8. Reduce and/or treat stormwater runoff before entering the watershed.

a. Identify potential sites for regional stormwater management facilities such as wet ponds, detention basins, offline storm water storage, and constructed wetlands.

Discussion: An evaluation should be performed to identify potential sites for regional stormwater facilities such as constructed wetlands. The economic, environmental, and social aspects of developing regional facilities should be considered. Encourage municipalities to create detention basins to hold stormwater runoff before it enters the nearest water body. Typical stormwater basins are designed to control the peak rate of stormwater runoff, not volume or quality. These basins can be retrofitted into stormwater wetlands, conventional wet ponds, or a combined wetlands-pond system. A modified stormwater control facility has longer storage time, long flow paths, and biological treatment, therefore providing a pollutant treatment aspect to the basin.

Responsible Parties: County and City governments.

Cooperators: County Engineers, County Planning Departments, regional planning commissions, developers, Association of Shopping Malls, NEMO

Potential Funding: County and city governments, 319 funding, grants

Schedule: 12-24 months from plan adoption

b. Encourage municipalities with ADEM to develop and implement stormwater management policies to control both the quantity and quality of stormwater runoff.

Discussion: Stormwater management policies should be updated to include provisions to reduce site runoff, maximize the use of natural drainage systems, and provide treatment to runoff before it enters water bodies. Municipalities should refer to the "How To" publication Considerations for Stormwater and Urban Watershed Management: Developing a Program for Complying with Stormwater Phase II MS4 Permit Requirements and Beyond developed by the Center for Environmental Research and Service, Troy State University and 2003 Alabama Handbook for Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas. Public Officials will be encouraged to attend the Nonpoint Source Education for Municipal and Elected Officials (NEMO) program to provide them the tools to develop effective stormwater policies or management plans.

Responsible Parties: County and City governments, ADEM

Cooperators: Municipal Planners, County and City engineers, Municipal Water Boards, NEMO, American Planning Association - Alabama Chapter

Potential Funding: No additional funding needed.

Schedule: 12-24 months from plan adoption

c. Evaluate current and future impervious cover limits and encourage developments with a minimal amount of impervious land cover.

Discussion: Studies have shown that the hydrology and pollutant loadings in a watershed are directly related to the amount of impervious area in a watershed. Therefore, the best method of reducing runoff is to minimize the amount of impervious area on a site. Implementing practices such as smaller parking lots, narrower residential road widths, shorter driveways, cul-de-sac with islands and open-space planning can minimize the amount of impervious area. Creation of open space increases infiltration of stormwater into the ground resulting in decreased stormwater runoff. Open space also provides wildlife habitat and recreational space, thus increasing economic value. The amounts and locations of future impervious cover within the watershed will be evaluated. Future growth should be encouraged in sub watersheds that appear most capable of absorbing growth in impervious cover. For new subdivisions, municipalities should identify potential conservation or open space lands, both primary (un-developable) and secondary (prime agricultural, streams, wetlands, historic/cultural areas, sensitive areas, etc.) and then locate the development site accordingly. Reduction in impervious areas should be balanced with the social and economic needs of residents and users.

Responsible Parties: City and County Governments

Cooperators: Municipal Planners, Ducks Unlimited, Alabama Natural Heritage, Developer's Associations, Historical Societies, NRCS, regional planning commissions, Homebuilder's Associations, NEMO

Potential Funding: No additional funding needed

Schedule: 12-24 months from plan adoption

d. Promote the use of stormwater drain stencils in residential and urban areas of the watershed.

Discussion: Storm drain stencils are Mylar, plastic or cardboard cut outs of phrases such as "DUMP NO WASTE: DRAINS TO STREAMS." These phrases are spray painted on the storm drains found in many residential and commercial areas. Stenciling may also be used on bridges in rural areas. Storm drain stenciling is a great project for young children and civic groups. Inform teachers, scout leaders, and other civic and environmental organizations of the availability of stencils. The use of stencils can also be promoted through newspaper articles and other forms of recognition.

Responsible Parties: City and County Government,

Cooperators: ADEM, BWCWP, Girl Scouts, Boy Scouts, Educators, and Environmental Clubs, S&WCD

Potential Funding: Local governments, SWCDs, Legacy, Private Entities
Schedule: 12-24 months from plan adoption

e. Install structures/equipment to remove floatables (trash, garbage, litter) from streams.

Discussion: Vast quantities of floatables enter streams by being washed in from roads and ditches. Engineering solutions are available to effectively remove stream floatables.
Responsible Parties: Counties, Cities, Environmental Groups, and BWCWP
Cooperators: Local Governments
Potential Funding: Local Governments, Public and Private Grants
Schedule: 12-24 months from plan adoption

9. Protect groundwater resources through conservation and pollution prevention.

a. Encourage communities using groundwater as the major water supply to become ground Water Guardians.

Discussion: Work with volunteers and the Ground Water Guardians program to develop protocol for groundwater testing.
Responsible Parties: ADEM, Local Water Authorities
Cooperators: GSA, USGS, Ground Water Guardians, ADEM and BWCWP
Potential Funding: ADEM, EPA
Schedule: 12-24 months from plan adoption

b. Educate citizens on water conservation and ways to prevent groundwater pollution.

Discussion: Include a section on water conservation and groundwater pollution prevention within a homeowner's educational brochure. Continue to coordinate established Groundwater Festivals and assist with the expansion to other counties who are not yet participating. Work with teachers to incorporate a groundwater component into other watershed educational activities.
Responsible Parties: ACES
Cooperators: BWCWP, Local school districts, City and County Governments,

Local Water Boards, SWCD, AWW
Potential Funding: City and County Government, Local Water Boards, Private Donations, 319 funding
Schedule: 12-24 months from plan adoption

c. Identify major groundwater withdrawal zones in the watershed.

Discussion: Many municipalities are currently identifying these areas through the Wellhead and Source Water Protection Program. Other significant withdrawal zones within the watershed need identification. Continue to support GSA's Ground-Water Level Monitoring Program.
Responsible Parties: GSA, USGS, and ADEM
Cooperators: ADECA - Office of Water Resources
Potential Funding: 319 funds
Schedule: 12-24 months from plan adoption

10. Seek identification and protection of fish and wildlife habitat through education and incentive programs.

a. Identify and map sensitive habitats, and develop a ranking system for prioritization.

Discussion: Alabama Natural Heritage will use the Nature Conservancy's Biological and Conservation Database (BCD) program as a primary information-managing tool to identify degradation of various threatened and endangered flora and fauna. A map or GIS data layer of sensitive lands and other significant biological features will be produced.
Responsible Parties: Alabama Natural Heritage, DCNR, Game & Fish Division
Cooperators: F&WS, GSA, TNC, and RPC's
Potential Funding: 319 funding, public and/or private foundations
Schedule: 12-24 months from plan adoption

b. Identify subwatersheds with significant habitat restoration needs and rank valuable parcels for acquisition or other forms of protection.

Discussion: Develop ecological indicators that can be used to identify valuable habitats in the Watershed. Evaluate using remote sensing, to identify sub watersheds with significant habitat loss. Identify possible areas for restoration based on their potential benefit for fish and wildlife and/or to mitigate water quality effects from adjacent land use activities. Prioritize areas for habitat restoration and important parcels for protection. Develop report and map to justify ranking and distribute to land protection organizations. Seek to acquire sensitive areas through existing land conservation organizations.

Responsible Parties: Alabama Natural Heritage

Cooperators: The Nature Conservancy, F&WS, Black Warrior/Cahaba River Land Trust, GSA, RC&D, Legacy, Ducks Unlimited, Trust for Public Land, Land Trust Alliance, Forever Wild, Alabama Forest Resources Center, Farm and Ranchland Protection Program, regional planning commissions, Auburn University Department of Wildlife and Fresh Water Fisheries

Potential Funding: 319 funding, public/private foundations, LWCF, SEP, FRAP

Schedule: 12-24 months from plan adoption

c. Utilize existing programs to provide cost-share to landowners for habitat restoration and protection activities such as Environmental Quality Incentives Program (EQIP), Wetlands Reserve Program (WRP), Conservation Reserve Program (CRP), and Partners for Wildlife (FWS), conservation easements, tax incentives and other land protection programs. Pursue funding to establish new grant or cost-share opportunities for habitat protection activities.

Discussion: Assist NRCS and FWS in informing landowners of the availability of federal cost-share assistance for habitat protection. Many programs are available to assist landowners in habitat restoration and protection activities; however, many landowners are not aware that programs are available or do not rank habitat protection as a management priority. Develop educational programs that include literature, workshops, and press releases on conservation options. Hold workshops for the general public on conservation easements and other land protection strategies. Write grants to fund additional programs that will provide cost-share at a higher rate, increasing the incentive for participation.

Responsible Parties: SWCD, NRCS, BWCWP

Cooperators: The Nature Conservancy, F&WS, Black Warrior/Cahaba Land Trust, GSA, RC&D, Legacy, Ducks Unlimited, Trust for Public Land, Land Trust Alliance, Forever Wild, Alabama Forest Resources Center
Potential Funding: public/private foundations, FTP
Schedule: 12-24 months from plan adoption

d. Provide educational programs for the general public and K-12 on the economic, social and environmental benefits of wetlands.
Discussions: Utilize existing wetland presentations and develop literature that addresses the importance of wetland protection and the effects of wetland loss. Written materials will be provided to the media for publication.
Responsible Parties: BWCWP, S&WCD, F&WS, CDNR
Cooperators: Local schools, advocacy groups, Legacy, ACES
Schedule: 12-24 months from plan adoption

11. Cooperate and partner with other Federal, State, and local agencies to achieve the objectives and strategies described herein.

a. Review Watershed Management Plan bi-annually and update the plan as necessary.
Discussion: Utilize stream, lake, and groundwater monitoring results to evaluate effectiveness of BMP. Monitor citizen concerns, revised EPA/ADEM regulations, new 303(d) listings, etc. to achieve maximum improvement in water quality and removal of streams from the 303(d) list. Solicit comment on the draft plan and future plan revisions from stakeholders. Seek to have an official "Adoption" of the Plan by public officials.
Responsible Parties: BWCWP Action and Steering Committees, ADEM
Cooperators: All Stakeholders
Potential Funding: No additional funding needed
Schedule: within 24 months from plan adoption

b. Work with ADEM through the TMDL process to ensure effective and efficient TMDL origination and implementation.
Discussion: Total Maximum Daily Loads (TMDLs) will be established for water

bodies within the Black Warrior River Basin by 2004. TMDLs will establish a limit on specific pollutants coming from all point and nonpoint sources contributing to a particular water body. The BWCWP will work with ADEM to provide data, stakeholder involvement and technical review that will be beneficial in the development of the watershed's TMDLs. Public participation throughout the process will be encouraged, as well as written comment during the public comment period. When the TMDL data is available, the Plan's BMPs will be adjusted as necessary to give highest priority to TMDL regulations on 303(d) listed streams.
Responsible Parties: ADEM
Cooperators: All stakeholders in impaired watershed
Potential Funding: Unknown
Schedule: within 24 months from plan adoption

c. Encourage all agencies involved to sign memorandum of understanding supporting the management strategies.
Discussion: Following public comment period, develop a Memorandum of Understanding to seek continued agency support of objectives and strategies identified in the Watershed Management Plan.
Responsible Parties: BWCWP
Potential Funding: No additional funding needed
Schedule: within 24 months from plan adoption

12. Raise the level of understanding and awareness of watersheds and develop long-term support of citizens for watershed planning and management activities.

a. Continue annual Project ROW (Reclaim Our Waterways) watershed cleanup days.
Discussion: There has recently been established an annual cleanup effort, designated "Project ROW (Reclaim Our Waterways.)" This annual cleanup effort, in conjunction with the US Corps of Engineers' Public Lands Day, will rotate throughout the watershed, raising awareness of nonpoint source pollution, local watershed groups and identifying new stakeholders for the

Action Committee.

Responsible Parties: BWCWP, US. Corps of Engineers,

Cooperators: Department of Health Officials, environmental regulatory agencies, SWCD, NRCS, RC&D, Black Warrior Riverkeeper, permitted industries, environmental groups, citizen groups, and other interested parties.

Potential Funding: No additional funds needed. Funding is developed within and through the support of the cleanup committee.

Schedule: Ongoing and throughout first 24 months from plan adoption

b. Utilize existing programs to expand environmental awareness among K-12 grade students.

Discussion: There is a vast amount of environmental education material and programs available for schools, educators and others involved in environmental education. The project coordinator will research, acquire and make available such resources to teachers and students. Small Schools Initiative (PACERS) provides online environmental education curriculum and river ecology curriculum. The project coordinator will develop presentations and recruit volunteers to do presentations, to local classes and youth groups.

Responsible Parties: BWCWP, Legacy, ACWP, RC&D, SWCD, NRCS

Cooperators: FWS, ADEM, Local School Districts, PACERS, RUS, APC, Project ROSE

Schedule: Ongoing and throughout first 24 months from plan adoption

c. Utilize the news media to increase public awareness about efforts within the watershed.

Discussion: Publish articles in local newspapers and newsletters periodically to update citizens on activities within the watershed. Use local radio stations to do public service announcements (PSA's). Promote the ACWP PSA's at local television stations.

Responsible Parties: BWCWP

Cooperators: Local newspapers, television stations, radio stations, ACWP, ADEM

Potential Funding: No additional funding needed.

Schedule: Ongoing and throughout first 24 months from plan adoption

d. Maintain the Black Warrior River Clean Water Partnership website.

Discussion: The Black Warrior River Clean Water Partnership website provides information regarding nonpoint source pollution, local watershed groups and activities of the BWCWP. Additionally, photos submitted by stakeholders of water bodies within the watershed are posted. Minutes from the BWCWP Sub-Basin Action Committee are also posted.

Responsible Parties: BWCWP

Potential Funding: No additional funding needed. Website hosting secured through a donation from P&M Mining Co., an active participant in the BWCWP.

Schedule: Ongoing

e. Design and print brochures describing the goals and objectives of the BWCWP.

Discussion: Develop a logo and brochure introducing the BWCWP to increase public awareness and develop new stakeholders.

Responsible Parties: BWCWP

Cooperators: ACWP

Potential Funding 319 funding, in-kind donations, Legacy

Schedule: Ongoing and throughout first 24 months from plan adoption

f. Provide signage on stream crossings at major roads to identify the water body.

Discussion: By providing a "name" to an otherwise nameless stream, will generate an increased sense of ownership within the community and therefore, an increased awareness of watersheds and water quality issues.

Responsible Parties: BWCWP

Cooperators: Public Highway Departments, County and City Road Departments, SWCD, NRCS, RC&D, AL DOT

Potential Funding: 319 funding, in-kind donations, public/private foundations, AL DOT

Schedule: Ongoing and throughout first 24 months from plan adoption

g. Educate citizens on local, State and Federal regulations governing water quality, enforcement options and BMPs.

Discussion: Training and literature can be developed to educate citizens on water quality regulations and Best Management Practices. Volunteers will learn the difference between a site that is being cleared with no potential violations and a site that has the potential to negatively affect water quality. If necessary, a regulatory authority will be contacted to address water quality violations.

Responsible Parties: BWCWP, AWW, Local watershed groups

Cooperators: ADEM

Potential Funding: 319 funding, Legacy

Schedule: Throughout first 24 months from plan adoption

h. Support grassroots watershed organizations. Promote watershed projects throughout the watershed.

Discussion: Encourage the development of new watershed organizations and provide support to existing organizations. Additional awareness will assist in furthering the objectives of this plan. Provide appropriate educational materials and assist in the development of the organization's brochures for recruitment. Maintain a list of watershed projects within the watershed and promote to raise awareness of watershed issues. Obtain watershed protection plans from drinking water suppliers and provide assistance in obtaining their strategies.

Responsible Parties: BWCWP

Cooperators: S&WCD, NRCS, RC&D

Potential Funding: 319 funding, Legacy, public/private foundations, SEWF, EI

Schedule: Ongoing and throughout first 24 months from plan adoption

i. Provide conference scholarships for stakeholders to increase the knowledge base of water quality issues.

Discussion: Many stakeholders are citizen volunteers that cannot afford to attend conferences. Encourage submission of scholarship application when the conference provides for scholarships. Assist with travel and hotel expense. This will educate more stakeholders in water quality issues providing for a higher level of participation.

Responsible Parties: BWCWP

Cooperators: To be determined

Potential Funding: ADEM, Donations, private funds, Southeast Watershed

Forum, Environmental Institute
Schedule: Ongoing and throughout first 24 months from plan adoption

j. Provide assistance to grassroots organizations in the development and implementation of Stream Restoration.

Discussion: Many local groups have a strong interest and desire to affect change in their portion of the watershed. Stream restoration activities can be simple low cost, but labor intensive way for them to make a difference. Encourage projects with local leadership that will install stream restoration activities. Provide technical and logistical support.
Responsible Parties: BWCWP
Cooperators: local grassroots groups, civic organizations, NRCS, SWCD, SWCS, State Stream Restoration Committee
Potential Funding: ADEM, Donations, private funds, Southeast Watershed Forum, Environmental Institute
Schedule: 12-24 months from plan adoption

B. FLOODING

Sediment and Siltation

Encourage municipalities and counties to develop and implement effective erosion and sedimentation control ordinances to control the quantity and nature of sediment releases from development and other land-disturbing activities.

Development

Use zoning and development scale regulations to effectively and responsibly require the use of pre-/post-development runoff analysis and attenuation to mitigate the increased runoff resulting from development

Impose overall limits on the amount of impervious surfaces per developed acre to enhance the runoff-attenuating characteristics of developed watersheds and promote runoff-friendly developments.

Provide financial support for migrating threats to the watershed and watershed-friendly improvements by imposing watershed protection fees on development projects.

Implement financial incentives for flash-reducing development strategies, such as underground detention/retention systems, wetlands creation or over-sized natural areas through protection fee rebates and credits.

Promote and encourage the use of land-use neutral stormwater management tools such as underground detention and retention systems.

Promote and encourage the use of stormwater uptake tools such as vegetation with high uptake characteristics.

Promote and encourage creation of public recreation areas, such as community ponds, which serve to attenuate storm water discharges as well as provide for stormwater treatment through supporting wetlands.

Landowner Reaction to Localized Flooding

Encourage and promote education directed at enhance landowners' awareness of the impact of unsophisticated management techniques, public resources for effective stormwater management

STRATEGY FOR PROTECTION

10 Current Research and Future Research Needs

A. ADDITIONAL DATA AND MONITORING

According to the Southeast Watershed Forum's Survey of Local Watershed Activity in the Southeast, "…only one-third of all watershed organizations in the Southeast have the physical and chemical water quality data needed. There is a need for more water quality data, particularly at the watershed and tributary level. Additionally, only 17% of the organizations surveyed have information on groundwater quality, which is a key factor in protecting families served by private wells, and communities served by groundwater." [2]

Financial and technical support available to State regulatory agencies as well as local watershed groups does not seem to be substantial enough to maintain current water quality protection efforts, much less increase efforts to restore degraded streams under the continuing pressures of growth and development in the Southeast. [1]

EPA and the State of Alabama need comprehensive water quality monitoring and assessment information on environmental conditions and changes over time to help set levels of protection in water quality standards and to identify problem areas that are emerging or that need additional regulatory and non-regulatory actions to support water quality management decisions such as TMDLs, NPDES permits, enforcement, and nonpoint source management. This information could also be used to inform EPA, State decision makers, the public, and other stakeholders of progress made within the watershed. Without this information, it is difficult to set priorities, evaluate the success of programs and activities, and report accomplishments in a credible and informed way.

The Black Warrior River Watershed would greatly benefit from a coordinated water quality monitoring effort. Evidence from a variety of publications areas follows:

- *Rapid population growth coupled with increasing agricultural and industrial demands has caused local water shortages in some areas and threatens to do so in others. Ground water level monitoring should be performed on a consistent basis to ensure the availability of water is sufficient to meet increasing demands. A new development that may affect Alabama's water availability in some areas is the permitting of merchant power plants in the state. Up to 20 of these unregulated plants could be installed. Depending on* *the specific plant, up to 11 million gallons of water per day could be withdrawn from either surface or ground water sources. The effects of this rate of withdrawal from Alabama aquifers have not been studied.* Source: Geological Survey of Alabama 2002 Annual Report.

- *Although the Mulberry Fork is a popular recreational river, relatively little public information is available on water-quality and biological condition in the drainage.* Source: Geological Survey of Alabama. *Biomonitoring in the Mulberry Fork Watershed, 1999-2002*. Tuscaloosa, 2002.

- *The recent attention to the TMDL program raises some challenging questions about the quality of the nation's surface waters, those subject to the Clean Water Act. After nearly 30 years of implementing the law, EPA and states acknowledge that a substantial portion of the nation's waters still are impaired or threatened by pollution. The most recent national inventory of water quality reported that nearly 40% of surveyed water bodies remain too polluted for fishing, swimming, and other designated uses. Yet those numbers only represent rivers, streams, and lakes actually surveyed by state monitoring programs - typically about one-third of all waters. The TMDL assessments now being developed by states are yielding more precise water quality information and are identifying large numbers of stream segments which require additional measures before water quality standards are attained.* Source: Copeland, Claudia. "Clean Water Act and Total Maximum Daily Loads (TMDLs) of Pollutants." CRS Report for Congress. 97-831 ENR, Updated June 7, 2002. Congressional Research Service. Library of Congress.

- The 1996 amendments to the Safe Drinking Water Act provided for new efforts to identify sources of drinking water and to protect these sources. Such efforts can be enhanced by improved coordination with water pollution control programs, such as the Clean Water Partnership, or other programs implemented under the Clean Water Act and other water quality protection laws. As a part of this effort, assessment is needed on a watershed basis, to identify the problems that impair the designated uses of waters, with a priority on waters designated for use as drinking water. [1]

Improvements in monitoring, research, and assessments are needed to provide consistent and reliable information on the condition of, and threats to, aquatic resources, including habitat alteration, polluted runoff, and point source discharge. Much of the information is fragmentary and incompatible because it is collected through programs that are designed and conducted at different scales or for different objectives (compliance versus resource assessment), and because standards are inconsistent for sampling methodology and data management and sharing. [1]

More accurate estimates of the sources, transport, and impacts of polluted runoff are needed to guide the implementation of management actions. Effective monitoring of polluted runoff is challenging because of different environmental settings and land uses. Because of its wide distribution, monitoring alone cannot adequately characterize polluted runoff. [1]

Better survey methods and computerized models are needed, with special attention given to determine location and relative contribution of sources of nitrogen and phosphorus. This includes isotope studies to pinpoint sources from animal feeding operations versus chemical fertilizers; remote sending; soil and water sampling devices; and source identification of sediments. [1]

Recommendations:

- **Development of a monitoring and assessment program consistent with EPA guidelines** *(Elements of a State Water Monitoring and Assessment Program, March 2003. EPA Publication #EPA 841-B-03-003)* which addresses ten elements summarized below:

1. Monitoring Program Strategy

   Develop a comprehensive monitoring program strategy that serves the water quality management needs of the Black Warrior River Watershed and addresses all waters, including streams, rivers, lakes, reservoirs, wetlands, and groundwater. This strategy should contain or reference a description of how to address each of the remaining nine elements.

   An integrative approach, working with other environmental managers and interested stakeholders (including EPA Regions, other Federal water quality and land management agencies, volunteer monitoring organizations, and academic institutions) should be developed. This collaboration provides an opportunity to maximize its use of other parties' data and effectively expand its monitoring resources. Other States have formed monitoring councils that help facilitate coordination of monitoring activities among various organizations.

2. Monitoring Objectives
Identify monitoring objectives critical to the design of a monitoring program that is efficient and effective in generating data that serve management decision needs. Develop a strategy and implement a monitoring program that reflects a full range of water quality management objectives including, but not limited to, Clean Water Act goals. For example, monitoring objectives could include determining water quality status and trends, identifying impaired waters, identifying causes and sources of water quality problems, implementing water quality management programs, and evaluating program effectiveness.

3. Monitoring Design
Develop an approach and rationale for selection of monitoring designs and sample sites that best serve monitoring objectives. The monitoring program will likely integrate several monitoring designs (e.g., fixed station, intensive and screening-level monitoring, rotating basin, judgmental and probability design) to meet the full range of decision needs. The monitoring design should include a probability-based network for making statistically valid inferences about the condition of all water types, over time.

4. Core and Supplemental Water Quality Indicators
Use a tiered approach to monitoring that includes core indicators selected to represent each applicable designated use, plus supplemental indicators selected according to site-specific or project-specific decision criteria. Core indicators for each water resource type include physical/habitat, chemical/toxicological, and biological/ecological endpoints as appropriate, which can be used routinely to assess attainment with applicable water quality standards throughout the watershed. Supplemental indicators are used when there is a reasonable expectation that a specific pollutant may be present in a

watershed, when core indicators indicate impairment, or to support a special study such as screening for potential pollutants of concern.

5. Quality Assurance
   Quality management plans and quality assurance program/project plans should be established, maintained, and peer reviewed to ensure the scientific validity of monitoring and laboratory activities.

6. Data Management
   Use an accessible electronic data system for water quality, fish tissue, toxicity, sediment chemistry, habitat, biological data, with timely data entry (following appropriate metadata and State/Federal geo-locational standards) and public access defining the geographic location of assessment units using the National Hydrography Dataset (NHD).

7. Data Analysis/Assessment
   Develop a methodology for assessing attainment of water quality standards based on analysis of various types of data (chemical, physical, biological, land use) from various sources, for all waterbody types and all waters. The methodology includes criteria for compiling, analyzing, and integrating all readily available and existing information (e.g., volunteer monitoring data, discharge monitoring reports).

8. Reporting
   The program should be able to produce timely and complete water quality reports and lists supporting Sections 305(b), 303(d), 314, and 319 of the Clean Water Act.

9. Programmatic Evaluation
   Periodic reviews of each aspect of its monitoring program should be made to determine how well the program serves its water quality decision needs for all waters, including all waterbody types. This should involve evaluating the monitoring program to determine how well each of the elements is addressed and determining how needed changes and additions are incorporated into future monitoring strategies.

10. <u>General Support and Infrastructure Planning</u>

Identify current and future resource needs required to fully implement the monitoring program strategy. This needs assessment should describe funding, staff, training, laboratory resources, and upcoming improvements. Make data publicly available. *(See #6 Data Management.)*

Today, as many entities are moving to a watershed approach with a commitment to identify and address remaining water quality problem areas, good information about the condition of waters and the health of aquatic systems on a watershed scale is absolutely critical. Federal, state, local governments, and businesses will need to make increased investments in water quality information.

Better data is important, but this information needs to be delivered to the public in a useful and easily accessible form. Using new computer systems capable of mapping water quality data, it is now possible to generate detailed information about the condition of specific waters and watersheds. In addition, the Internet makes it possible to deliver detailed and localized water quality data and maps to the greatest number of people. By providing this information and the assessment tools to make it meaningful, government agencies can inform the public about the condition of waters where they live and thereby empower citizens to get involved in restoring and protecting water quality. [1]

- **Stream and River Classification**

Classification of waterways is an essential part of any watershed management plan. All bodies of water contribute to the condition of the watershed. Sedimentation is a major concern within many watersheds. The influence of this natural condition should be studied and characterized. These are very complex by definition and are in need of study to become a component of any management plan. David Rosgen, PhD (1994) has worked for many years to create a model for stream and river classification.

The Black Warrior River Basin encompasses a multitude of stream and river morphology due to the differing geology and relief. These various systems contribute and also complicate the implementation of a watershed management plan. Under this stage of watershed management, funding should be provided to classify (Type I & II) streams and rivers (Rosgen 1994) for assessment to provide data that will yield conditions concurrent to the natural state of the system.

After a complete study of the basin to understand and assess the steam types has been established, further evaluation of the streams and rivers should be performed, such as hydrologic, stability, biological (type III & IV Rosgen, 1994, Kuhnle and Simon, 2000), and bioassessment (EPA protocol) to evaluate the potential for restoration and habitat re-establishment.

- **Compile and/or Increase Biological Assessment Studies**

  Macroinvertebrate and fish communities serve as excellent indicators of water quality. They inhabit these areas for most of all of their life cycles (up to 10 years or longer) and, therefore, reflect recent as well as historical environmental conditions. Resident biota in a water body function as continual monitors of environmental quality, capable of detecting both the effects of episodic and cumulative pollution as well as the effects of altering available habitat. Any stress (biological, chemical, or physical) imposed on an aquatic ecosystem manifests its impact in the biological organisms present in that ecosystem such that the organisms might not recover to reestablish their pre-stress community structure. Therefore, the structure and function of resident biota are the only direct measurements of the condition of the aquatic ecosystem. [4]

  Biological assessments are evaluations of the condition of water bodies using surveys and other direct measurements of resident biological organisms (macroinvertebrates, fish, and plants). Biological assessment results are used to answer the question of whether water bodies support survival and reproduction of desirable fish, shellfish, and other aquatic species. Typically, during a water quality investigation, a water quality meter will be used to assess in-situ parameters, such as temperature, dissolved oxygen, pH, specific conductivity, salinity, and turbidity. Taken alone, these measurements do not give a comprehensive picture of water quality at a particular sample station. However, when combined with the other biological parameters and with other sampling results from efforts conducted as part of an overall watershed assessment, these data become a confirming piece of the puzzle in analyzing biological and water quality conditions. [4]

- **Baseline Support and Evaluation**

  Previous studies should be revisited to provide a baseline of comparison. Listed below are only studies identified during the compilation of the management plan. A comprehensive list could be compiled upon further investigation.

  1. *Application of the Index of Biotic Integrity for Assessing Biological Condition of Wadeable Streams in the Black Warrior River System, Alabama.* Geological Survey of Alabama. Bulletin 169. Tuscaloosa, Alabama. 2000.
     - Study should be expanded and performed on other streams within the Black Warrior River System to establish a baseline for biological integrity.
  2. *Acid Mine Drainage in Cane Creek Basin, Near Oakman, Walker County, Alabama. Geological Survey of Alabama.* Circular 64. University, Alabama. 1970. Study should be re-performed to include efforts of the Alabama Department of Industrial Relations-Abandoned Mine Land reclamation project.
  3. *Water-Quality Assessment of the North Alabama Junction Abandoned Mine Land Reclamation Project Area, East-Central Tuscaloosa County, Alabama.* Geological Survey of Alabama. Circular 151. Tuscaloosa, Alabama. 1990.
  4. *Effects of Coalbed Methane Development on the Water-Quality and Fish and Benthic Invertebrate Communities of the Big Sandy Creek Drainage System, Alabama.* Geological Survey of Alabama. Circular 171. 1993.
  5. *An Assessment of Impacts from Animal Waste Runoff in Lewis Smith Lake and Selected Streams in Cullman and Winston Counties, 1994 Interim Report.* Auburn University. Department of Fisheries and Allied Aquaculture.
  6. *Effect of Surface Coal Mining on the Hydrology of Crooked and Turkey Creek Basins, Jefferson County. Alabama.* Puente, Celso, Newton, J.G.

U.S. Geological Survey. Water Resources Investigations 79-91. August, 1979.

7. Cole, E.F., 1985. *Water-quality and sedimentation data from Lake Tuscaloosa and selected tributaries, North River Basin, Alabama-water year 1983.* U.S. Geological Survey Open File Report 85-0091.
8. Slack, L.J., 1987, *Water Quality of Lake Tuscaloosa and Streamflow and Water-Quality of Selected Tributaries to Lake Tuscaloosa, Alabama, 1982-86.* U.S. Geological Survey Water Resources Investigations Report 87-4002.
9. *Problem Assessment Report for the Upper Black Warrior Water Quality Project in North Central Alabama.* Technical Task Force. Upper Black Warrior Water Quality Project. Funded by ADEM. 1989.

- **Increased and continued monitoring and analyses of the physical, chemical, biological, and habitat conditions of the river's main stem and tributaries**

  Comprehensive monitoring is necessary to obtain a clear picture of the health of the watershed. Additional soils, land use, topography, and water quality data is needed to provide reliable and scientifically defensible indicators of real and potential threats to the basin's environmental and economic health. [5]

- **Support programs that focus on collaboration between multiple groups.**

  Collaborative efforts within the Black Warrior River Watershed include:
  - Mobile River Basin Coalition
  - Challenge 21
  - Black Warrior Clean Water Partnership
  - Soil & Water Conservation District's Watershed Assessment
  - Hurricane Creek Watershed Forum
  - Five Mile Creek Greenway Partnership
  - Region 2020

- **Support programs that involve citizens in gathering water quality monitoring data.**
  - Alabama Water Watch
  - Globe Program

- **Identify the source(s) of impairment (i.e. natural, development, forestry, mining, etc.)**

  Water quality impairment may be caused by one source or by a combination of several sources. Correctly identifying the source(s) of impairment allows for efficient and cost-effective remedial action.

B. EXISTING RESEARCH AND MONITORING

The Black Warrior River Watershed has been the focus of numerous monitoring projects over the last 10 years. ADEM and EPA, Region IV's Clean Water Act, Section 319 Program have funded many of these projects. Agencies that monitor water quality within the Watershed are included below.

Geological Survey of Alabama (GSA)

The Geological Survey of Alabama, established in 1848, provides service and information to Alabama and its citizens as a natural resource data gathering and research agency. As part of its mission, GSA explores and evaluates the mineral, water, energy, biological, and other natural resources of the State of Alabama and conducts basic and applied research in these fields. Numerous resources for the state, as well as the Black Warrior River Basin may be found at www.gsa.state.al.us.

Alabama Water Watch (AWW) www.alabamawaterwatch.org

The Alabama Water Watch program, a program funded in part by the US EPA and ADEM Clean Water Act Section 319 grants, has a proven record of collecting quality data through its network of highly motivated, trained, volunteer citizen monitors. The program has put protocols in place to monitor for six physical and chemical parameters: pH, temperature, hardness, alkalinity, dissolved oxygen (DO), and turbidity; coliform bacteria and *E. coli*; and stream health based on a simple citizen level macroinvertebrate stream assessment.

As important as the data collection and data quality are, the greatest benefit of AWW is its ability to mobilize and bring citizens together to solve water quality problems where they exist and prevent them from developing where they do not exist.

Thirty-five (35) Alabama Water Watch groups have provided sampling information for 168 sites within the Black Warrior River Basin. Sixty-three (63) of these sites are currently active. *See Appendix H for a map of Alabama Water Watch sampling sites within the Black Warrior River Basin and a list of active and inactive sites.*

U.S. Department of the Interior,
Office of Surface Mining - Birmingham Field Office

The Birmingham Field Office (BFO) of the Office of Surface Mining (OSM) conducts oversight evaluations of the Alabama Surface Mining Commission (ASMC) and the Alabama Department of Industrial Relations (ADIR), the State coal mine regulatory and abandoned mine lands (AML) program agencies, respectively. The BFO regularly conducts field studies and water quality testing on known AML sites. [1]

Rule 880-X-8E-.06 (j) describes the requirements of the surface water monitoring plan that should be included in mining permit applications. This regulation requires that all surface water monitoring locations that are discharging and impacted by mining are monitored for total dissolved solids or specific conductance corrected to 25 degrees centigrade, total suspended solids, pH, total iron, total manganese, and flow. Point source discharges should be monitored following standards required by the NPDES permitting authority. Each complete inspection requires the testing of sediment pond discharges on the permit, and the parameters listed above should be addressed. [6]

ASMC gathers baseline hydrological data before the mine commences operations. At each inspection, the inspector notes the historical hydrological data of the particular mine that is being inspected and checks the characteristics of each basin. If there is any indication that there is a metals problem or suspended solids problem, the inspector will gather a sample and transport it directly to the hydrologist or the hydrologist will go on-site to retrieve a sample. The ASMC inspector tests the discharges from any pond during a complete permit inspection for pH and will test for iron on any new permit issued. A sample may be taken to test for manganese and will be brought to the hydrologist to be lab tested. Water discharge samples are also tested for total suspended solids or total dissolved solids on an as needed basis. ASMC uses the NPDES reports that the permittee submits to ASMC each quarter to analyze possible hydrological problems on a permit. [6]

Each parameter mentioned in Rule 880-X-8E-.06 (j) is tested during the life of the mine; however, only pH is routinely tested when sediment pond discharges are sampled during complete inspections. Iron, manganese, and total suspended solids are tested on an as needed basis when there is an indication, either visually or historically, of a problem. [6] See Figure 39: ACid Mine Drainage for AML Acid Mine Drainage Sampling Results in Section 4: Documented Impairments - Alteratin of pH from Outside Sources.

Jefferson County Storm Water Management Authority (SWMA)

Storm Water Management Authority, Inc. (SWMA) compiles and maintains extensive records and GIS data of the watersheds within Jefferson County (Cahaba and Warrior). SWMA monitors storm water to meet the mandatory requirements of the NPDES Phase I permit issued by EPA on behalf of the member jurisdictions (currently 26).

SWMA collects three types of samples: Instreams, Screening Points, and Characterizations.

- Instreams are collected to establish baselines for all 6 major receiving waters in both watersheds: Turkey, Five Mile, Village, Valley, Shades and the Cahaba. Eighteen (18) instream sites are monitored seasonally both during rain and non- rain events. Eleven (11) sites are located in the Warrior Watershed. Water samples are analyzed for forty-two (42) total parameters including metals, nutrients (in various phases), chemicals, pH, TSS, TDS, fecal counts, and runoff components such as oil and grease
- Screening Points are strategically located below major outfalls. Major outfalls include pipes, man-made channels, and tributaries. This type of monitoring enables SWMA to detect illicit connections and/or illegal dumping. There are 139 sites monitored during the first part of rain events annually. There are 85 sites located in the Warrior Basin. The water quality parameters such as surfactants, metals, nutrients, fecal coliform and oil and grease are analyzed.
- Characterizations are collected to analyze runoff components from homogeneous land usage. SWMA monitors 7 sites seasonally during rain events. There are 4 located in the Warrior Basin. The water quality parameters such as pH, nutrients, BOD, TSS, TDS, oil and grease are analyzed.

U.S. Geological Survey (USGS)

The USGS provides maps, reports and information to help others meet their needs to manage, develop, and protect America's water, energy, mineral, and land resources. They identify the natural resources and supply scientific understanding needed to help minimize or mitigate the effects of natural hazards and environmental damage caused by human activities. Water data for Alabama can be found on their website at http://al.water.usgs.gov and includes:

- Alabama Current Streamflow Conditions
- Daily Streamflow Conditions for Alabama
- Duration Graphs for Selected Alabama Stations
- National Daily Streamflow Conditions

The United States Geological Survey maintains streamflow data for quite a few sites in the Warrior Watershed. Figure 62 references a list of these sites, ranked in order of flow volume (2002b). The average streamflow of the four gauge stations listed on the Black Warrior River proper is 6636 ft3/s.

The USGS has offices in every State, thus providing a local presence and facilitating relations with the public and private sectors, academia, and Federal, State, and local agencies. Several USGS activities in Alabama that include the Black Warrior River Watershed:

- **Flood Magnitude and Frequency**
  The USGS has developed methods of estimating peak discharges for floods of various recurrence intervals for rural streams in Alabama not affected by regulation or urbanization. With accurate estimates of flood magnitude and frequency, planners and managers can improve the design of highway bridges and culverts, determine locations for water- and wastewater treatment facilities, and establish flood-insurance rates.

- **Monitoring the Quality of Public Water Supplies**
  For several years, the USGS has had ongoing cooperative agreements with the Cities of Tuscaloosa and Birmingham to monitor the quality of water in their public supply reservoirs. The basic study involves monitoring the major tributaries of the reservoirs to establish a baseline of water-quality data.

Figure 62

LONG-TERM MEDIAN STREAMFLOWS FOR THE BLACK WARRIOR RIVER AND MAJOR TRIBUTARIES THEREOF, AS MONITORED BY USGS

USGS Station Name	Longterm Median Streamflow (ft3/s)
Village Creek at 86th Street N at Roebuck	3.1
Turkey Creek near Tuscaloosa	7.8
Halls Creek at Bessemer	9.6
Blue Springs Creek near Blountsville	13.0
Village Creek at Apalachee Street in Birmingham	20.0
Fivemile Creek at Ketona	24.0
Elliotts Creek at Moundville	32.0
Turkey Creek at sewage plant near Pinson	35.0
Village Creek at 24th Street in Birmingham	38.0
Village Creek at Avenue West at Ensley	45.0
Fivemile Creek near Republic	53.0
Village Creek near Pratt City	55.5
Turkey Creek at Morris	79.0
Valley Creek near Bessemer	87.0
Clear Creek at New Hope Church near Poplar Springs	88.0
Valley Creek below Bessemer	101.0
Village Creek near Docena	134.0
Fivemile Creek below Prudes Creek near Graysville	150.0
Sipsey Fork near Grayson	159.0
Lost Creek above Parrish	205.0
Valley Creek near Oak Grove	225.0
North River near Samantha	231.0
Blackwater Creek near Manchester	246.0
Locust Fork near Cleveland	489.0
Mulberry Fork near Garden City	650.0
Mulberry Fork near Arkadelphia	800.0
Locust Fork at Sayre	1315.0
Mulberry Fork at Cordova	2490.0
Black Warrior R. at Bankhead Lock & Dam near Bessemer	5950.0
Black Warrior River at Northport	6959.0
Black Warrior R. at Holt Lock & Dam near Holt	7000.0
Black Warrior River at Selden Lock & Dam near Eutaw	9480.0

Source: USGS, 2002b

- **Collection of Hydrologic Data**
  The USGS, in cooperation with numerous local, State, and Federal agencies, has collected streamflow, groundwater and water-quality data at sites throughout the State.

- **Biological and Ecological Studies**
  The USGS Biological Resources Division conducts research on many aspects of Alabama's ecosystems. Much of this research is done by the Alabama Cooperative Fish and Wildlife Research Unit, which is located on the Auburn University campus, in close cooperation with the State and the U.S. Fish and Wildlife Service (USFWS). The USGS is tracking the abundance and locations of sensitive species. Aquatic research focuses on effects of river management alternatives on the diversity and abundance of native river fauna. Projects include investigation of growth of sport fishes, such as spotted bass and flathead catfish. This work includes development of appropriate methods for evaluating habitat quality for species-rich communities that are characteristic of Southeastern U.S. rivers. Other projects include studies of the relations between landscape characteristics and fish movements in reservoirs and large rivers; the effects of acid mine drainage on stream fishes; and the conditions of fish communities affected by gravel mining. [7]

The USGS implemented the National Water Quality Assessment (NAWQA) Program to support national, regional, and local information needs and decisions related to water-quality management and policy. Shaped by and coordinated with ongoing efforts of other Federal, State, and local agencies, the NAWQA Program is designed to answer: What is the condition of our Nation's streams and ground water? How are the conditions changing over time? How do natural features and human activities affect the quality of streams and ground water, and where are those effects most pronounced? By combining information on water chemistry, physical characteristics, stream habitat, and aquatic life, the NAWQA Program aims to provide science-based insights for current and emerging water issues and priorities. NAWQA results can contribute to informed decisions that result in practical and effective water-resource management and strategies that protect and restore water quality. [8]

Alabama Department of Environmental Management (ADEM)

ADEM is responsible for the administration and oversight of numerous environmental programs. Included in these environmental programs is the review of permit applications, permitting decisions, inspections and compliance activities. Major areas of responsibility relating to water quality include NPDES permitting, municipal water, ground water, 305(b) reporting, TMDL development, Safe Drinking Water Act and the Nonpoint Source Program.

The Nonpoint Source Program uses a voluntary approach to address nonpoint source pollution in Alabama. The program relies on best management practices, education and outreach, technology transfer, monitoring and assessments, and resource assistance using a balanced statewide and watershed focused restoration approach. Local partnerships and citizen input are primary implementation components.

ADEM also performs an extensive variety of monitoring activities to establish environmental standards and document the effectiveness of environmental programs. Current statewide monitoring activities are summarized below. [9]

Reservoir Water Quality Monitoring. The Reservoir Water Quality Monitoring Program has monitored the water quality of Alabama's lakes and reservoirs since 1990. ADEM staff utilizes scientific equipment to monitor water quality continually during critical, seasonal transitions. Currently over 180 sites across the state are monitored with the resultant water quality data used to establish water quality standards.

Fish Tissue Monitoring. ADEM has administered a systematic Fish Tissue Monitoring Program for more than ten years and has collected samples of fish from rivers and lakes throughout Alabama. All fish collected under this program are weighed, measured, assessed for external abnormalities and analyzed for contaminants that have the potential to bioaccumulate (PCBs, arsenic, chlordane, toxaphene, mercury, mirex, DDT, DDD, DDE, dieldrin, dursban, endrin, heptachlor, heptachlorepoxide, endosulfan, hexachlorobenzene, lindane, and certain heavy metals). Once the fish tissue samples have been analyzed, the results are submitted to the Alabama Department of Public Health, which utilizes the analytical data to determine the necessity for fish consumption advisories.

Algae Assessments. ADEM is currently evaluating three different methods to assess the algal content of a stream. Algal content can be an indicator of excess nutrients in a stream that can lead to nutrient impairment, low dissolved oxygen and fish kills. The three methods under evaluation include a viewing box with grids, examination/identification of single-cell aquatic plants and analysis of the amount of chlorophyll present in the plant communities.

Fish and Aquatic Insect Community Assessments. Assessment of fish and aquatic insect communities provide indications of water quality and the overall health of stream segments. These assessments are performed in conjunction with specific studies and involve the collection of fish and/or aquatic insects. Additionally, all habitats present are sampled including rocks, logs, streambanks and sand substrates.

Water Quality Monitoring. Stream segments are routinely monitored to obtain water quality data and to document trends in water quality. These monitoring activities involve the collection and laboratory analysis of water samples for bacteria and other pollutants, as well as the collection of field data, such as stream flow rates and temperature. Department staff also record visual observations at the stream sampling locations. These visual observations are combined with other data to determine the overall quality of a specific stream segment. The water quality data collected through this program allows the Department to establish trends in water quality by comparing previous data.

Compliance Evaluations. Compliance sampling inspections are performed on a routine basis at municipal and industrial facilities that hold National Pollutant Discharge Elimination System (NPDES) permits. These comprehensive inspections allow Department personnel to document compliance activities and determine when facilities are in compliance with the discharge limits of their NPDES permits. Department inspectors collect samples of the treated water being discharged with a wide variety of manual and automated sampling devices. The water samples can be analyzed for field parameters on site or transported to one of ADEM's three laboratories for analysis.

Groundwater Monitoring. ADEM personnel perform a diverse scope of groundwater monitoring activities including the collection of groundwater samples at landfills, industrial sites and underground storage tank sites. The Department also performs special groundwater studies involving the collection and analysis of groundwater data.

For more information on these and other ADEM programs visit the website at www.adem.state.al.us.

Cullman County Soil & Water Conservation District (S&WCD)

The Cullman County S&WCD monitors eight 303(d) listed stream segments within Cullman County, as shown in Figure 63. The initial analysis of the current data indicates that several stream segments listed on the 303(d) list could possibly be removed. Change in land use and/or more frequent and recent sampling could support delisting. [10]

Figure 63:

CULLMAN COUNTY SOIL & WATER CONSERVATION DISTRICT MONITORING SITES OF 303(D) LISTED STREAMS IN CULLMAN COUNTY

Waterbody Name	Site Description
Brindley Creek	at US hwy 278
BrindleyCreek	1/4 mi S US Hwy 278
BroglenRiver	site info inc,
Crooked Creek	Crooked Creek at CR 1043 (Clarkston Bridge)
Duck River	Duck River at AL Hwy 69 N
Duck River	100 ft N of CR 781
EightmileCreek	CR 1427 - 50 ft W
Wolf Creek	at CR 1568

Source: www.alabamawaterwatch.org

Tuscaloosa County Soil & Water Conservation District

The Tuscaloosa County S&WCD monitors the following 303(d) listed stream segments within Tuscaloosa County:

- Big Sandy Creek - 4 sites
- Big Yellow Creek - 2 sites

- Carroll's Creek - 3 sites
- Elliotts Creek - 3 sites

Alabama Department of Public Health

Fish Tissue Sampling Program. The fish tissue-sampling program monitors fish on a rotational basis from 28 major lakes (reservoirs), 28 smaller lake and stream locations, and 20 state lakes managed specifically for fishing by the Alabama Department of Conservation and Natural Resources. [11] In the fiscal year 2003, fish samples were taken from Bankhead Reservoir, Holt Reservoir, Warrior Reservoir, Smith Reservoir, Tuscaloosa Reservoir, North River, Opossum Creek, and Valley Creek of the Black Warrior River Basin. [12] Fish are sampled late in the growing season, which in Alabama is from late September through mid to late November. For most species, their lipid content is highest late in the growing season. Since lipids are an important reservoir for organic pollutants, sampling the fish when their lipid content is highest more accurately describes the amount of organic pollutants in the samples. [11]

Certain target species are selected for sampling. The target species are chosen the following criteria. They should be abundant and large enough to provide adequate tissue samples for chemical analysis. The species selected are those commonly consumed in the study area and those of commercial, recreational, or subsistence fishing value. Lastly, the species selected are those that have the potential to bioaccumulate high concentrations of chemical contaminants and have a wide geographic distribution (EPA 823-R-95-007, 1995).

Two distinct ecological groups of finfish (i.e., bottom-feeders and predators) are used as target species. Bottom-feeding species may accumulate high contaminant concentrations from direct physical contact with contaminated sediment and/or by consuming invertebrates and organisms that live in contaminated sediment. Predator species are also good indicators of persistent pollutants. Freshwater target species are the predatory species: largemouth bass, spotted bass, smallmouth bass, black crappie, white crappie, flathead catfish, and the bottom-feeding species: channel catfish, blue catfish, white catfish, common carp, and smallmouth buffalo. These species are sampled for contaminants and the fish advisories are based upon the results. Advisories have been issued for chlordane, DDT, mercury, and polychlorinated biphenyls (PCBs). [11]

Alabama Power (APC)

APC operates an extensive network of rainfall and streamflow gages in the Bankhead drainage basin. Rainfall is reported to APC through 13 automated rain gages. Tributary streamflow is monitored with four gages. These gages automatically report data every 15 minutes.

As a result of the hydro-relicensing effort, APC has drafted a shoreline management plan, which includes a conservation policy and best management practices. The plan specifically addresses point and non point source pollution, erosion and sedimentation, water quality, water quantity, toxins, and threatened and endangered species. Reports on each of these areas will describe existing conditions at the hydropower development on the Warrior River.

Alabama Soil & Water Conservation Districts www.swcc.state.al.us

Using Section 319 grant funding provided by ADEM, the Soil & Water Conservation Districts conduct a Statewide Nonpoint Source Watershed Assessment in cooperation with the NRCS. The last State Nonpoint Source Watershed Assessment was conducted in 1997 and is updated every five years. The next update is scheduled for 2003 and includes conducting a detailed assessment of each watershed within each county using guidance sheets developed for this purpose. Each assessment allows the District to rate each sub-watershed from the standpoint of the potential of various nonpoint sources (NPS) impacting streams, groundwater, and public bodies in the watershed. The potential NPS pollutants include sediment (from various sources), animal wastes, pesticides, failing septic systems, and urban runoff.

The local NRCS District Conservationists and technicians perform the bulk of the work. Consultations with other agencies, aerial photographs, and a variety of other resources are used to estimate the potential exposure to NPS impacts within the watershed.

Data from this assessment have been entered into a computer database. The database is being linked to a computerized Geographic Information System (GIS) that will allow visual presentation of watershed information in a wide variety of ways and plans are being made to make the information publicly available. Benefits of this assessment include:

- Focus of financial and technical resources to high priority watersheds to more effectively address water quality problems.
- Focus water quality monitoring efforts in critical watersheds.
- Conduct sociological and economic evaluations related to land use, zoning, and public health issues.
- Provide information to public officials of needs in their area.
- Increase public awareness of water quality issues.

Alabama Forestry Commission

The AFC conducts random checks of forestry activities and evaluates the implementation of BMPs. If BMPs are not followed, Commission personnel work with the landowner, timber harvesters, and timber buyers to educate them on the proper use and benefits of BMPs and outline specific, voluntary measures that can be used to successfully resolve problems associated with the operation in question.

As noted in the Alabama Forestry Commission's 2000-2001 Annual Report, AFC personnel conducted 169 random BMP monitoring reports to assess the BMP implementation rate on harvesting operations across the state. On approximately 87 percent of the sites monitored, BMPs were properly applied during the timber harvest operation. Counties in the Black Warrior River Basin covered under this report included: Blount, Cullman, Fayette, Jefferson, Tuscaloosa, Walker, and Winston.

DOCUMENTATION OF SOURCES

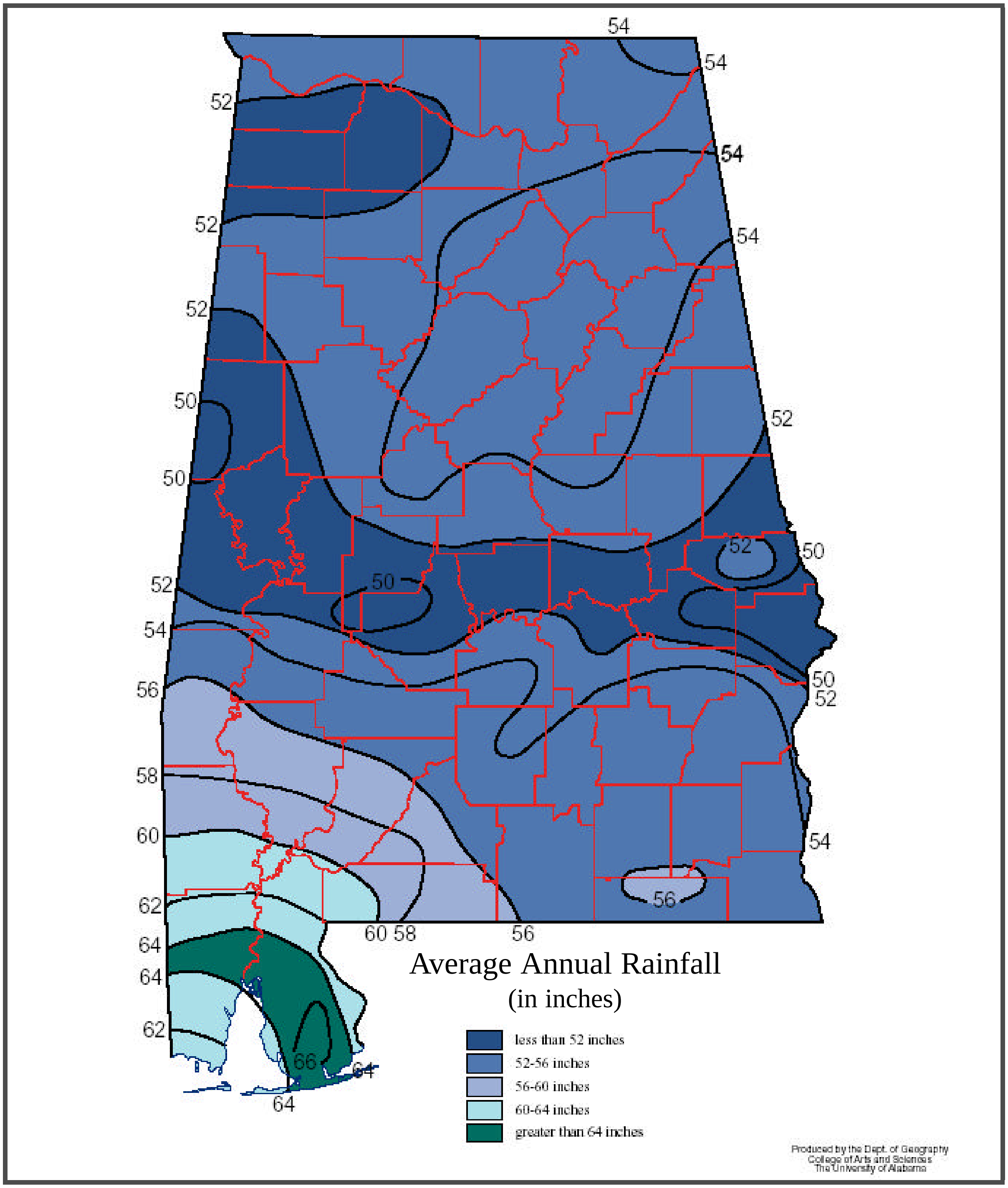
1. *Clean Water Action Plan: Restoring and Protecting America's Waters.* EPA. 1998.
2. *Survey of Local Watershed Activity in the Southeast,* Southeast Watershed Forum.
3. *Elements of a State Water Monitoring and Assessment Program.* Assessment and Watershed Protection Division Office of Wetlands, Oceans and Watershed, US Environmental Protection Agency. EPA 841-B-03-003. March 2003. www.epa.gov/owow/monitoring/repguid.html

4. *Biological Assessments: A Critical Tool for Effective Water Resource Planning.* Stormwater. November/December 2002. pg 26-39.
5. *Middle Coosa Watershed Management Plan.* Coosa Clean Water Partnership. 2002.
6. Provided by the Office of Surface Mining - Birmingham Field Office for the Black Warrior River Watershed Management Plan.
7. *U.S. Geological Survey Programs In Alabama.* U.S. Geological Survey Fact Sheet FS-006-96.
8. Zappia, Humbert. *Organochlorine Compounds and Trace Elements in Fish Tissue and Streambed Sediment in the Mobile River Basin, Alabama, Mississippi, and Georgia, 1998.* U.S. Geological Survey Water-Quality Investigations Report 02-4160.
9. *Alabama Department of Environmental Management: Working to Protect Alabama's Environment.* Alabama Department of Environmental Management.
10. Minutes of the Upper Sub-basin of the Black Warrior Clean Water Partnership. September 25, 2002. www.warriorcwp.org. Accessed June 12, 2003.
11. Alabama Department of Public Health. www.adph.org. Accessed August 10, 2003.
12. Alabama Department of Environmental Management. Press Release Fish Consumption Advisory, March 3, 2003.

APPENDIX A

Watershed Characteristics

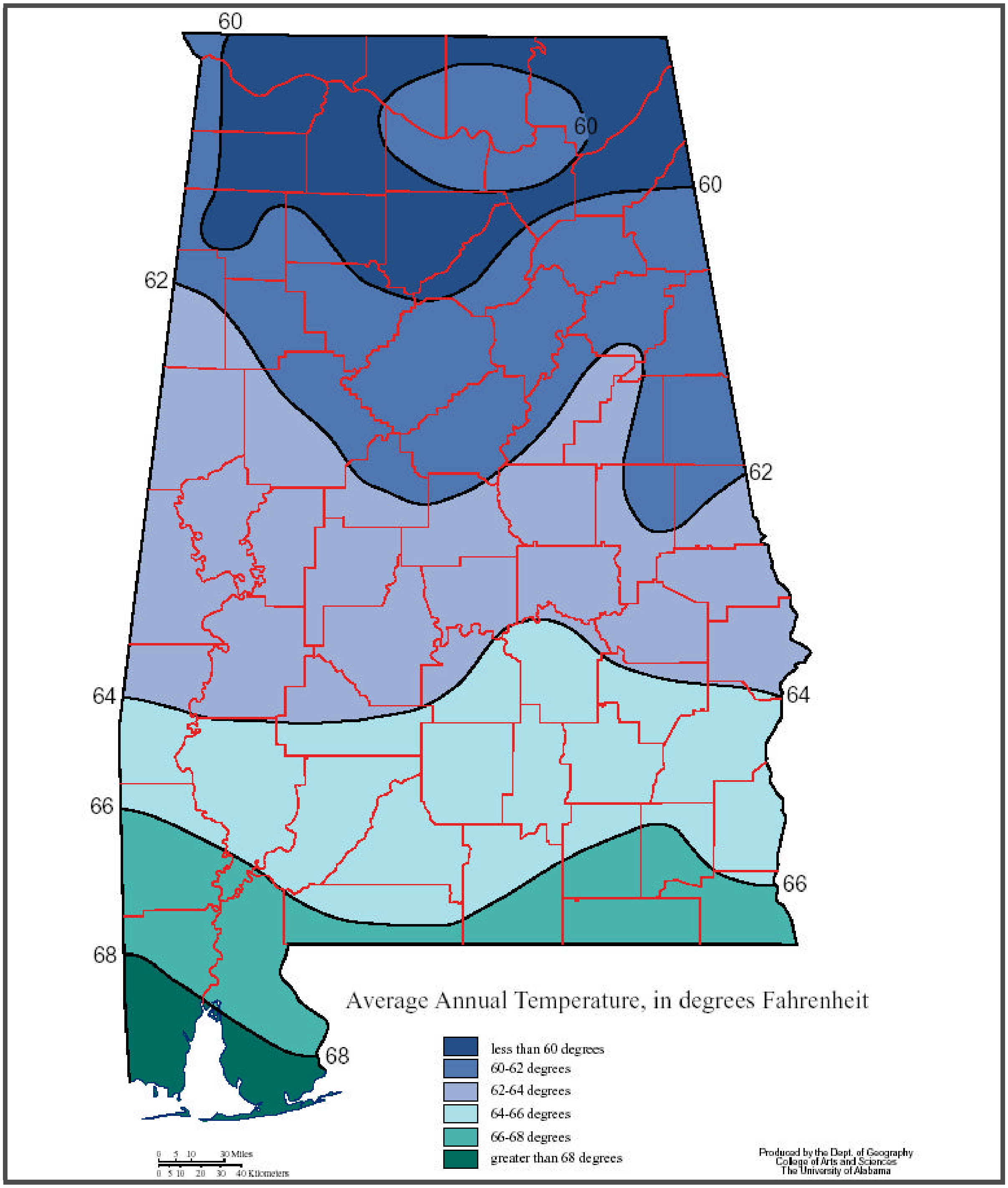
Appendix 1
Average Annual Precipitation



Source: Department of Geography at the University of Alabama
http://alabamamaps.ua.edu/alabama/climate/avgrain.pdf

APPENDIX 1

Appendix 2
Average Annual Temperature

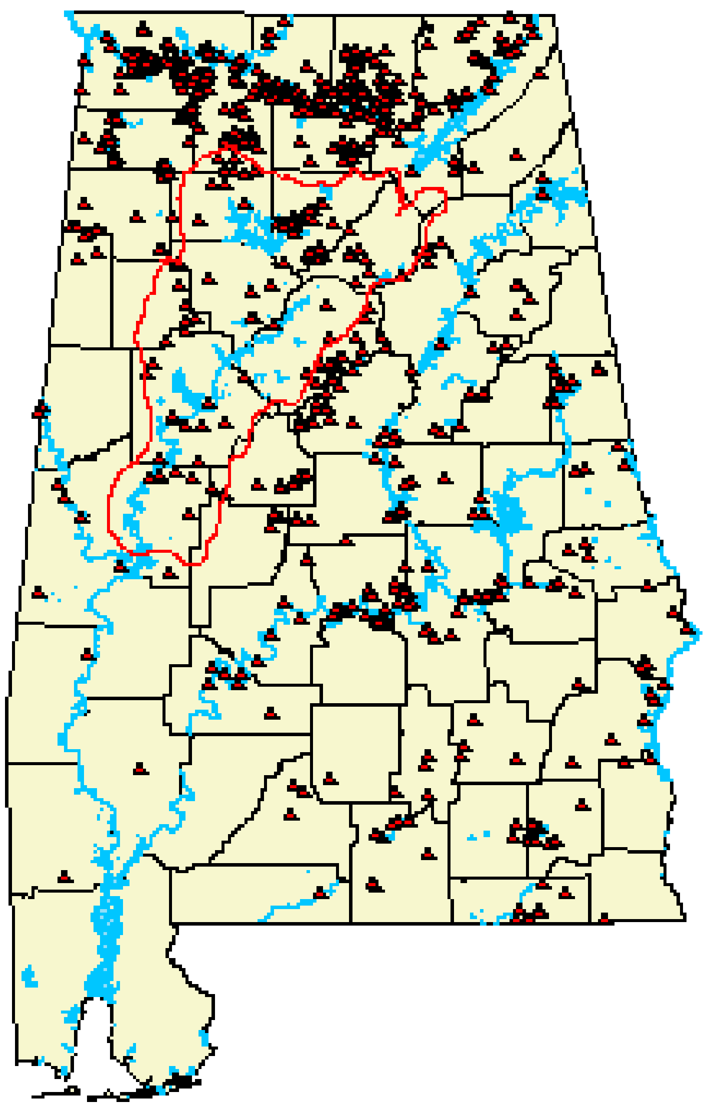


Source: Department of Geography at the University of Alabama; http://alabamamaps.ua.edu/alabama/climate/avgtemp.pdf

APPENDIX 2

Appendix 3
Cultural Resources

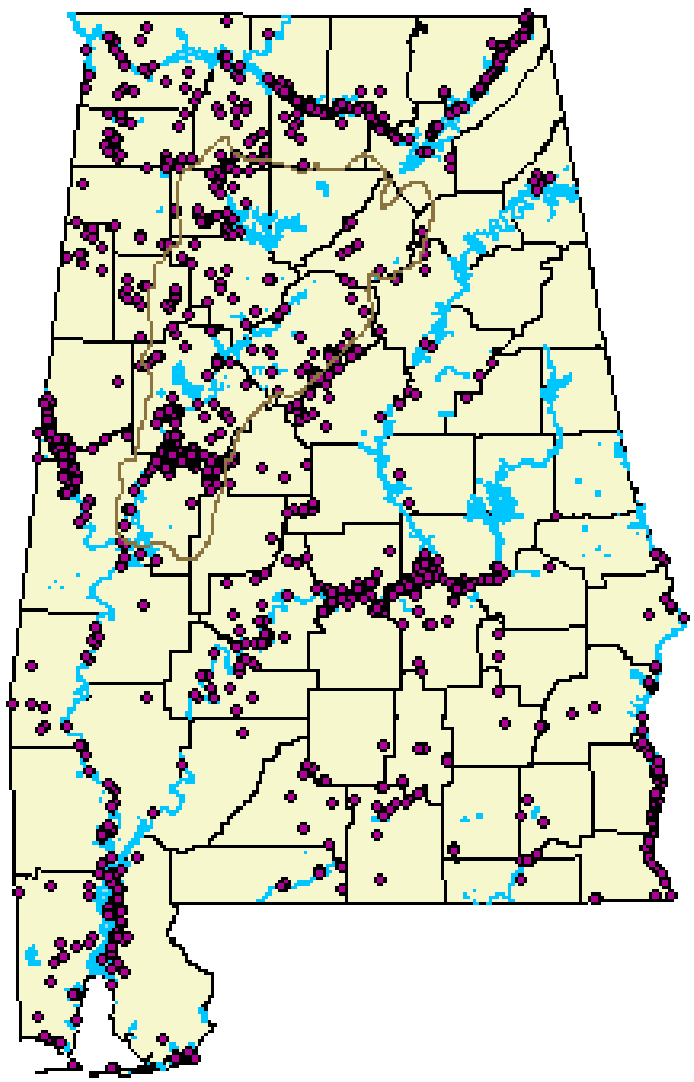
Distribution of Early Archaic Sites in Alabama



SOURCE: University of Alabama, Office of Archeological Research.
www.museums.ua.edu/oar

APPENDIX 3

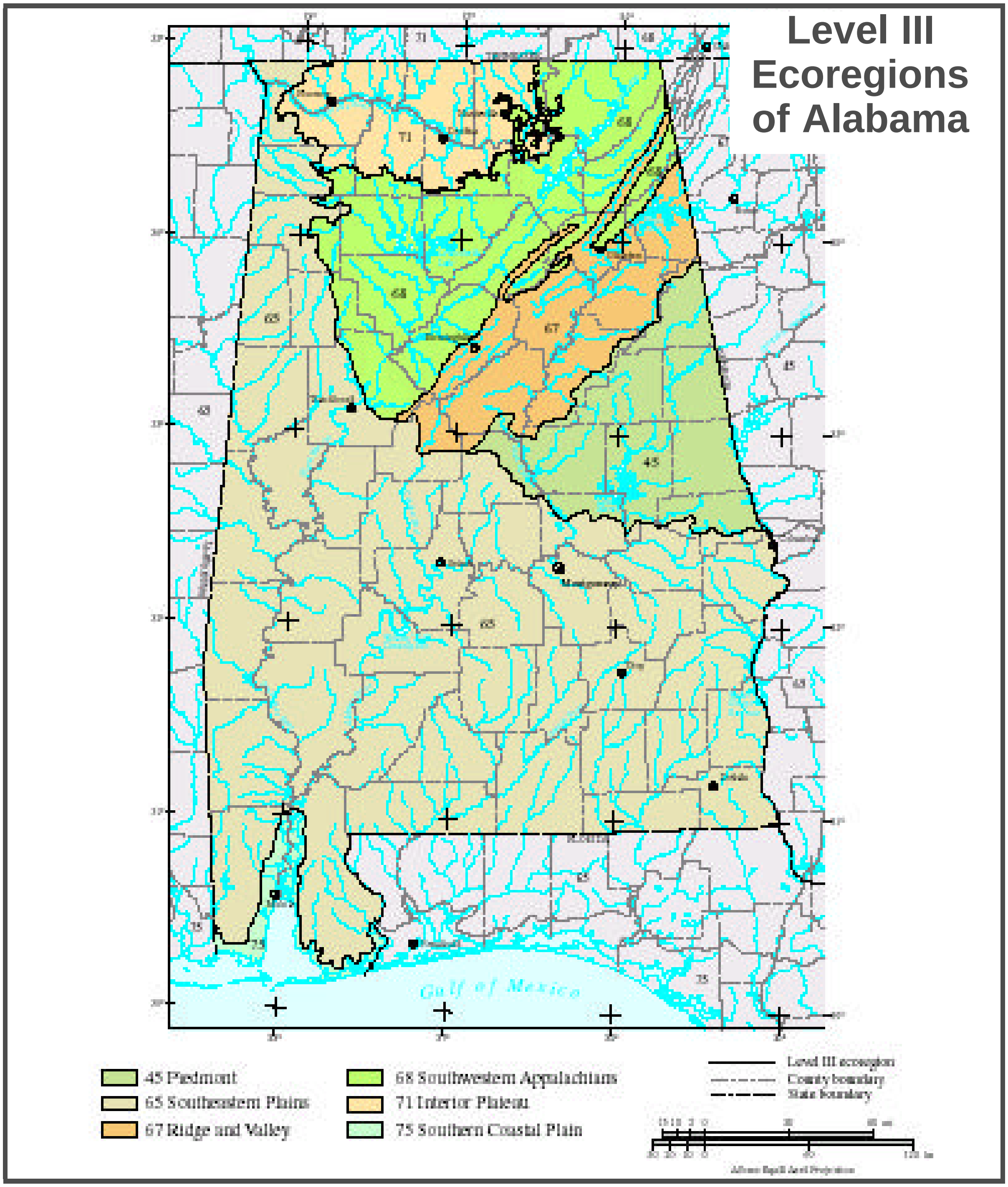
Distribution of Late Woodland Sites in Alabama



SOURCE: *University of Alabama, Office of Archeological Research.*
www.museums.ua.edu/oar

APPENDIX 3

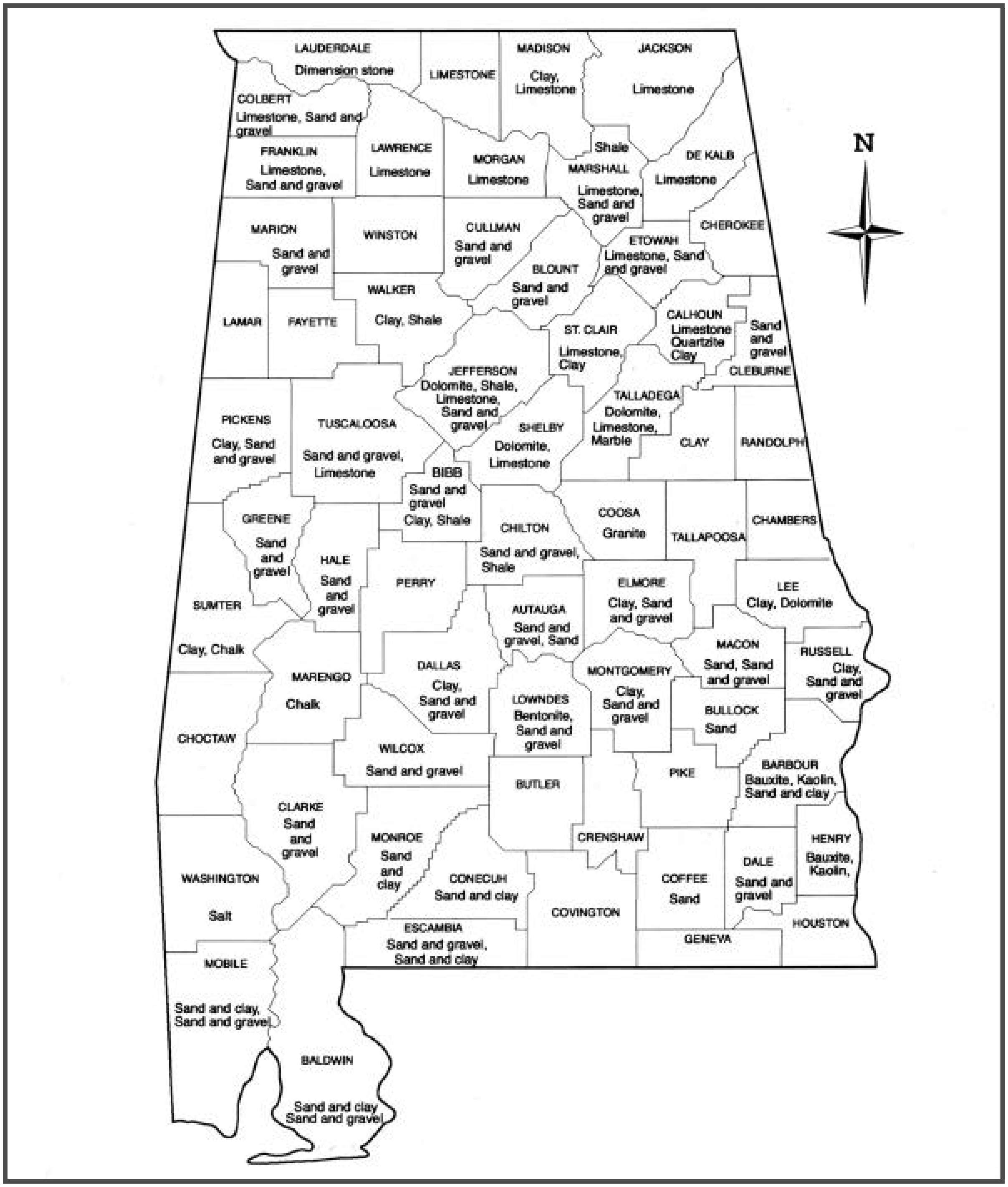
Appendix 4
Ecoregions



Source: Alabama Department of Environmental Management
http://www.adem.state.al.us/FieldOps/Monitoring/01LevIIIEco.pdf

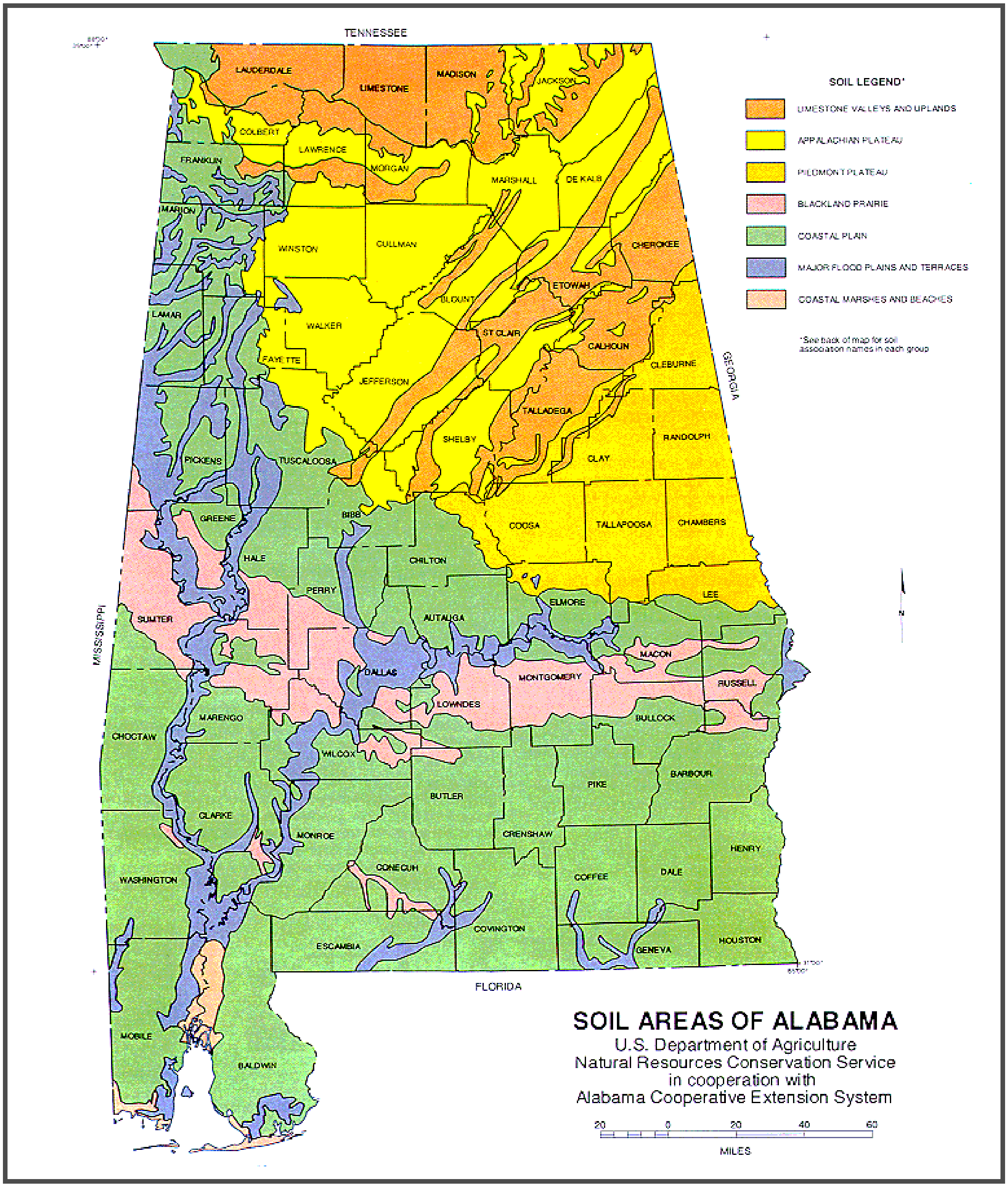
APPENDIX 4

Appendix 5
Minerals



APPENDIX 5

Appendix 6
Soil Map



Source: USDA, NRCS, and ACES;
http://www.mo15.nrcs.usda.gov/alsoilnt/algsm.html

APPENDIX 6

Appendix 7
Soil Types

Predominant Soil Types of Counties Within the Black Warrior River Watershed

Predominant soils of Walker County, AL

Sunlight-Townley-Sipsey

Moderately deep and shallow, gently sloping to very steep, well drained soils that have a loamy or clayey subsoil, formed of shale, siltstone, and sandstone. This soil type makes up approximately 65 percent of Walker Co.

Sipsey-Bankhead

Moderately deep, strongly sloping to steep, well drained soils that have loamy subsoil; formed of weathered sandstone. This soil type makes up about 15 percent of the county.

Sipsey-Nauvoo

Moderately deep and deep gently sloping to moderately steep well drained soils that have loamy subsoil formed of sandstone or sandstone intermeddled with siltstone and shale. This soil type makes up about 10 percent of the county.

Remaining soil-types include: Wynnville-Sipsey-Townley (3%), Spadra-Whitwell-Mooreville (4%), Townley-Sunlight (2%), Smithdale-Townley (1%)

Erosion Hazards for these soils:

Bankhead- Severe

Townley- Severe

Sipsey-Moderate to severe

Nauvoo- Slight to moderate

Sunlight- Severe

Predominant Soils of Jefferson County, AL

Montevallo-Nauvoo

Well drained soils that are moderately permeable; formed in residuum from shale, siltstone, and sandstone. This soil represents about 51 percent of the county. It is about 3o percent Montevallo soils, 25 percent Nauvoo soils, and 45 percent minor soils.

Urban Land-Tupelo-Decatur

Urban Land and moderately well and well-drained soils that are slowly and moderately permeable; soils formed in cherty limestone and residuum or colluvium. This soil makes up about 6 percent of the county, with 55 percent in Urban Land, 20 percent Tupelo, and 10 percent Decatur. The remaining 15 percent are minor soils.

Nauvoo-Townley-Montevallo

Well drained soils that are moderately and slowly permeable; formed in residuum from sandstone, siltstone, and shale. This soil type makes up 14 percent of Jefferson County.

Fullerton-Bodine-Urban Land

Well and somewhat excessively drained soils that are moderately and rapidly permeable and urban land; soils formed in residuum from cherty sandstone. This soil type represents 7 percent of Jefferson County.

Remaining soil-types include: Nauvoo-Allen-Gorgas (2%), Gorgas-Nauvoo- Urban Land (2%), Holston-Townley-Urban Land (3%), Etowah-Decatur-Sullivan (1%), Bodine-Fullerton (4%), Bodine-Birmingham (4%), Leesburg-Gorgas (4%), Sullivan-State (2%).

Erosion hazard for these soils:

Montevallo-Severe
Nauvoo-Slight
Bodine-Moderate
Birmingham- Severe
Gorgas-Moderate

Predominant Soils of Cullman County, AL

Tilsit-Hartsells-Albertville

Well drained to moderately well drained soils, underlain by sandstone and shale, on level to rolling areas of the plateau. This soil makes up about 32 percent of the county.

Hartsells-Albertville-Linker-Miskingum

Well drained to excessively drained soils, underlain by sandstone and shale, on gently sloping to hilly parts of the plateau. This soil group makes up about 32 percent of the county.

Pottsville-Muskinghum-Linker-Hartsells

Well drained to excessively drained soils, underlain by sandstone and shale, on the part of the plateau that has narrow ridge tops, steep slopes, and narrow valleys. This soil makes up 34 percent of the county.

Philo-Tyler-Monongahela-Pope

Well drained, to somewhat poorly drained soils on narrow alluvial fold plains and low stream terraces on the plateau. This soil type makes up 2 percent of the county.

Erosion Hazard for these soils:

Albertville- Moderate to Severe

Hartsells- Moderate to Severe

Linker- Moderate to Severe

Monongahela- Slight to Moderate

Pottsville- Moderate to Severe

Predominant Soils of Tuscaloosa County, AL

Montevallo-Nauvoo

Shallow and deep, moderately steep, well drained soils that have dominantly loamy subsoil; formed from material weathered from siltstone, sandstone, shale, and interbedded sandstone and shale. This soil makes up 30 percent of the county.

Smithdale-Luverne

Deep, sloping to steep, well-drained soils that have loamy or clayey subsoil; formed in marine sediments deposited as stratified sands, silts, and clays. This soil comprises 30 percent of the county.

Smithdale-Palmerdale-Pikeville

Deep, rolling to steep well-drained and somewhat excessively drained soils that have loamy subsoil; formed in thick beds of loamy and gravelly marine sediments and mine spoil materials. This soil makes up 16 percent of the county.

Bama-Smithdale-Shatta

Deep, nearly level to sloping, well drained and moderately well drained soils that have loamy subsoil; formed in thick beds of loamy marine sediments. This soil comprises 12 percent of the county.

Remaining soil-types include: Augusta-Amy (3%), Allen-Bodine-Decatur (2%), Adaton-Ellisville-Dundee (7%).

Erosion Hazards for these soils:

Luverne- Moderate

Montevallo-Severe

Nauvoo-Slight

Smithdale-Slight

Palmerdale- Severe

Pikeville-Moderate

Bama-Slight

Shatta-Slight

Predominant Soils of Blount County, AL

Hector-Rock outcrop-Allen

Shallow and deep, well drained soils and rock outcrop on uplands and foot slopes. This soil and rock association makes up 17 percent of the county.

Townley-Montevallo

Moderately deep and shallow, well-drained soils on uplands. This soil makes up 19 percent of the county.

Linker-Hartsells-Hector

Moderately deep and shallow, well-drained soils on uplands. This soil makes up 18 percent of the county.

Hartsells-Hector-Wynnville

Shallow to deep, well drained, and moderately drained soils on uplands. This association makes up about 17 percent of the county.

Bodine-Fullerton-Hamblen

Deep, excessively drained to moderately well drained soils on uplands and floodplains. This soil comprises about 8 percent of the county.

Albertville-Nectar-Linker

Deep and deep, well drained soils on uplands. This soil makes up 8 percent of the county.

Remaining soil-types include: Palmerdale (1%), Barfield-Rock outcrop-Remlap (4%), Bodine-Hector- Barfield (4%), Remlap-Decatur-Tupelo (2%), Minvale-Fullerton-Lobelville (2%).

Erosion Hazard of these soils:

Allen-Slight	Townley-Moderate
Wynnville-Slight	Remlap-Moderate
Hector-Moderate to Severe	Linker-Slight
Montevallo-Severe	

Predominant soils of Fayette County, AL

Ruston-Cithbert-Shubuta

Moderately deep and deep soils over thick beds of sandy or clayey marine sediments. This soil makes up about 74 percent of Fayette County.

Montevallo-Enders-Townley

Shallow to moderately deep soils over shale and sandstone. This soil makes up about 17 percent of the county.

Remaining soil-types include: Myatt-Stough-Mantachie (4%), Savannah-Ora (>1%), Ora-Ruston-Greenville (2%), Shubuta-Ora (2%).

Erosion Hazard of these soils:

Ruston-Slight to Moderate

Shubuta- Slight to Moderate

Enders- Slight

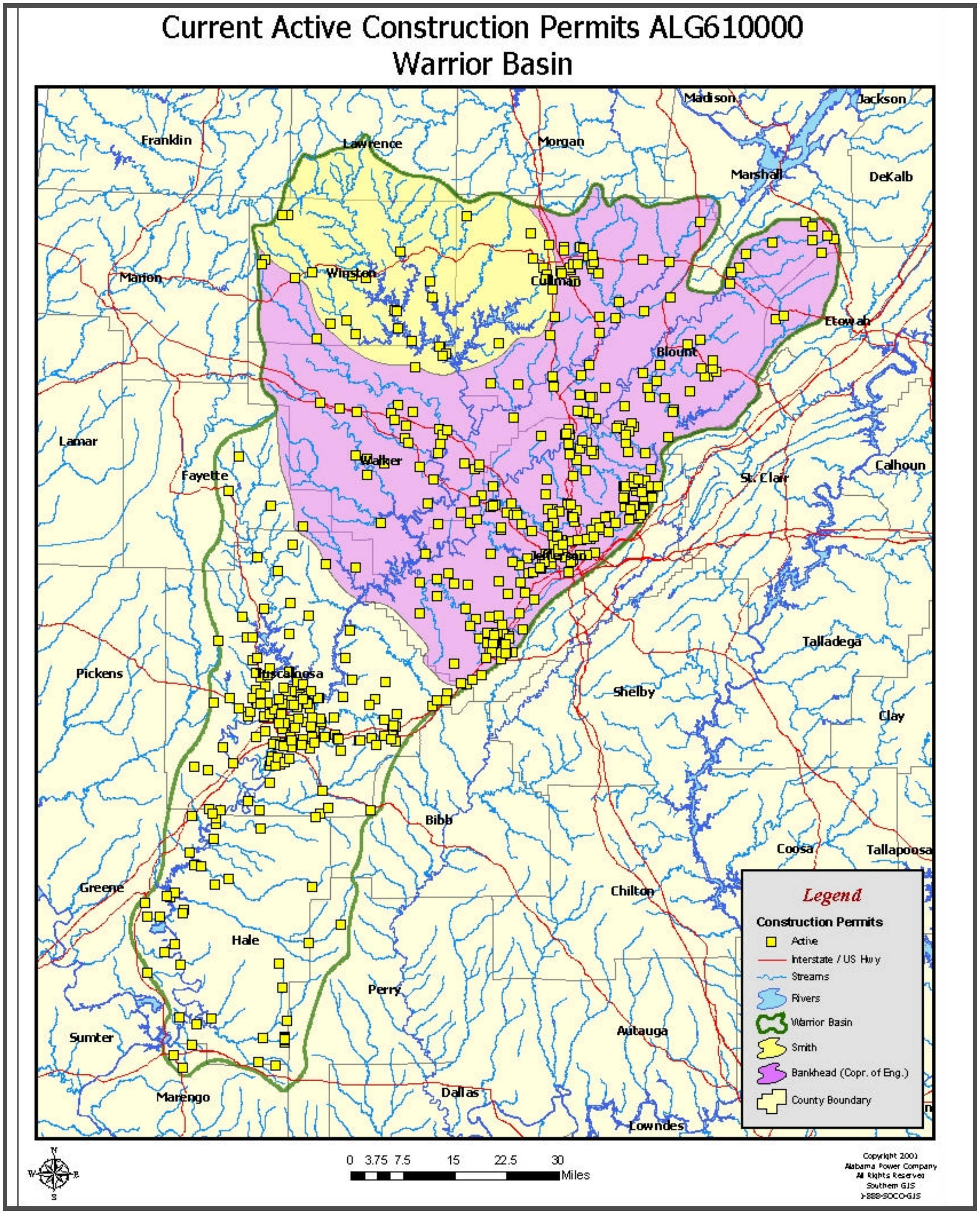
Ora- Slight

APPENDIX B

Sources of Impairments

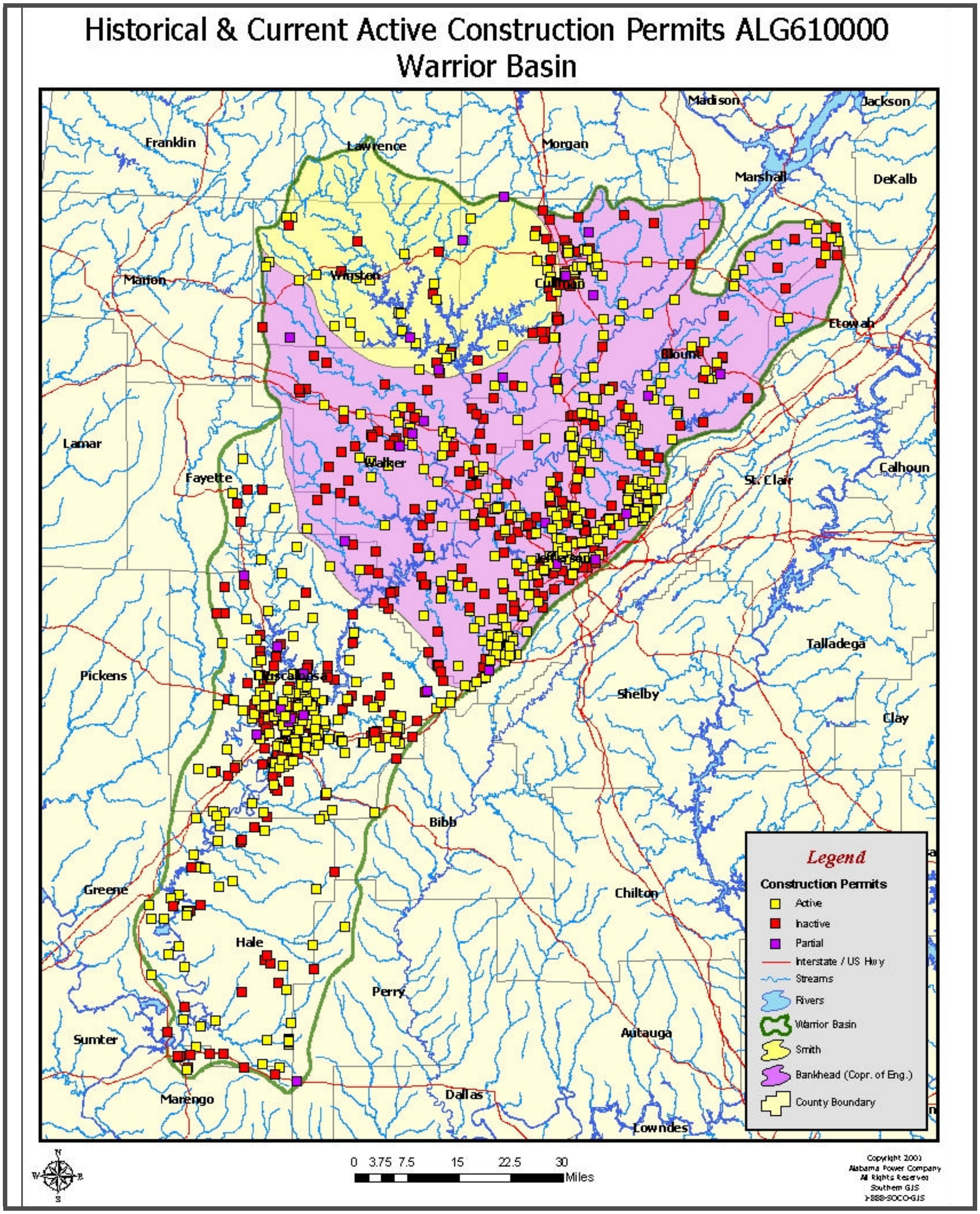
APPENDIX 7

Appendix 8
Current Construction Permits



APPENDIX 8

Appendix 9
Historical Construction Permits



APPENDIX 9

Appendix 10
Public Water Suppliers

Public Water Suppliers Within the Black Warrior River Basin

Blount
All Water Works
Blountsville Utilities
Cleveland Water Works
Hayden Water Works
Mt. High Rock Springs Water Authority
Northwest Blount Count Water and Fire Protection Authority
Nectar Water System
Oneonta Utilities Board
Pine Bluff Water Authority
Remlap-Pine Mountain Water Authority
Snead Water Works
The Blue Hole Water Company, Inc.

Cullman
Cullman County Commission
Cullman Utilities Board
East Cullman Water System
Garden City Water Department
Hanceville Water Works
Johnsons Crossing Water System
Joppa, Hulaco & Ryan Water Authority
VAW Water System, Inc.
Walter Water Authority

Fayette
Belk Water System
Berry Water Works
Fayette County Water Coord & FPA
Fayette Water Works Board
Glen Allen Water System

Green
Forkland Water System
Green County Housing Authority
Green County Water Authority
Mt. Hebron - Clinton Water Authority

Hale
Akron Water System
Greensboro Utilities Department
Hale County Water Authority
Moundville Water Works

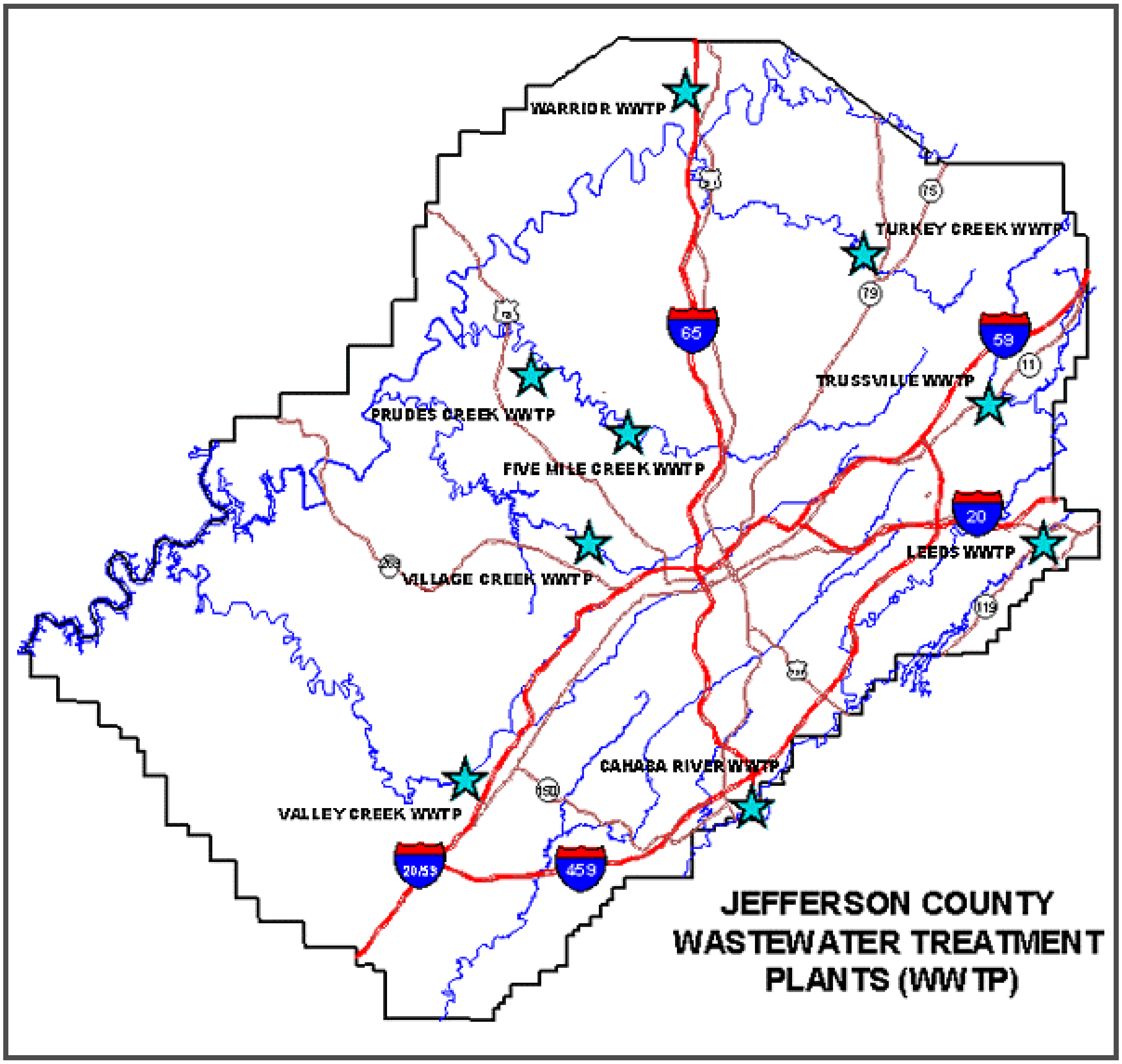
Jefferson
Bessemer Water Service
Birmingham Water Board
Brookside Water Works
Graysville Water Board
Irondale Water System
Leeds Water Board
Mulga Water Works and Gas
Roupes Valley Water Authority
Town of West Jefferson Water Works
Trussville Utilities
Warrior River Water Authority
Woodward Estates Mobile Home Park

Tuscaloosa
Buhl, Elrod and Holman Water Authority
Carroll's Creek Water Authority
Citizen's Water Service, Inc.
Coaling Water Authority
Coker Water Authority
Englewood-Hulls Water System, Inc.
Fosters-Ralph Water Authority
Mitchell Water System, Inc.
Northport Water Works
Peterson Water System
Sand Springs Water Authority
Tuscaloosa Water Authority

Walker
Boldo Water Authority
Carbon Hill Utilities Board
Copeland Ferry/Pumpkin Center W S
Cordova Water Works and Gas Board
Curry Water Authority
Eldridge Water System
Jasper Utilities Board
Kansas Water System
Nauvoo Water Works
Oakman Water Works
Parrish Water Works Board
Providence Water Authority
Sumiton Water Works Board
Townley Water Authority
Water Works and Gas Board of Dora

Winston
Addison Water Works
Arley Water System
Double Springs Water Works
Haleyville Water Works
Lynn Water Works

Appendix 11
Jefferson County Waste Water Treatment Plants



Source: Jefferson County Environmental Services Department
http://www.jeffcointouch.com/jeffcointouch/environmental/WWTP.htm

APPENDIX 11

Appendix 12
Waste Water Treatment Plants Within The Black Warrior River Watershed

Blount County
Cleveland Waste Water Treatment Plant
County Line Industrial Park Waste Water Treatment Plant
Warren Springs Waste Water Treatment Plant

Cullman County
Cullman Waste Water Treatment Plant
Dodge City Waste Water Treatment Plant
Good Hope Waste Water Treatment Plant
Hanceville Waste Water Treatment Plant
Holly Pond Waste Water Treatment Plant
Southern Pines Waste Water Treatment Plant

Greene County
None

Hale County
None

Jefferson County
East Tuscaloosa West Jefferson Waste Water Treatment Plant
Warrior Waste Water Treatment Plant
Turkey Creek Waste Water Treatment Plant
Five Mile Creek Waste Water Treatment Plant
Prudes Creek Waste Water Treatment Plant
Village Creek Waste Water Treatment Plant
Valley Creek Waste Water Treatment Plant

- Brasfield & Gorrie has started the third phase of a $73 million construction project at the Valley Creek Waste Water Treatment Plant in Bessemer, Alabama. The expansion is expected to increase the plant's water treatment capacity from 65 million gallons per day to 85 million gallons per day. After the expansion, the plant will also be able to handle peak flows. Jefferson County is adding new head works, eight new primary clarifiers, 16 new intermediate clarifiers, a new effluent pump station, a blower building, and a generator building to the plant. The Valley Creek plant is one of seven serving Jefferson County. The Valley Creek Plant is also the largest wastewater treatment plant in the state. *See Appendix 11 for a map of waste water treatment facilities serviced by Jefferson County.*

  Jefferson County's plants have very tight permit limits. In fact, they are some of the most stringent in the country. Most plants in other parts of the country have a secondary treatment limit of 30 parts per million (ppm) for biochemical oxygen demand. Jefferson County plants, however, are generally bound by tertiary treatment limits of less than 10 ppm. These limits are imposed due to the small size of the receiving streams.

Tuscaloosa County

Coaling Estates Waste Water Treatment Plant
Northport Waste Water Treatment Plant
Tuscaloosa Waste Water Treatment Plant

Walker County

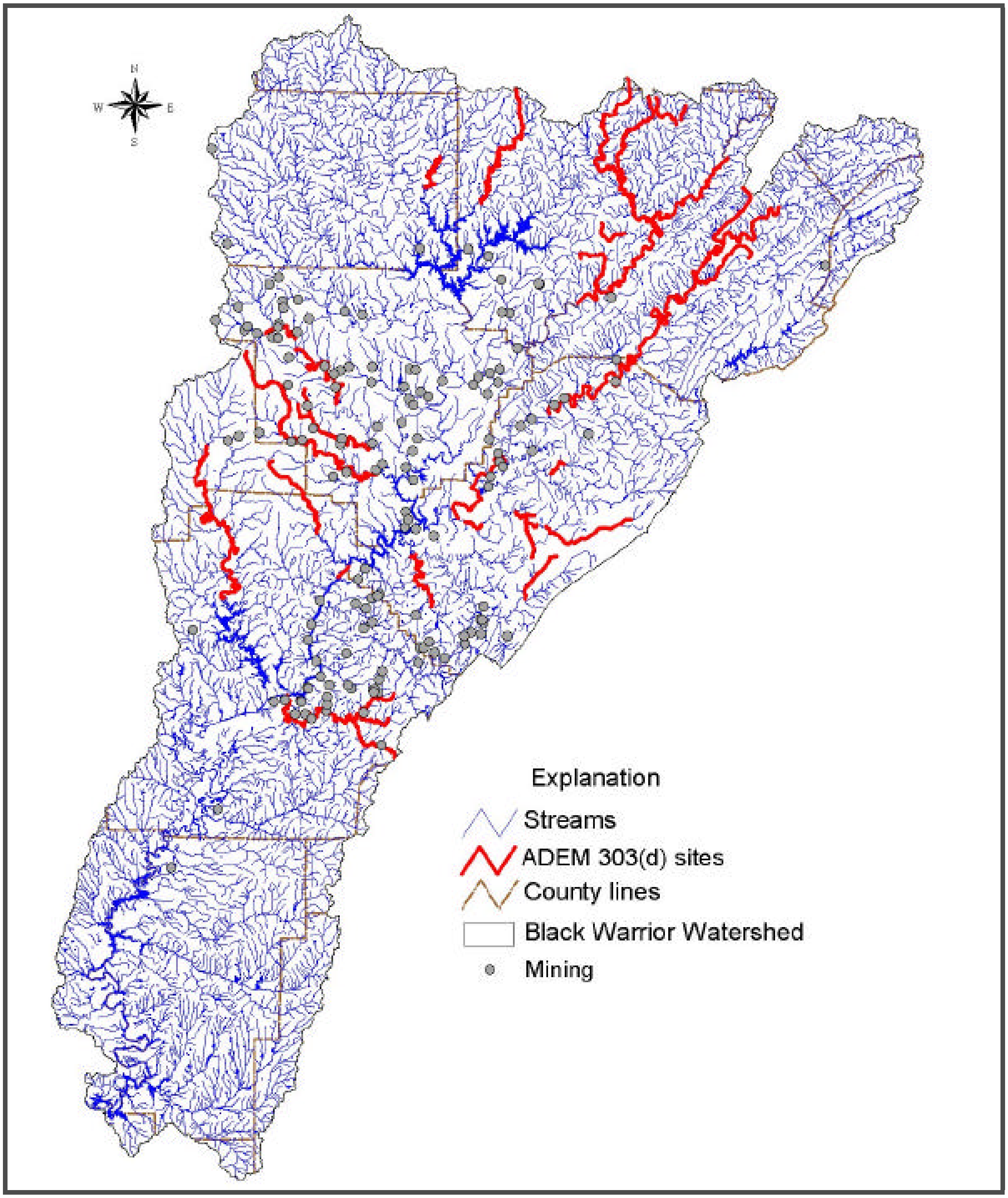
Carbon Hill Waste Water Treatment Plant
Cordova City Waste Water Treatment Plant
East Walker County Waste Water Treatment Plant
Jasper Waste Water Treatment Plant

Winston County

Town of Double Springs Waste Water Treatment Plant
Haleyville Waste Water Treatment Plant

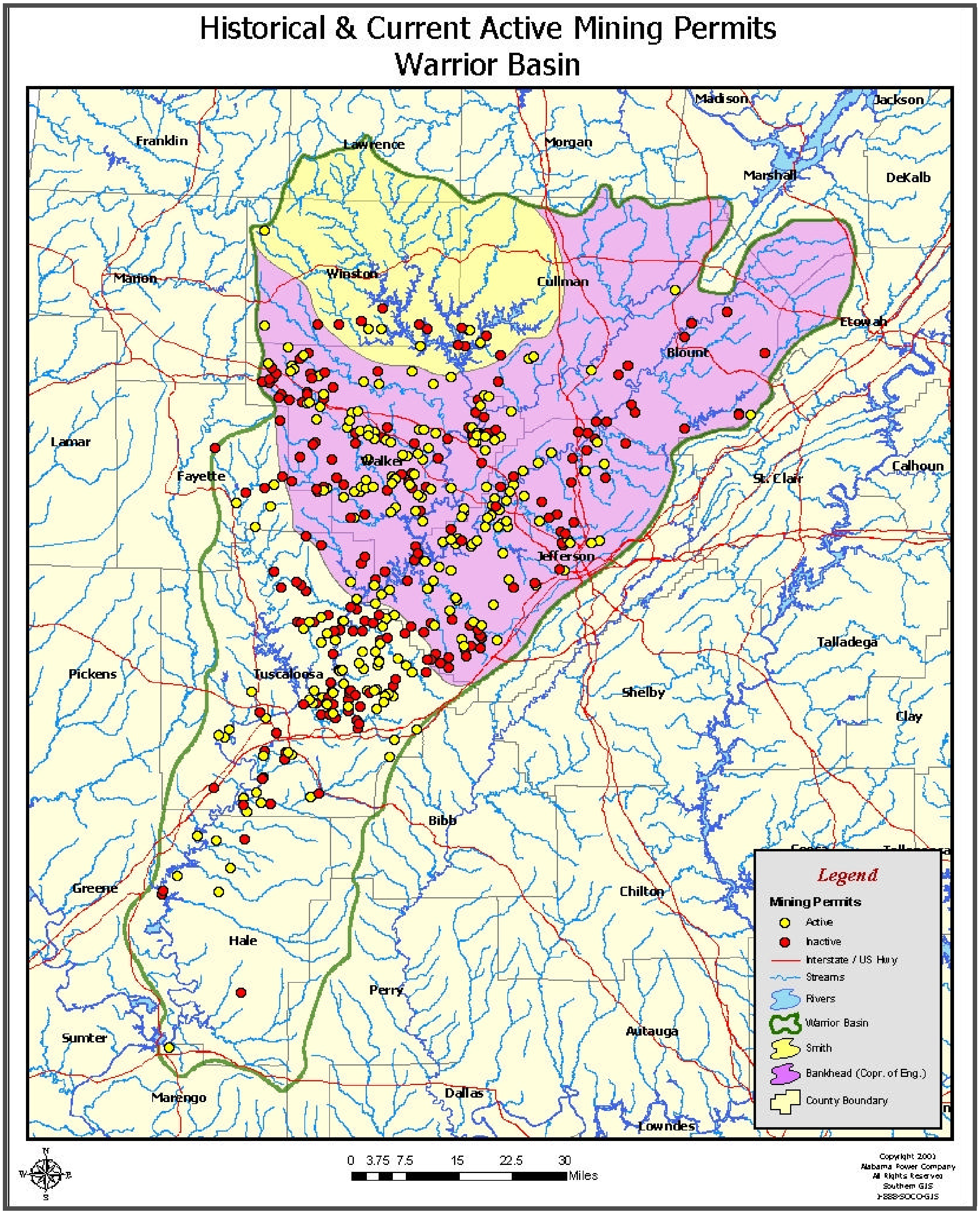
Appendix 13
Mining - Current

NPDES Permitted Mining Sites Within the Black Warrior River Basin



APPENDIX 13

Appendix 14
Mining - Historical



APPENDIX 14

APPENDIX C

Impairments

APPENDIX

Appendix 15
Agricultural BMPs

BEST MANAGEMENT PRACTICE SUMMARY GUIDE	SURFACE WATER							GROUND WATER	
	Sediment	Soluble Nutrients	Adsorbed Nutrients	Soluble Pesticides	Adsorbed Pesticides	Oxygen-Depleting Organisms	Bacteria	N Logg to Grd Wtr	Pst Logg to Grd Wtr
Conservation Tillage	●	☒	●	☒		☒	☒	●	●
Contour Farming and Terracing	●	❖	●	❖	●	❖	❖	●	●
Stripcropping	❖	❖	❖	❖	❖	❖	❖	☒	☒
Filter Strip	❖	☒	❖	☒	❖	❖	❖	☒	☒
Cover Crop	❖	❖	❖	❖	❖	☒	☒	❖	☒
Crop Rotation	●	❖	●	❖	●	☒	☒	☒	❖
Nutrient Management	☒	●	●	☒	☒	❖	☒	●	☒
Pest Management	☒	☒	☒	●	●	☒	☒	☒	●
Irrigation Water Management	❖	❖	❖	❖	❖	☒	☒	❖	❖
Pasture Management	❖	☒	❖	☒	☒	❖	❖	☒	☒
Ag Waste Management Systems	●	●	●	☒	☒	●	●	●	☒
Streambank Waterbody Protection	●	☒	●	☒	☒	☒	☒	☒	☒
Grassed Waterway	❖	☒	❖	☒	❖	☒	☒	☒	☒
Critical Area Planting	●	❖	❖	☒	❖	☒	☒	☒	☒
Streamside Forest Buffers	❖	☒	❖	☒	❖	❖	●	☒	☒
Composting	☒	●	●	☒	☒	❖	☒	●	☒

NOTE: Because of the general nature of this chart, there may be situations where practices will not perform as indicated.

☒	No control to low effectiveness
❖	Low to medium effectiveness
●	Medium to high effectiveness

SOURCE: Brach, John. 1991. Agriculture and Water Quality: Best Management Practices for Minnesota. Minnesota Pollution Control Agency. St. Paul, MN.

APPENDIX 15

Appendix 16
Alabama Power Erosion Hot Spots

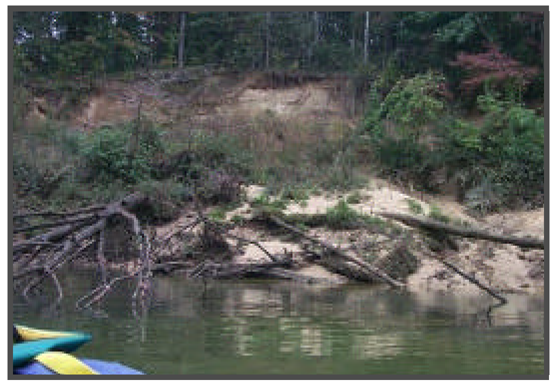
Alabama Power Site 101
Location: Smith Lake
See discussion under Documented Impairments - Erosion

APPENDIX 16

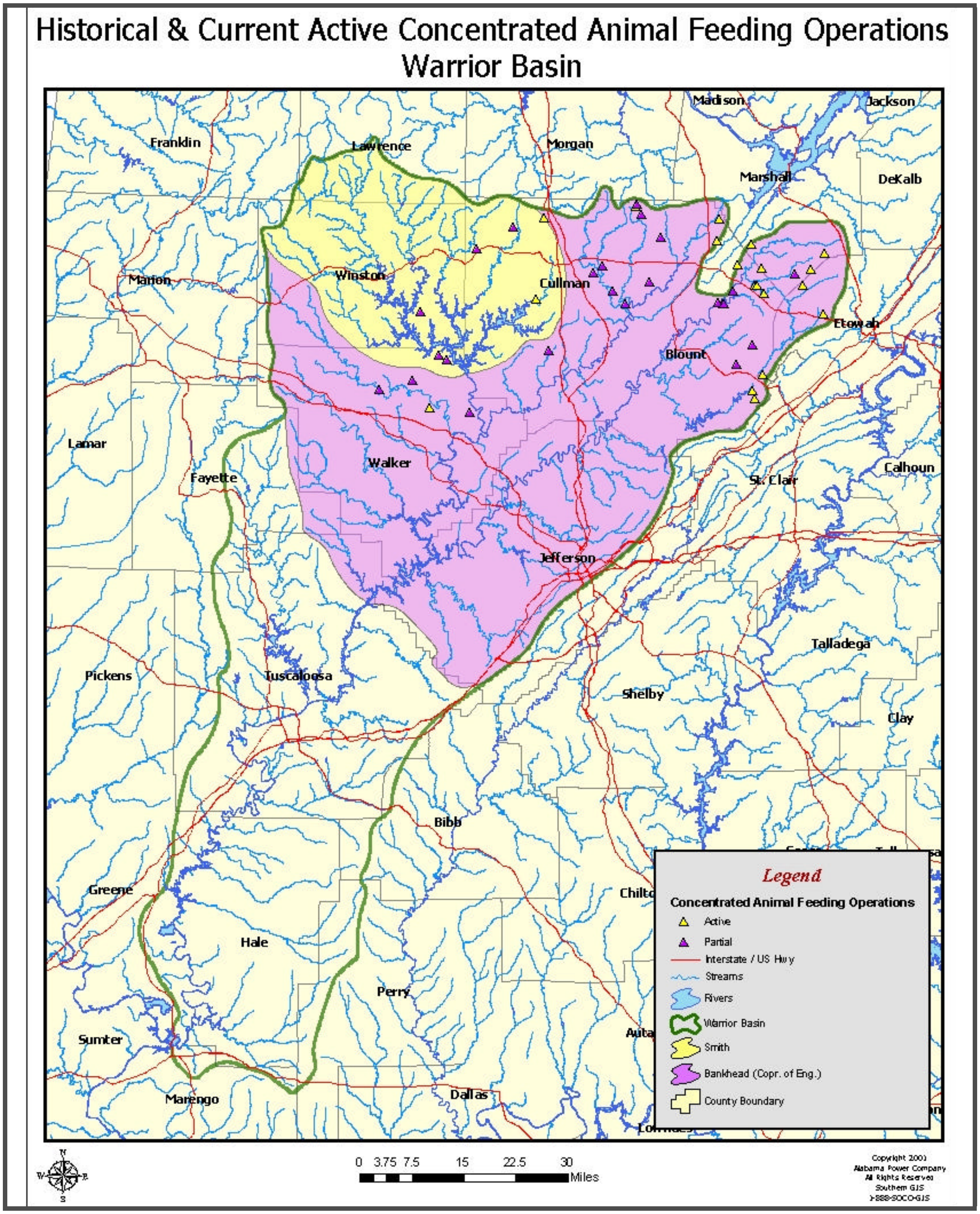
Alabama Power Site 102

Alabama Power Site 103

Alabama Power Site 104

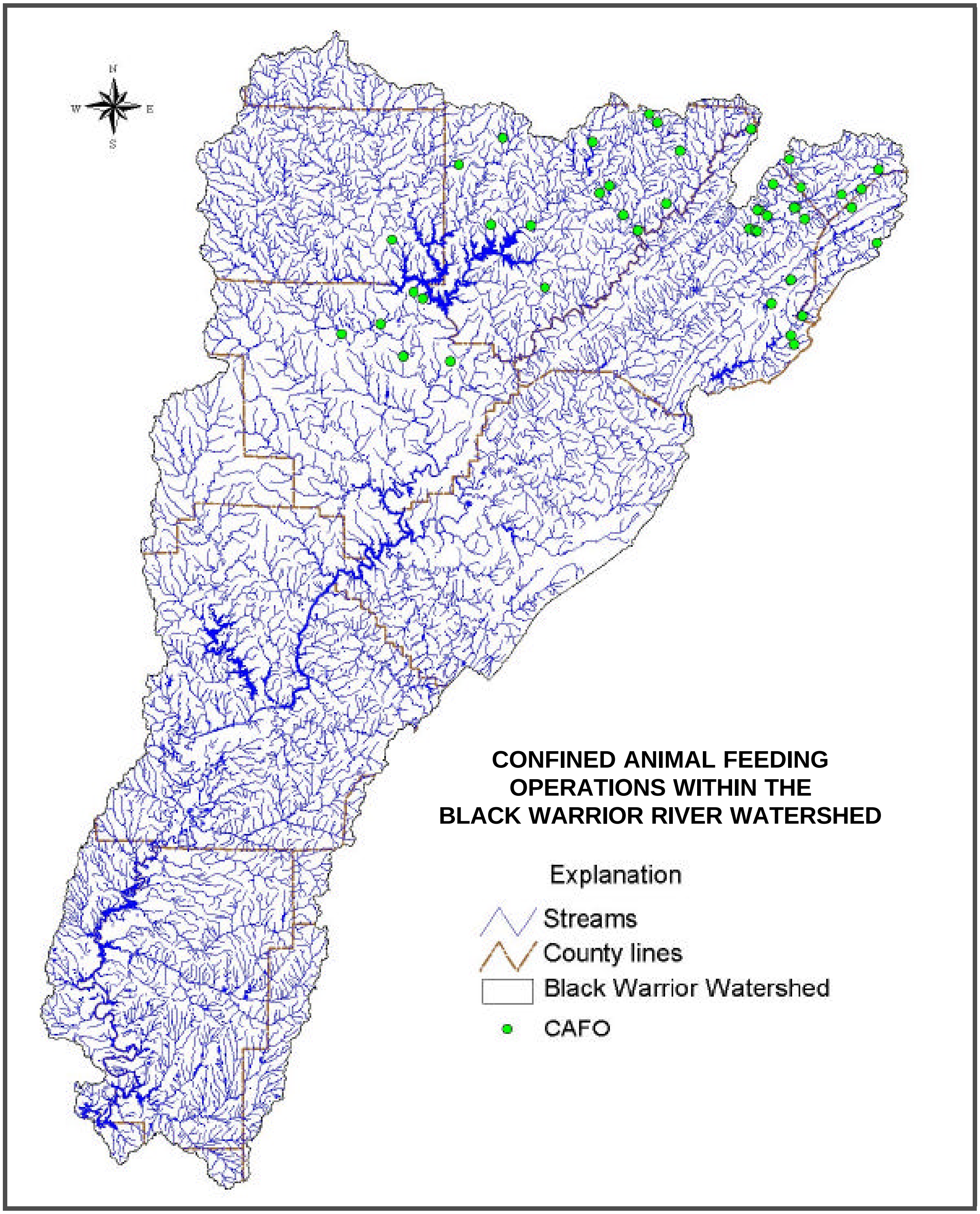


Appendix 17
CAFO - Historical



APPENDIX 17

Appendix 18
CAFO - Current



APPENDIX 18

Appendix 19
NPDES List of Major Dischargers

Blount

NPDES ID	FACILITY NAME	ADDRESS	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	DESCRIPTION
AL0049549	ONEONTA CITY UTILITIES BOARD	105 HIGH SCHOOL STREET ALLGOOD, AL 35013	OCT-15-1999	OCT-31-2004	SEWERAGE SYSTEMS
AL0001449	TYSON FOODS INCORPORATED	67240 MAIN STREET BLOUNTSVILLE, AL 35031	SEP-08-2000	SEP-30-2005	POULTRY SLAUGHTERING AND PROCESSING

Cullman

NPDES ID	FACILITY NAME	ADDRESS	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	DESCRIPTION
AL0040843	AMERICAN PROTEINS INCORPORATED HANCEVILLE DIVISION	1170 COUNTY RD. 508 HANCEVILLE, AL 350770429	SEP-28-2000	SEP-30-2005	ANIMAL AND MARINE FATS AND OILS
AL0050423	CULLMAN WASTEWATER TREATMENT PLANT	WELTI ROAD CULLMAN, AL 35055	JAN-24-2001	FEB-28-2006	SEWERAGE SYSTEMS
AL0026832	GOLDEN ROD BROILERS INCORPORATED	2352 COUNTY ROAD 719 CULLMAN, AL 35056	APR-14-2000	APR-30-2005	NONCLASSIFIABLE ESTABLISHMENTS

Hale

NPDES ID	FACILITY NAME	ADDRESS	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	DESCRIPTION
AL0026921	EASTMAN RESINS	12982 CRACKER ROAD MOUNDVILLE, AL 35474	JUL-17-1998	JUL-31-2003	PLASTICS MATERIALS, SYNTHETIC RESINS, AND NONVULCANIZABLE ELASTOMERS
AL0057193	GREENSBORO LAGOON	COUNTY ROAD 19 GREENSBORO, AL 36744	APR-15-1999	APR-30-2004	SEWERAGE SYSTEMS

Jefferson

NPDES ID	FACILITY NAME	ADDRESS	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	DESCRIPTION
AL0003417	ABC COKE	ONE RAILROAD AVENUE BIRMINGHAM, AL 35217	JUN-25-2003	JUN-30-2008	STEEL WORKS, BLAST FURNACES (INCLUDING COKE OVENS), AND ROLLING MILLS
AL0027146	ALABAMA POWER COMPANY J H MILLER STEAM ELECTRIC PLANT	4250 PORTER ROAD QUINTON, AL 35130	SEP-29-2001	SEP-30-2006	ELECTRIC SERVICES
AL0045969	BIRMINGHAM WW AND SEWER BOARD	3600 FIRST AVENUE NORTH BIRMINGHAM, AL 35222	SEP-30-2000	OCT-31-2002	SEWERAGE SYSTEMS
AL0062421	DRUMMOND COMPANY SHOAL CREEK MINE	8488 NANCY ANN BEND ROAD ADGER, AL 35006	MAY-31-2001	MAY-31-2006	BITUMINOUS COAL AND LIGNITE SURFACE MINING

AL0026913	FIVE MILE CREEK WWTP	JEFFERSON COUNTY COMMISION FULTONDALE, AL 35068	AUG-29-2002	SEP-30-2007	SEWERAGE SYSTEMS
AL0002097	HONEYWELL COMMERCIAL ROOFING SYSTEMS	1327 ERIE STREET BIRMINGHAM, AL 35224	AUG-25-2000	AUG-31-2005	CYCLIC ORGANIC CRUDES AND INTERMEDIATES, AND ORGANIC DYES AND PIGMENTS
AL0003221	KOPPERS INDUSTRIES INCORPORATED	1835 KOPPERS DRIVE DOLOMITE, AL 35061	SEP-25-2001	SEP-30-2006	CYCLIC ORGANIC CRUDES AND INTERMEDIATES, AND ORGANIC DYES AND PIGMENTS
AL0003247	SLOSS INDUSTRIES CORPORATION SLAG WOOL PLANT	3500 35TH AVENUE NORTH BIRMINGHAM, AL 35207	JUN-25-2003	JUN-30-2008	STEEL WORKS, BLAST FURNACES (INCLUDING COKE OVENS), AND ROLLING MILLS
AL0001554	SMI STEEL INCORPORATED	101 50TH STREET SOUTH BIRMINGHAM, AL 35212	AUG-29-2002	AUG-31-2007	STEEL WORKS, BLAST FURNACES (INCLUDING COKE OVENS), AND ROLLING MILLS
AL0022926	TURKEY CREEK WWTP	7137 DISPOSAL PLANT ROAD PINSON, AL 35126	AUG-29-2002	SEP-30-2007	SEWERAGE SYSTEMS
AL0003620	U S STEEL MINING COMPANY L.L.C. CONCORD	1500 CONCORD MINE ROAD HUEYTOWN, AL 35023	SEP-29-2000	SEP-30-2005	BITUMINOUS COAL AND LIGNITE SURFACE MINING
AL0003646	US STEEL FAIRFIELD WORKS	5700 VALLEY ROAD FAIRFIELD, AL 35064	JAN-19-1995	JAN-31-2000	STEEL WORKS, BLAST FURNACES (INCLUDING COKE OVENS), AND ROLLING MILLS
AL0023655	VALLEY CREEK WASTEWATER TREATMENT PLANT	3923, CLEARWATER DRIVE BESSEMER, AL 35023	JAN-12-2001	JAN-31-2006	SEWERAGE SYSTEMS
AL0023647	VILLAGE CREEK WASTEWATER TREATMENT FACIL	610 AVENUE D ENSLEY, AL 35218	JAN-12-2001	JAN-31-2006	SEWERAGE SYSTEMS

Tuscaloosa

NPDES ID	FACILITY NAME	ADDRESS	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	DESCRIPTION
AL0001767	EMPIRE COKE COMPANY	3200 MAIN ST. N.E. TUSCALOOSA, AL 35404	OCT-29-1999	NOV-30-2004	STEEL WORKS, BLAST FURNACES (INCLUDING COKE OVENS), AND ROLLING MILLS
AL0000973	HUNT REFINING COMPANY A CORPORATION	1855 FAIRLAWN RD. TUSCALOOSA, AL 35401	OCT-22-2002	OCT-31-2007	PETROLEUM REFINING
AL0026590	JIM WALTER MINE 4	JIM WALTER RESOURCES INCORP TUSCALOOSA COUNTY, AL	APR-30-2003	APR-30-2008	BITUMINOUS COAL AND LIGNITE SURFACE MINING
AL0064394	NORTHPORT WASTEWATER TREATMENT PLANT	3950 3RD STREET SOUTH N PORT, AL 35476	MAY-12-2003	MAY-31-2008	SEWERAGE SYSTEMS
AL0022713	TUSCALOOSA WASTE WATER TREATMENT PLANT	3900 KAULOOSA AVENUE TUSCALOOSA, AL 35401	JUL-14-2000	AUG-31-2005	SEWERAGE SYSTEMS

Walker

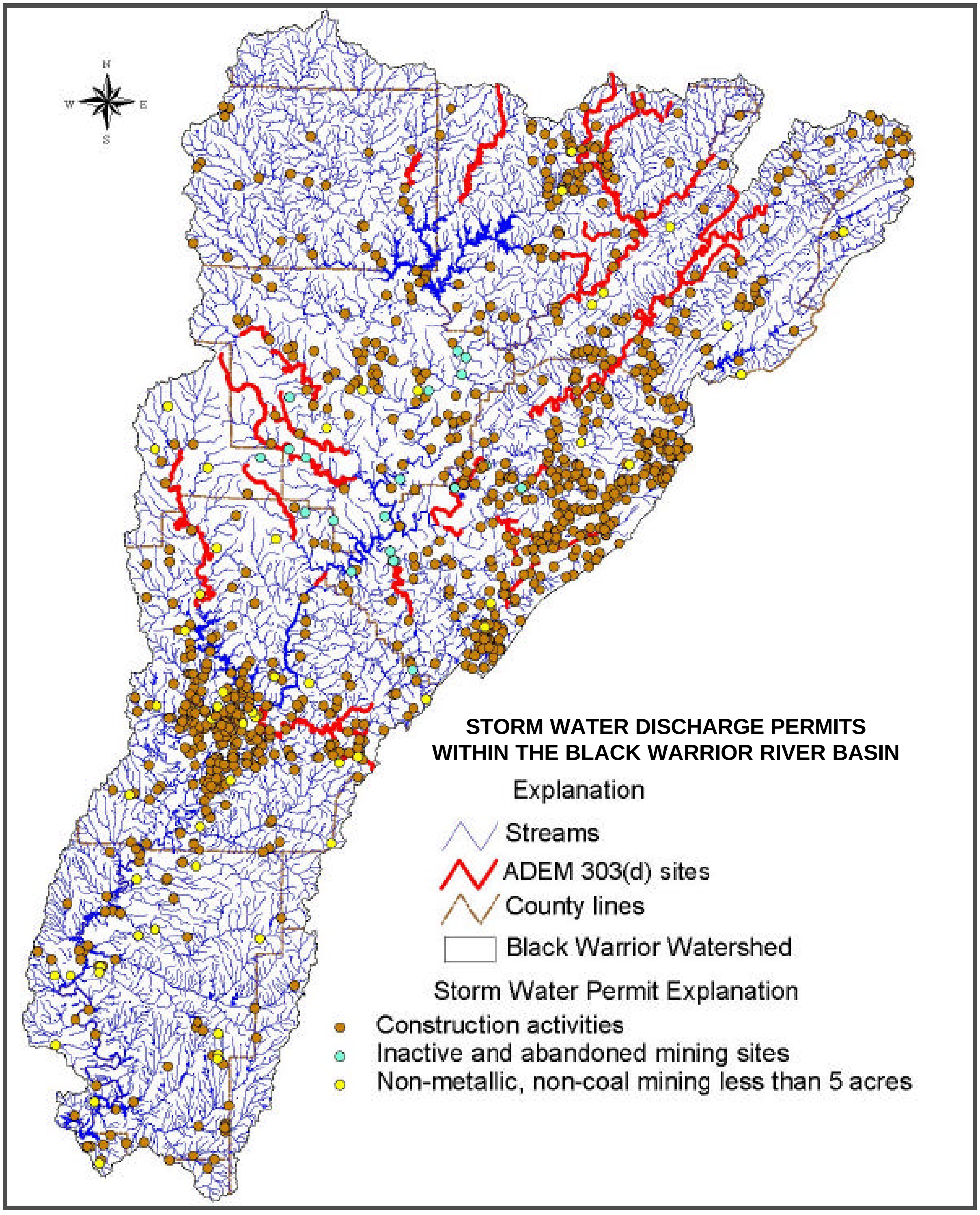
NPDES ID	FACILITY NAME	ADDRESS	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	DESCRIPTION
AL0002909	ALABAMA POWER COMPANY GORGAS STEAM PLANT	460 GORGAS ROAD PARRISH, AL 35580	SEP-29-2001	SEP-30-2006	ELECTRIC SERVICES
AL0023418	JASPER WATERWORKS & SEWER BD	FLORIDA AVENUE JASPER, AL 355021348	JUL-23-1997	AUG-31-2002	SEWERAGE SYSTEMS

Winston

No Major Dischargers

APPENDIX 19

Appendix 20
NPDES Storm Water Discharge Permits



APPENDIX 20

Appendix 21
Pesticides and Herbicides

Atrazine is the most heavily applied organic pesticide in the US and is persistent in the environment.

Chlorpyrifos is an organophosphate insecticide used in gardens, in residential areas, and on a wide variety of crops to control insects, including the pine beetle. It is also used for termite control in residential and industrial settings and in pet shampoo. This product will be removed from the market in December of 2003.

Diazinon and carbaryl are commonly used to control insects on lawns and gardens in urban areas. Diazinon is no longer being produced.

Malathion is an insecticide used in broad-scale aerial applications to control fruit flies and mosquitoes in urban areas.

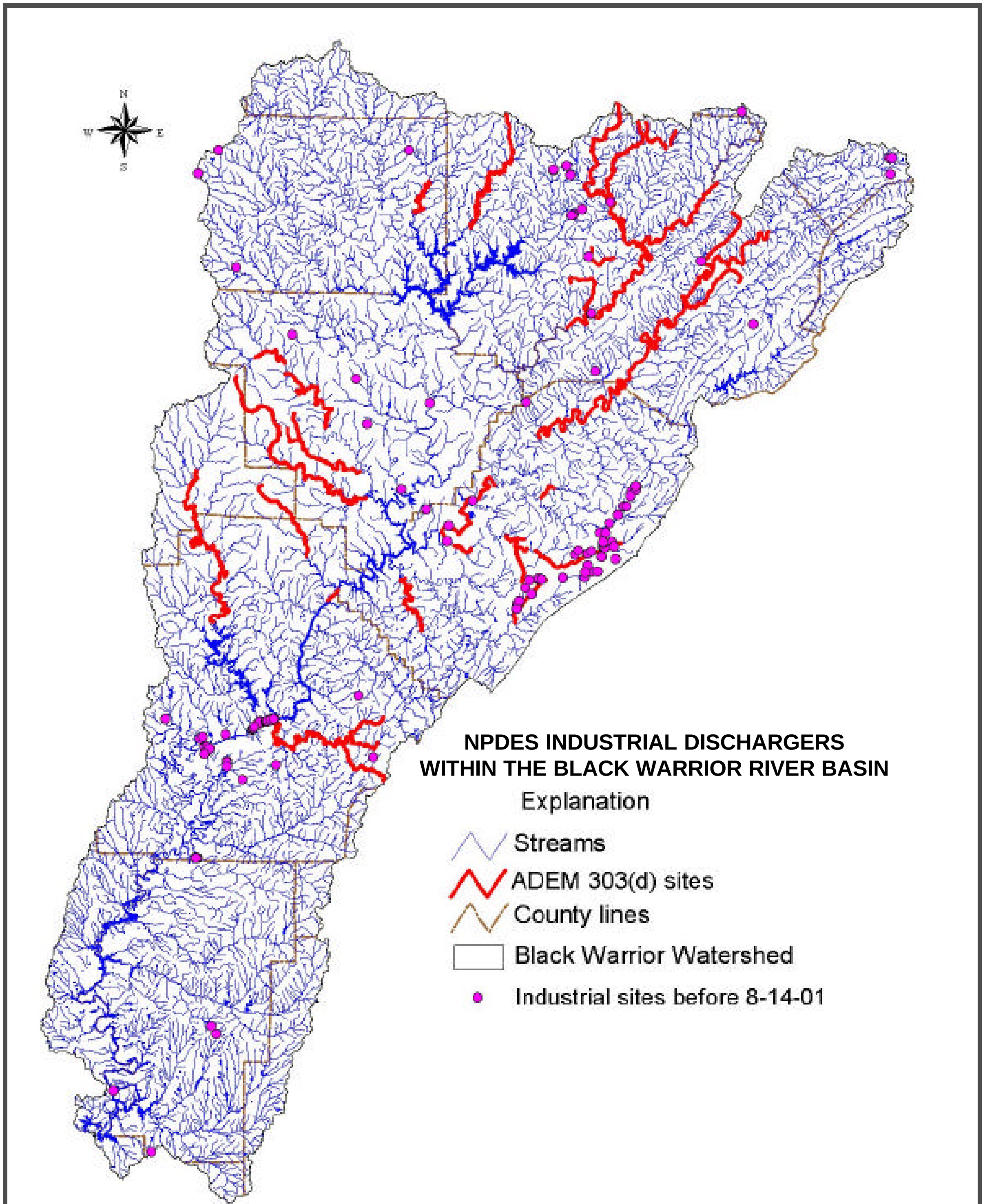
Simazine is a herbicide commonly used in orchards, vineyards, and along rights-of-way. It is frequently used in urban areas for weed control along roadways and railways, along fences, and in other public areas. Simazine is also persistent in the environment.

Polycyclic Aromatic Hydrocarbons Polycyclic aromatic hydrocarbons (PAHs) are formed during combustion processes and may enter surface-water systems in a variety of ways, including atmospheric deposition, surface runoff, and soil leaching. Several PAHs have been identified as carcinogens or mutagens. Sources of PAHs include domestic sewage, asphalt surfaces, car tires, vehicular exhaust, crude oil, and petroleum. [1]

SOURCE:
Investigation of Water Quality and Aquatic-Community Structure in Village and Valley Creeks, City of Birmingham, Jefferson County, Alabama, 2000-01. Water Resources Investigations Report 02-4182. U.S. Geological Survey and U.S. Army Corps of Engineers. Montgomery, Alabama. 2002.

APPENDIX 21

Appendix 22
NPDES Industrial Dischargers



APPENDIX 23

Appendix 23
Trace and Major Elements

Aluminum is the third most abundant element in the Earth's outer crust, but it is rarely found in solution in surface water in high concentrations.

Arsenic is a trace element that is toxic in relatively small amounts. Although naturally occurring, it can be produced as a by-product when coal is burned or iron is smelted, and it is commonly used in pesticides.

Cadmium occurs in some ores and is used extensively in industry. It can become an environmental contaminant through waste-disposal practices or from atmospheric deposition.

Chromium concentrations in natural waters are generally less that 10 micrograms per liter. However, chromium may be introduced to surface waters by industrial wastes.

Copper is commonly detected in the environment and may originate from natural sources or from industry and agriculture.

Iron is the second most abundant metal in the Earth's outer crust. However, concentrations present in surface water are generally small. If present in drinking water in excessive amounts, iron tends to form red oxyhydroxide precipitates that may stain laundry and plumbing fixtures.

Lead concentrations tend to be low in surface water because lead absorbs readily to inorganic and organic surfaces. Environmental contamination from lead occurs from its use as an additive in gasoline and from industrial sources such as coal burning.

Manganese is undesirable in water supplies because it tends to deposit black oxide stains. Concentrations in untreated surface water commonly exceed the secondary drinking-water standards because iron and manganese commonly coat clay particles.

Molybdenum occurs naturally in streams in trace amounts. Fossil-fuel combustion is a probable source where higher molybdenum concentrations are detected. No water-quality standards or criteria have been set for molybdenum.

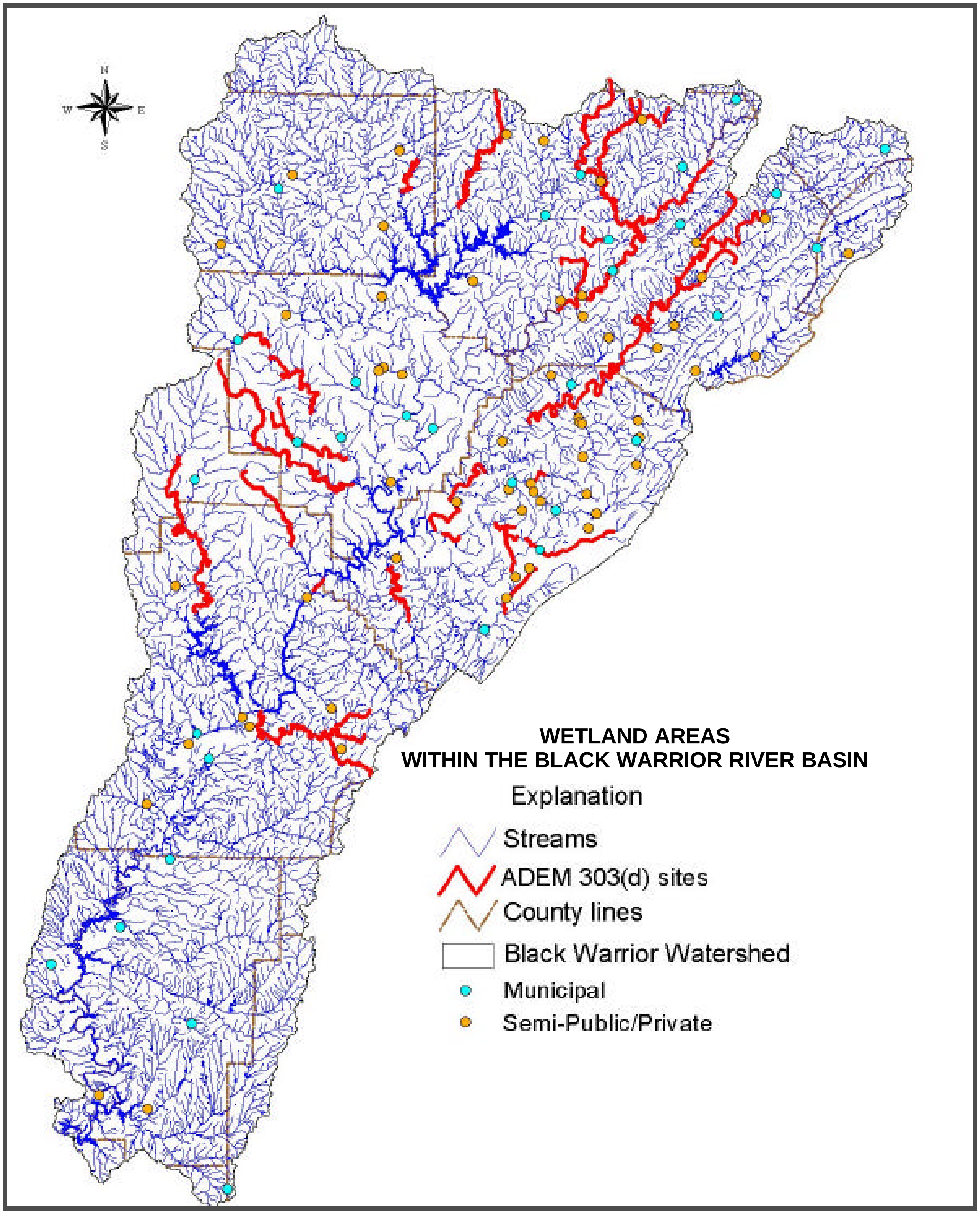
Nickel is widely used in industry and is a common environmental contaminant. It is a constituent of stainless steel and other alloys.

Silver has numerous human sources.

Zinc is widely used in combination with other metals, such as galvanizing steel, and is commonly used in paints.

SOURCE:
Investigation of Water Quality and Aquatic-Community Structure in Village and Valley Creeks, City of Birmingham, Jefferson County, Alabama, 2000-01. Water Resources Investigations Report 02-4182. U.S. Geological Survey and U.S. Army Corps of Engineers. Montgomery, Alabama. 2002.

Appendix 24
NPDES Waste Water Treatment Plant Dischargers



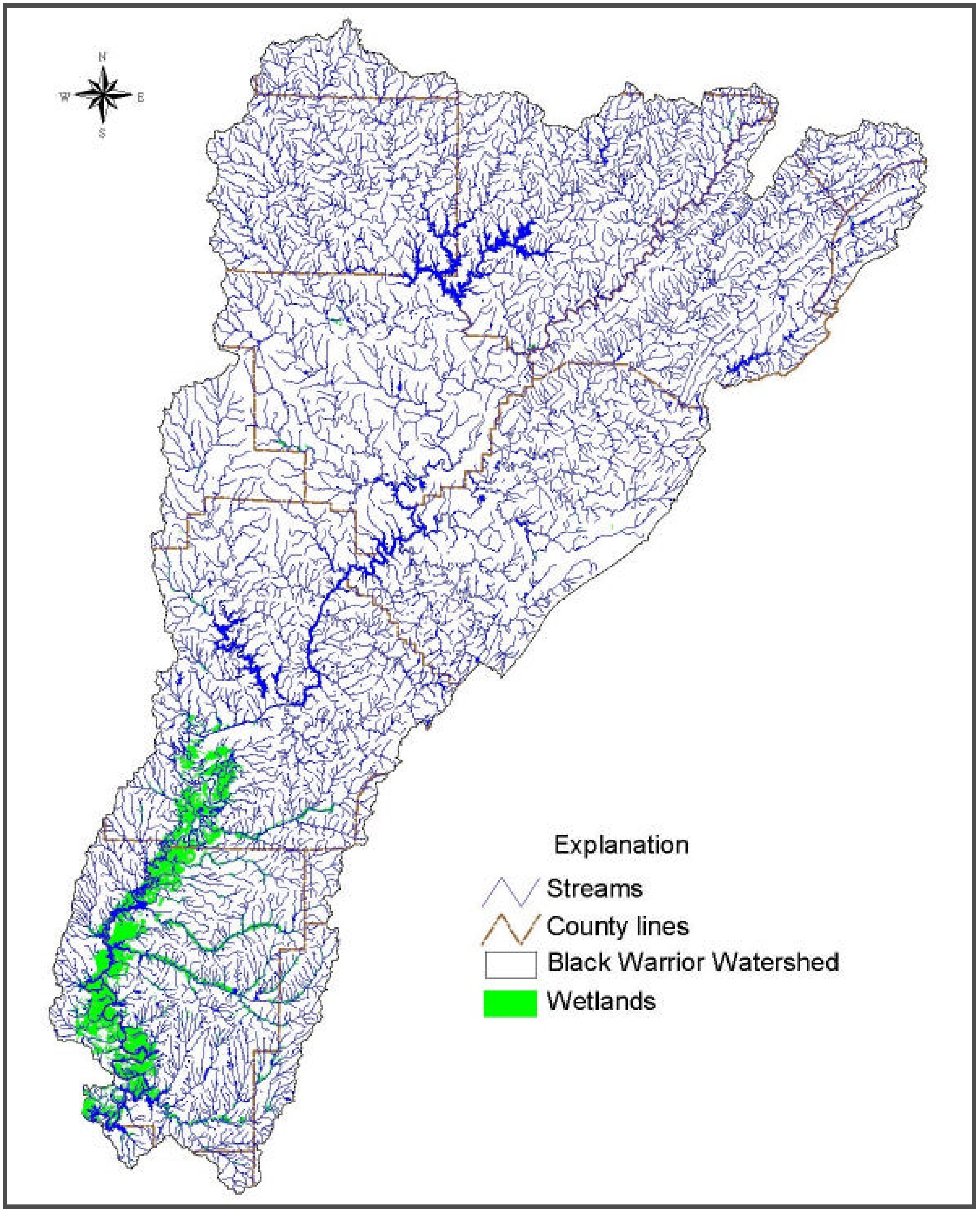
APPENDIX 24

APPENDIX D

Effects of Impairments

APPENDIX

Appendix 25
Wetlands



APPENDIX 25

APPENDIX E

Total Maximum Daily Loads

APPENDIX

A.70 Black Warrior River Watershed Management Plan

Appendix 26
303(d) List

2000 303(d) LISTED STREAM SEGMENTS WITHIN THE BLACK WARRIOR RIVER BASIN

Waterbody Name	Support Status	TYPE	Rank	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations	TMDL Date
Duck Creek	Non	R	H	Cullman	F&W	OE/DO	Pasture Grazing+ Int. animal feeding oper	1991, 1997	6.4 miles	Duck River /Its Source	2001
Long Branch	Partial	R	M	Cullman	F&W	Ammonia	Pasture Grazing _ Int. animal feeding oper.	1990, 1997	2.0 miles	Wolf Creek / Its source	2001
Long Branch	Partial	R	M	Cullman	F&W	OE/DO	Pasture Grazing _ Int. animal feeding oper.	1990, 1997	2.0 miles	Wolf Creek / Its source	2001
Long Branch	Partial	R	M	Cullman	F&W	Pathogens	Pasture Grazing _ Int. animal feeding oper.	1990, 1997	2.0 miles	Wolf Creek / Its source	2001
Brindley Creek	Non	R	H	Cullman	PW	Ammonia	Urban runoff/Storm sewers	1996	18.8 miles	Broglen River /Its source	2004
Brindley Creek	Non	R	H	Cullman	PW	Nutrients	Urban runoff/Storm sewers	1996	18.8 miles	Broglen River /Its source	2004
Brindley Creek	Non	R	H	Cullman	PW	OE/DO	Urban runoff/Storm sewers	1996	18.8 miles	Broglen River /Its source	2004
Brindley Creek	Non	R	H	Cullman	PW	Pathogens	Urban runoff/Storm sewers	1996	18.8 miles	Broglen River /Its source	2004
Eightmile Creek	Partial	R	L	Cullman	F&W	Pathogens	Urban runoff + Pasture grazing	1991, 1996	23.0 miles	Broglen River /Its source	2002
Broglen River	Partial	R	M	Cullman	F&W	Pathogens	Urban runoff + Pasture grazing	1991, 1996	12.0 miles	Mulberry Fork /Its source	2002
Mulberry Fork	Non	R	H	Blount/Cullman	F&W	Siltation	Agriculture	1974-83	18.4 miles	Broglen River /Blount Co Rd6	2004
Mulberry Fork	Non	R	H	Blount/Cullman	F&W	Other habitat alteration	Agriculture	1974-83	18.4 miles	Broglen River /Blount Co Rd7	2004
Mud Creek	Non	R	H	Cullman	F&W	OE/DO	Urban runoff/Storm sewers	1996	4.7 miles	AL Hwy. 31 /Its Source	2004

Thacker Creek	Non	R	H	Cullman	F&W	Ammonia	Pasture Grazing	1991, 1997	9.5 miles	Mulberry Fork /Its source	2001
Thacker Creek	Non	R	H	Cullman	F&W	OE/DO	Pasture Grazing	1991, 1997	9.5 miles	Mulberry Fork /Its source	2001
Thacker Creek	Non	R	H	Cullman	F&W	Pathogens	Pasture Grazing	1991, 1997	9.5 miles	Mulberry Fork /Its source	2001
Mulberry Fork	Non	R	H	Blount/Cullman	F&W	Nutrients	Ag, industrial, municipal	1972-83, 88, 96	2.5 miles	Marriott Creek/Mill Creek	2004
Mulberry Fork	Non	R	H	Blount/Cullman	F&W	Nutrients	Ag, industrial, municipal	1972-83, 88, 96	20 miles	Mill Creek/Broglen River	2004
Mulberry Fork	Non	R	H	Blount/Cullman	F&W	Siltation	Ag, industrial, municipal	1972-83, 88, 96	20 miles	Mill Creek/Broglen River	2004
Mulberry Fork	Non	R	H	Blount/Cullman	F&W	Other habitat alteration	Ag, industrial, municipal	1972-83, 88, 96	20 miles	Mill Creek/Broglen River	2004
Cane Creek	Partial	R	M	Walker	F&W	Metals	Surface mining-abandoned, municipal	1988, 1993	14.7 miles	Lost Creek /Its source	2004
Cane Creek	Partial	R	M	Walker	F&W	Nutrients	Surface mining-abandoned, municipal	1988, 1993	14.7 miles	Lost Creek /Its source	2004
Cane Creek	Partial	R	M	Walker	F&W	pH	Surface mining-abandoned, municipal	1988, 1993	14.7 miles	Lost Creek /Its source	2004
Cane Creek	Partial	R	M	Walker	F&W	OE/DO	Surface mining-abandoned, municipal	1988, 1993	14.7 miles	Lost Creek /Its source	2004
Cane Creek	Partial	R	M	Walker	F&W	Siltation	Surface mining-abandoned, municipal	1988, 1993	14.7 miles	Lost Creek /Its source	2004

Black Branch	Non	R	H	Walker	F&W	Metals	Surface mining-abandoned	1996-97	3.1 miles	Cane Creek/Its source	2004
Black Branch	Non	R	H	Walker	F&W	pH	Surface mining-abandoned	1996-97	3.1 miles	Cane Creek/Its source	2004
Black Branch	Non	R	H	Walker	F&W	Siltation	Surface mining-abandoned	1996-97	3.1 miles	Cane Creek/Its source	2004
Black Branch	Non	R	H	Walker	F&W	Other habitat alteration	Surface mining-abandoned	1996-97	3.1 miles	Cane Creek/Its source	2004
Lost Creek	Partial	R	H	Walker	F&W	Siltation	Surface mining-abandoned	1987	12.8 miles	US Hwy. 78 at Carbon Hill /	2004
Lost Creek	Partial	R	H	Walker	F&W	Other habitat alteration	Surface mining-abandoned	1987	12.8 miles	US Hwy. 78 N. of Cedrum	2004
Lost Creek	Partial	R	H	Walker	F&W	Siltation	Surface mining-abandoned	1987	17.3 miles	Mill dam@Cedrum /AL Hwy69@Oakman	2004
Lost Creek	Partial	R	H	Walker	F&W	Other habitat alteration	Surface mining-abandoned	1987	17.3 miles	Mill dam@Cedrum /AL Hwy69@Oakman	2004
Wolf Creek	Partial	R	H	Walker	F&W	Siltation	Surface mining-abandoned	1996	37.2 miles	Lost Creek /AL Hwy 102	2004
Wolf Creek	Partial	R	H	Walker	F&W	Other habitat alteration	Surface mining-abandoned	1996	37.2 miles	Lost Creek /AL Hwy 102	2004
Rock Creek	Partial	R	M	Winston	F&W	OE/DO	Pasture Grazing+Int animal feeding oper	1990-91, 1997	5.0 miles	Smith Lake/Blevens Creek	2001
Rock Creek	Partial	R	M	Winston	F&W	Pathogens	Pasture Grazing+Int animal feeding oper	1990-91, 1997	5.0 miles	Smith Lake/Blevens Creek	2001
Crooked Creek	Partial	R	M	Cullman	F&W	Ammonia	Pasture Grazing+Int animal feeding oper	1991, 1997	28.0 miles	Smith Lake /Its Source	2001
Crooked Creek	Partial	R	M	Cullman	F&W	OE/DO	Pasture Grazing+Int animal feeding oper	1991, 1997	28.0 miles	Smith Lake /Its Source	2001

Crooked Creek	Partial	R	M	Cullman	F&W	Pathogens	Pasture Grazing+Int animal feeding oper	1991, 1997	28.0 miles	Smith Lake /Its Source	2001
Dry Creek	Partial	R	M	Blount	F&W	Nutrients	Pasture Grazing	1988	11.2 miles	Locust Fork /Its Source	2004
Dry Creek	Partial	R	M	Blount	F&W	Ammonia	Pasture Grazing	1988	11.2 miles	Locust Fork /Its Source	2004
Dry Creek	Partial	R	M	Blount	F&W	OE/DO	Pasture Grazing	1988	11.2 miles	Locust Fork /Its Source	2004
Dry Creek	Partial	R	M	Blount	F&W	Pathogens	Pasture Grazing	1991	11.2 miles	Locust Fork /Its Source	2004
Graves Creek	Non	R	H	Blount	F&W	OE/DO	Pasture Grazing+Industrial	1991	10.2 miles	Locust Fork /Its Source	2001
Locust Fork	Partial	R	H	Blount	F&W	Siltation	Ag+surface mining-abandoned	1987	21.8 miles	Little Warrior River /Blount Co. Rd. 30	2004
Locust Fork	Partial	R	H	Blount	F&W	Other habitat alteration	Ag+surface mining-abandoned	1987	21.8 miles	Little Warrior River /Blount Co. Rd. 30	2004
Locust Fork	Partial	R	H	Blount/Jefferson	F&W	Nutrients	Ag+surface mining-abandoned	1998	47.3 miles	JeffCo Rd77 /Little Warrior Riv	2004
Locust Fork	Partial	R	H	Blount/Jefferson	F&W	Siltation	Ag+surface mining-abandoned	1998	47.3 miles	JeffCo Rd77 /Little Warrior Riv	2004
Locust Fork	Partial	R	H	Blount/Jefferson	F&W	Other habitat alteration	Ag+surface mining-abandoned	1998	47.3 miles	JeffCo Rd77 /Little Warrior Riv	2004
Locust Fork	Partial	R	L	Jefferson	F&W	OE/DO	Urban Runoff/Storm Sewers	1990-91, 1997	16.3 miles	Short Creek/Fivemile Cr	2003
Newfound Creek	Partial	R	M	Jefferson	F&W	Biology	Urban runoff/Storm sewers	1986	3.0 miles	Fivemile Creek/Impoundment	2004

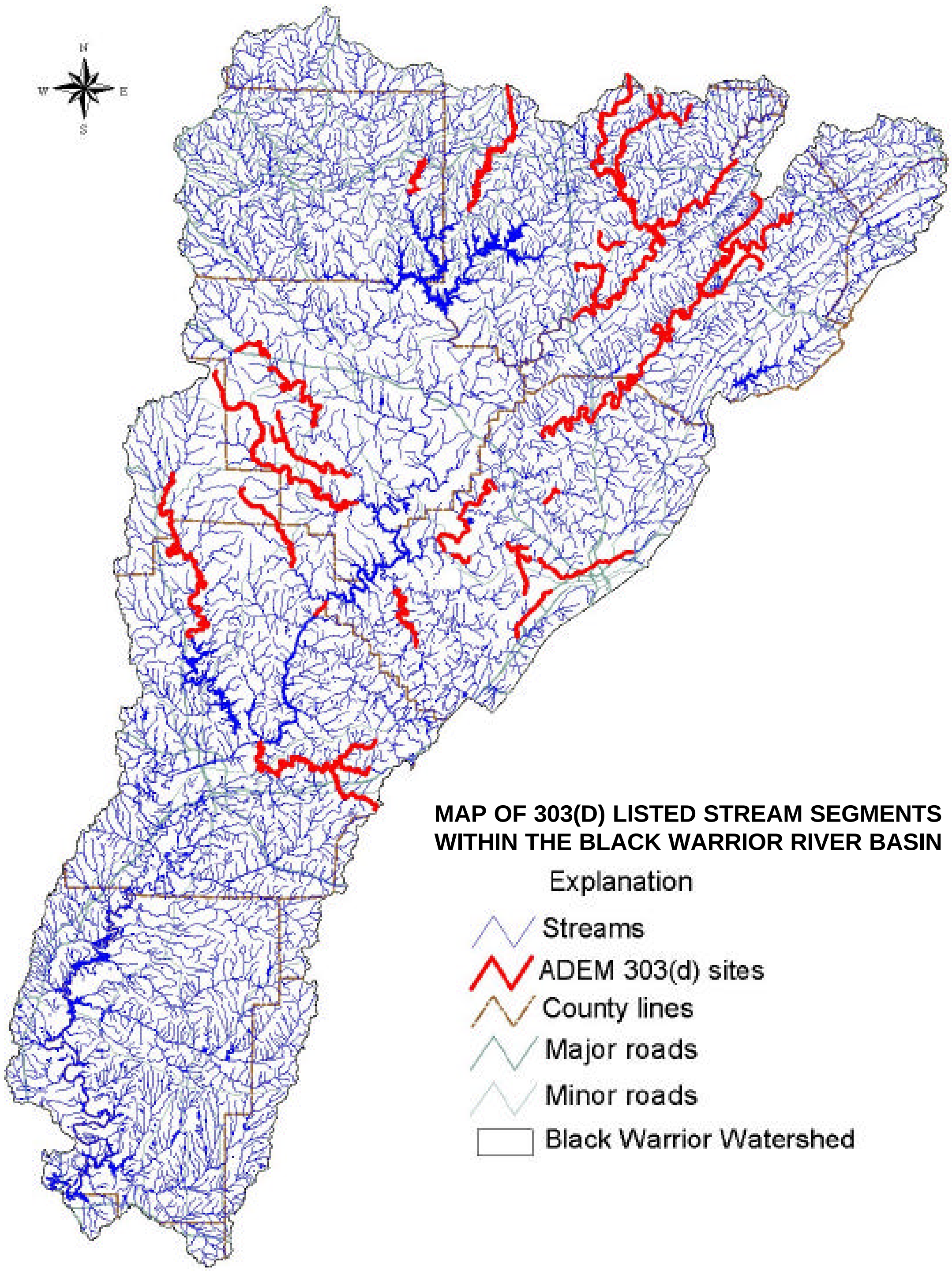
Camp Branch	Non	R	L	Jefferson	F&W	Metals	Surface mining-abandoned, sub-surf abandoned, Mill tailings-abandoned, mine tailings-abandoned, landfills	1991	10.0 miles	Bayview Lake/Its Source	2002
Camp Branch	Non	R	L	Jefferson	F&W	pH	Surface mining-abandoned, sub-surf abandoned, Mill tailings-abandoned, mine tailings-abandoned, landfills	1991	10.0 miles	Bayview Lake/Its Source	2002
Camp Branch	Non	R	L	Jefferson	F&W	Siltation	Surface mining-abandoned, sub-surf abandoned, Mill tailings-abandoned, mine tailings-abandoned, landfills	1991	10.0 miles	Bayview Lake/Its Source	2002
Camp Branch	Non	R	L	Jefferson	F&W	Other habitat alteration	Surface mining-abandoned, sub-surf abandoned, Mill tailings-abandoned, mine tailings-abandoned, landfills	1991	10.0 miles	Bayview Lake/Its Source	2002
Village Creek	Non	R	L	Jefferson	A&I	Nonpriority Organics	Ind,municipal, urban runoff, storm sewers, surface mining-abandoned, subsurf mining-aband, mill tailings-aband, mine tailings-aband	1990-91, 1997	12.6 miles	JeffCo Rd 65/Woodlawn Bridge	2002

Village Creek	Non	R	L	Jefferson	A&I	Metals	Ind,municipal, urban runoff, storm sewers, surface mining-abandoned, subsurf mining-aband, mill tailings-aband, mine tailings-aband	1990-91, 1997	12.6 miles	JeffCo Rd 65/Woodlawn Bridge	2002
Village Creek	Non	R	L	Jefferson	A&I	Ammonia	Ind,municipal, urban runoff, storm sewers, surface mining-abandoned, subsurf mining-aband, mill tailings-aband, mine tailings-aband	1990-91, 1997	12.6 miles	JeffCo Rd 65/Woodlawn Bridge	2002
Village Creek	Non	R	L	Jefferson	A&I	pH	Ind,municipal, urban runoff, storm sewers, surface mining-abandoned, subsurf mining-aband, mill tailings-aband, mine tailings-aband	1990-91, 1997	12.6 miles	JeffCo Rd 65/Woodlawn Bridge	2002
Village Creek	Non	R	L	Jefferson	A&I	Siltation	Ind,municipal, urban runoff, storm sewers, surface mining-abandoned, subsurf mining-aband, mill tailings-aband, mine tailings-aband	1990-91, 1997	12.6 miles	JeffCo Rd 65/Woodlawn Bridge	2002
Village Creek	Non	R	L	Jefferson	A&I	OE/DO	Ind,municipal, urban runoff, storm sewers, surface mining-abandoned, subsurf mining-aband, mill tailings-aband, mine tailings-aband	1990-91, 1997	12.6 miles	JeffCo Rd 65/Woodlawn Bridge	2002

Bayview Lake	Non	L	L	Jefferson	A&I	Ammonia	Municipal, urban runoff, storm sewers, ind, spills, surface mining-aband	1991, 1997	440 acres	Bayview Lake Dam/Village Creek	2002
Bayview Lake	Non	L	L	Jefferson	A&I	OE/DO	Municipal, urban runoff, storm sewers, ind, spills, surface mining-aband	1991, 1997	440 acres	Bayview Lake Dam/Village Creek	2002
Bayview Lake	Non	L	L	Jefferson	A&I	Siltation	Municipal, urban runoff, storm sewers, ind, spills, surface mining-aband	1991, 1997	440 acres	Bayview Lake Dam/Village Creek	2002
Bayview Lake	Non	L	L	Jefferson	A&I	Pesticides	Municipal, urban runoff, storm sewers, ind, spills, surface mining-aband	1991, 1997	440 acres	Bayview Lake Dam/Village Creek	2002
Short Creek	Non	R	L	Jefferson	F&W	Metals	Subsurface mining-abandoned, Mine tailings-aband	1990-91, 1997	3.0 miles	Jeff Co Rd 39/3mi upstream	Removed2002
Opossum Creek	Non	R	H	Jefferson	A&I	OE/DO	Ind, urban runoff, storm sewers	1996	7.1 miles	Valley Creek/Its source	2002
Mud Creek	Non	R	H	Jefferson	F&W	pH	Unknown source	1974-83	5.1 miles	Valley Creek/Big Branch	2004
Mud Creek	Non	R	H	Jefferson	F&W	Siltation	Unknown source	1974-83	5.1 miles	Valley Creek/Big Branch	2004
Big Yellow Creek	Non	R	H	Tuscaloosa	F&W	Metals	Surface mining-abandoned	1979-85, 1988	20.7 miles	Bankhead Lake/Its source	2004
Black Warrior River	Partial	R	L	Tuscaloosa	PWS	OE/DO	Dam construc.	1991	2.0 miles	Bankhead Dam/Big Yellow Creek	2002
North River	Partial	R	H	Fayette/Tuscaloosa	F&W	Nutrients	Surface mining-abandoned	1987, 1993	38 miles	Lake Tuscaloosa/Ellis Creek	2004

North River	Partial	R	H	Fayette/Tuscaloosa	F&W	Siltation	Surface mining-abandoned	1987, 1993	38 miles	Lake Tuscaloosa/Ellis Creek	2004
North River	Partial	R	H	Fayette/Tuscaloosa	F&W	Other habitat alteration	Surface mining-abandoned	1987, 1993	38 miles	Lake Tuscaloosa/Ellis Creek	2004
Hurricane Creek	Non	R	H	Tuscaloosa	F&W	Metals (Al, Fe)	Surface mining-abandoned	1996	31.4 miles	Black Warrior Riv/Coal Creek	2001
Hurricane Creek	Non	R	H	Tuscaloosa	F&W	Pathogens	Land development	1993-96	31.4 miles	Black Warrior Riv/Coal Creek	2001
Hurricane Creek	Non	R	H	Tuscaloosa	F&W	Turbidity	Land development	1993-96	31.4 miles	Black Warrior Riv/Coal Creek	2001
Little Hurricane Creek	Non	R	H	Tuscaloosa	F&W	Metals (Al, As, Cu, CrT, Fe)	Surface mining-abandoned	1996	10 miles	Hurricane Creek/Its source	2001
Little Hurricane Creek	Non	R	H	Tuscaloosa	F&W	Pathogens	Surface mining-abandoned	1996	10 miles	Hurricane Creek/Its source	2001
N. Fk. Hurricane Creek	Non	R	H	Tuscaloosa	F&W	Metals (Al)	Surface mining-abandoned	1996	6.4 miles	Hurricane Creek/Its source	2001

Appendix 27
303(d) Map



APPENDIX 27

Appendix 28
303(d) Pollutant Definitions

OE/DO (Organic Enrichment/Low Dissolved Oxygen) - Excessive organic material decay results in the depletion of the amount of oxygen available in the water, vital to fish and other aquatic life.

Ammonia - Ammonia is present naturally in surface waters and wastewaters. A compound of nitrogen and hydrogen (NH3) is very soluble in water. The amount of oxygen available in the water is depleted by bacteria as they convert ammonia to nitrate, a compound of nitrogen. Ammonia can also exhibit toxicity to aquatic organisms.

Siltation - Excessive amounts of sediment which degrade the habitat of aquatic organisms and interfere with the stream's aquatic community.

Turbidity - A cloudy condition in water due to suspended silt or organic matter. The clarity of a natural body of water is an important determinant of its condition and productivity.

Nutrients - Any substance assimilated by living things that promotes growth. Nitrogen and phosphorus are the two major nutrients. All plants require nutrients for growth.

Pathogens - Microorganisms (e.g., bacteria) that can cause disease in humans and animals. Fecal Coliform are commonly used as an indicator for the possible presence of these organisms.

PH - An expression of the intensity of the basic or acidic condition of a liquid; may range from 0 to 14 where 0 is the most acid and 7 is neutral. Natural waters usually have a pH between 6.5 and 8.5.

Metals - A chemical element as distinguished from an alloy (e.g. copper, iron, aluminum). This term can apply to one or more specific elements. Some metals are essential to plant and animal growth while others may adversely affect receiving waters. The benefits versus toxicity of some metals depend on their concentrations in waters.

Zinc - A chemical element classified as being a metal.

Mercury - A Chemical element classified as being a metal. Methyl mercury is the form which accumulates in animals, including fish and humans, and can pose a health risk at sufficiently high concentrations.

Pesticides - Substances or mixture there of intended for preventing, destroying, repelling, or mitigating any pest. Also, any substance or mixture intended for use a a plant regulator, defoliant, or desiccant. Pesticides can be persistent in the environment and may cause toxicity in receiving waters as rainfall runoff enters streams during a rain event.

Chlorodane - A pesticide commonly used for termite control.

Priority and Non-priority Organics - Compounds containing carbon. Priority organics for this listing generally refers to PCBs and DDT, both of these compounds have been shown to be persistent in the environment. Non-priority organics generally refer to the organic compounds: benzene, ethyl benzene, toluene, and xylene (BETX.)

Color - Color change in the stream as a result of wastewater discharges that affects the aesthetic value of the stream.

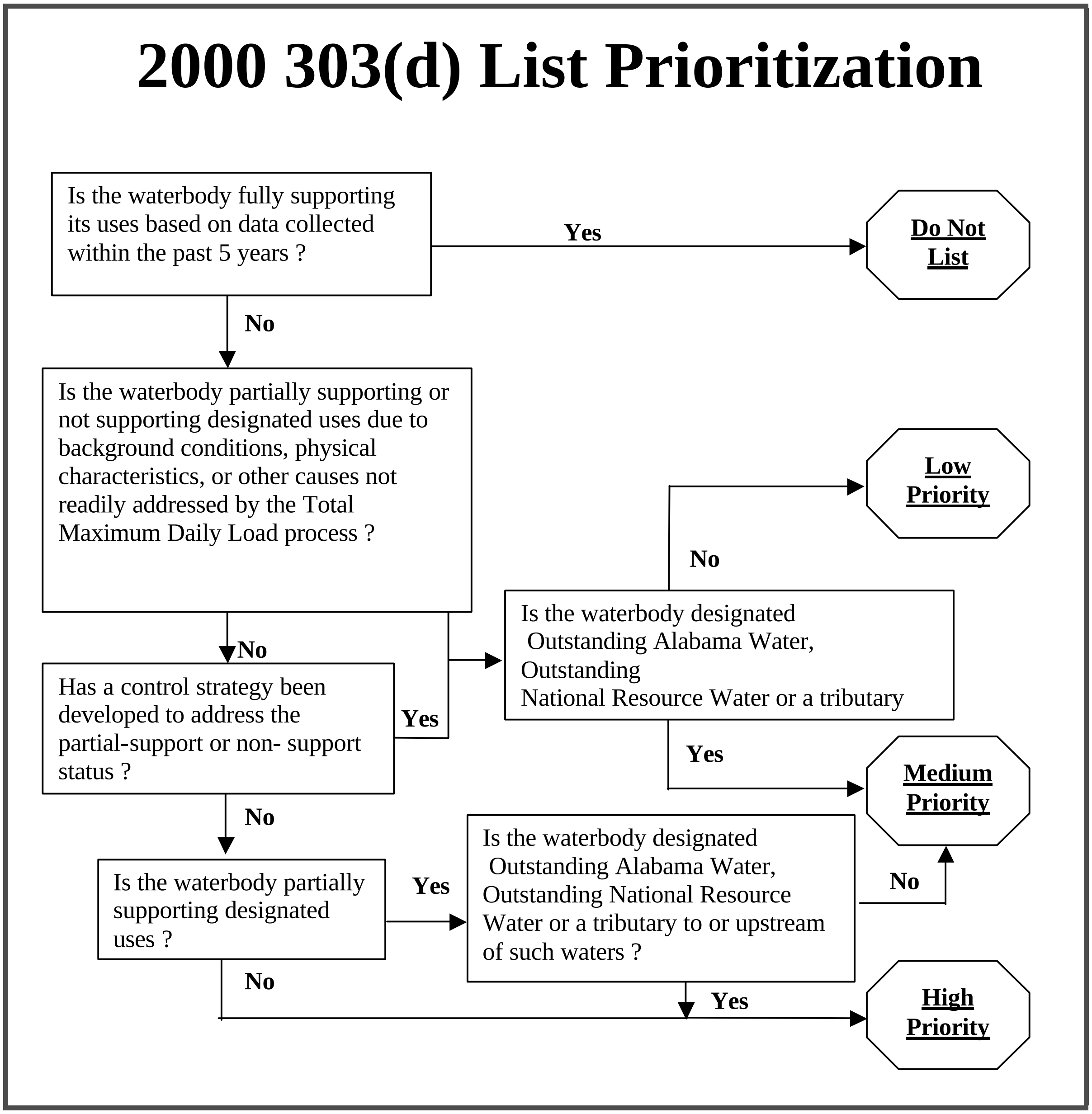
Chlorides - A compound of chlorine with another element or radical (e.g., salt (NaCl)). The presence of chlorides at certain levels in freshwater streams can result in toxicity to freshwater organisms.

Biology - Plant and/or animal life which is adversely impacted.

Other Habitat Alteration - The habitat for aquatic organisms has been changed as a result of stream channel modification (i.e. channelization) or changes in the stream's hydrograph (i.e. greater peak flows or extended low-flow periods.)

SOURCE: Alabama's 303(d) List, Alabama Clean Water Partnership

Appendix 29
303(d) Prioritization



APPENDIX 29

Appendix 30
Water Use Classification

WATER USE CLASSIFICATIONS FOR WATERBODIES WITHIN THE BLACK WARRIOR RIVER BASIN

Stream	From	To	Classification
WARRIOR RIVER	TOMBIGBEE RIVER	Five miles upstream from Big Prairie Creek	S/F&W
WARRIOR RIVER	Five miles upstream from Big Prairie Creek	Eight miles upstream from Big Prairie Creek	PWS/S/F&W
WARRIOR RIVER	Eight miles upstream from Big Prairie Creek	Warrior Lock and Dam	S/F&W
WARRIOR RIVER	Warrior Lock and Dam	Oliver Lock and Dam	F&W
WARRIOR RIVER	Oliver Lock and Dam	Hurricane Creek	F&W1
WARRIOR RIVER	Hurricane Creek	Bankhead Lock and Dam	S/F&W1
WARRIOR RIVER	Bankhead Lock and Dam	Junction of Locust and Mulberry Forks	PWS/S/F&W
Locust Fork	Junction of Locust and Mulberry Forks	Jefferson County Highway 61 (Maxine)	PWS/S/F&W
Locust Fork	Jefferson County Highway 61 (Maxine)	U. S. Highway 31	F&W
Locust Fork	U. S. Highway 31	County road between Hayden and County Line	PWS/F&W
Locust Fork	County road between Hayden and County Line	Its source	F&W
Mulberry Fork	Junction of Locust and Mulberry Forks	Burnt Cane Creek (9 miles below Cordova)	PWS/S/F&W
Mulberry Fork	Burnt Cane Creek (9 miles below Cordova)	Frog Ague Creek (Cordova)	PWS/F&W
Mulberry Fork	Frog Ague Creek (Cordova)	Junction of Mulberry and Sipsey Forks	PWS/F&W
Mulberry Fork	Junction of Mulberry and Sipsey Forks	Its source	F&W
Sipsey Fork	Junction of Mulberry and Sipsey Forks	Lewis Smith Dam	PWS/F&W

Stream	From	To	Classification
Lake Lewis Smith on Sipsey Fork	Lewis Smith Dam	Three miles upstream from Lewis Smith Dam	PWS/S/F&W
Lake Lewis Smith on Sipsey Fork	Three miles upstream from Lewis Smith Dam	Reservoir limits	S/F&W
Sipsey Fork	Lake Lewis Smith	Sandy Creek	F&W
Sipsey Fork and tributaries	Sandy Creek	Its source	F&W3
Big Prairie Creek	Head of backwater above Demopolis Lock and Dam on WARRIOR RIVER	Its source	F&W
Cottonwood Creek	Big Prairie Creek	Its source	F&W
White Creek	WARRIOR RIVER	Its source	F&W
Big Brush Creek	WARRIOR RIVER	Its source	F&W
Colwell Creek	Big Brush Creek	Its source	F&W
Minter Creek	WARRIOR RIVER	Its source	F&W
Five Mile Creek	WARRIOR RIVER	Payne Lake in Talladega National Forest	F&W
Payne Lake in Talladega National Forest			S
Elliotts Creek	WARRIOR RIVER	Its source	F&W
Cypress Creek	WARRIOR RIVER	Its source	F&W
North River	WARRIOR RIVER	City of Tuscaloosa's water supply reservoir dam	F&W
North River	City of Tuscaloosa's water supply reservoir dam	Binnion Creek	PWS/S
North River	Binnion Creek	Its source	F&W
Binnion Creek	North River	Its source	F&W
Cedar Creek	North River	Its source	F&W
Clear Creek	North River	Bugs Lake Dam	F&W
Clear Creek	Bugs Lake Dam	Its source	PWS
Hurricane Creek	WARRIOR RIVER	Its source	F&W
Yellow Creek	WARRIOR RIVER	City of Tuscaloosa's water supply reservoir dam	F&W
Yellow Creek	City of Tuscaloosa's water supply reservoir dam	Its source	PWS

Stream	From	To	Classification
Davis Creek	WARRIOR RIVER	Its source	F&W
Blue Creek	WARRIOR RIVER	Its source	F&W
Big Yellow Creek	WARRIOR RIVER	Its source	S/F&W
Valley Creek	WARRIOR RIVER	Blue Creek	F&W
Valley Creek	Blue Creek	Its source	LWF
Opossum Creek	Valley Creek	Its source	A&I
Village Creek	Locust Fork	Bayview Lake Dam	F&W
Village Creek	Bayview Lake Dam	Its source	LWF
Fivemile Creek	Locust Fork	Its source	F&W
Turkey Creek	Locust Fork	Its source	F&W
Cunningham Branch	Turkey Creek	Its source	F&W
Self Creek	Locust Fork	Town of Bradford's water supply intake	F&W
Self Creek	Town of Bradford's water supply intake	Its source	PWS
Gurley Creek	Self Creek	Its source	F&W
Little Warrior River	Locust Fork	Junction of Blackburn Fork and Calvert Prong	F&W
Calvert Prong	Little Warrior River	City of Oneonta's water supply intake	F&W
Calvert Prong	City of Oneonta's water supply intake	Its source	PWS
Blackburn Fork	Little Warrior River	Inland Lake Dam	F&W
Blackburn Fork	Inland Lake Dam	Its source	PWS/S
Chitwood Creek	Calvert Prong	Its source (junction with Mill and Cheney Branch)	F&W
Mill Creek	Chitwood Creek	Its source	F&W
Graves Creek	Locust Fork	Its source	F&W
Whippoorwill Creek	Locust Fork	Its source	F&W
Clear Creek	Locust Fork	Its source	F&W
Slab Creek	Locust Fork	Its source	F&W
Lost Creek	Mulberry Fork	Two miles upstream from Wolf Creek	F&W

Stream	From	To	Classification
Lost Creek	Two miles upstream from Wolf Creek	Cane Creek	PWS/F&W
Lost Creek	Cane Creek	Its source	F&W
Cane Creek (Oakman)	Lost Creek	Dixie Springs Road	F&W
Cane Creek (Oakman)	Dixie Springs Road	Alabama Highway 69	LWF
Cane Creek (Oakman)	Alabama Highway 69	Its source	F&W
Indian Creek	Lost Creek	Its source	F&W
Wolf Creek	Lost Creek	Its source	F&W
Burnt Cane Creek	Mulberry Fork	Its source	F&W
Cane Creek (Jasper)	Mulberry Fork	Town Creek	LWF
Cane Creek (Jasper)	Town Creek	Its source	F&W
Town Creek	Cane Creek	100 yards upstream of Southern Railway crossing (1.1 miles upstream of Cane Creek)	LWF
Town Creek	100 yards upstream of Southern Railway crossing (1.1 miles upstream of Cane Creek)	Its source	F&W
Blackwater Creek	Mulberry Fork	Its source	F&W
Mud Creek	Mulberry Fork	Its source	F&W
Broglen River	Mulberry Fork	Junction of Eightmile and Brindley Creeks	F&W
Brindley Creek	Broglen River	Its source	PWS
Eightmile Creek	Broglen River	Cullman water supply reservoir dam	F&W
Eightmile Creek	Cullman water supply reservoir dam	Its source	PWS
Pope Creek	Cullman water supply dam	Its source	PWS
Blue Springs Creek	Mulberry Fork	Its source	F&W
Warrior Creek	Mulberry Fork	Its source	F&W
Tibb Creek	Warrior Creek	Its source	F&W
Riley Maze Creek	Tibb Creek	Its source	F&W
Ryan Creek	Lake Lewis Smith	Its source	F&W
Crooked Creek	Lake Lewis Smith	Its source	F&W
Brushy Creek	Lake Lewis Smith (Sipsey Fork)	U.S. Highway 278	PWS/F&W

Stream	From	To	Classification
Brushy Creek	U.S. Highway 278	Its source	F&W
Clear Creek	Lake Lewis Smith	City of Haleyville water supply reservoir dam	F&W
Clear Creek	City of Haleyville water supply reservoir dam	Its source	PWS
Rock Creek	Lake Lewis Smith	Its source	F&W
Sandy Creek	Sipsey Fork	Its source	F&W
Curtis Mill Creek	Sandy Creek	Town of Double Springs water supply reservoir dam	F&W
Curtis Mill Creek	Town of Double Springs water supply reservoir dam	Its source	PWS

Author: James E. McIndoe
Statutory Authority: Code of Alabama 1975, §§22-22-9, 22-22A-5, 22-22A-6, 22-22A-8.
History: Adopted: May 5, 1967. Amended: June 19, 1967; April 1, 1970; October 16, l972; September 17, 1973; May 30, 1977; August 29, 1977; December 19, 1977; February 4, 1981; April 5, 1982; December 11, 1985; March 26, 1986; August 26, 1988; March 2, 1990; April 3, 1991; August 1, 1991; April 2, 1992; May 28, 1992; February 1, 1993; September 23, 1993; August 29, 1994; May 30, 1997; July 14, 1999; September 7, 2000; January 12, 2001, May 16, 2002.

APPENDIX 30

APPENDIX F

Initiatives

APPENDIX

Appendix 31
Black Warrior Schools

GLOBE PROGRAM

Prospective Schools for Student Hydrology Testing Program

Black Warrior Clean Water Initiative

SystemName Phone	SchoolName Fax	Address	City, State Zip
Blount County (205)-274-9712	Appalachian School (205)-274-9706	350 County Road 12	Oneonta AL 35121
Blount County (205)-274-0503	Blount County Multi-Needs Center (205)-274-7848	189 Horton Ln	Cleveland AL 35049
Blount County (205)-429-2458	Blountsville Elementary School (205)-429-5540	PO Box 160	Blountsville AL 35031
Blount County (205)-274-9915	Cleveland High School (205)-274-0201	71 High School St	Cleveland AL 35049
Blount County (205)-274-2223	Cleveland Elementary School (205)-274-2224	115 Stadium Dr	Cleveland AL 35049
Blount County (205)-647-2103	Hayden Elementary School (205)-647-6520	160 Bracken Ln	Hayden AL 35079
Blount County (205)-647-0397	Hayden High School (205)-647-8633	310 2nd Ave	Hayden AL 35079
Blount County (205)-647-3083	Hayden Middle School (205)-647-4462	4111 State Highway 160	Hayden AL 35079
Blount County (205)-429-4101	JB Pennington High School (205)-429-4104	81 College St	Blountsville AL 35031
Blount County (205)-681-7846	Locust Fork School (205)-681-6175	PO Box 46	Locust Fork AL 35097
Blount County (205)-681-9512	Locust Fork Elementary (205)-681-8479	PO Box 46	Locust Fork AL 35097
Blount County (205)-681-3964	Southeastern Elementary School (205)-681-3975	18770 State Highway 75	Remlap AL 35133
Blount County (205)-466-7663	Susan Moore High School (205)-466-7858	4040 Susan Moore Rd	Blountsville AL 35031
Blount County	Susan Moore Elementary	3996 Susan Moore Rd	Blountsville AL 35031

Cullman County (256)-287-1247	Cold Springs Elementary School (256)-287-2775	PO Box 120	Bremen AL 35033
Cullman County (256)-739-0486	Cullman Child Development Center (256)-739-0458	17600 US Highway 31 N	Cullman AL 35058
Cullman County (256)-796-5106	Fairview High School (256)-796-9025	841 Welcome Rd	Cullman AL 35055
Cullman County (256)-796-6304	Fairview Elementary School (256)-796-0066	841 Welcome Rd	Cullman AL 35058
Cullman County (256)-796-5106	Fairview Middle School (256)-796-9025	841 Welcome Rd	Cullman AL 35058
Cullman County (256)-352-5051	Garden City Elementary School (256)-352-1924	PO Box 185	Garden City AL 35070
Cullman County (256)-734-3807	Good Hope High School (256)-734-3427	210 Good Hope School Rd	Cullman AL 35057
Cullman County (256)-734-3824	Good Hope Elementary School (256)-734-4985	210 Good Hope School Rd	Cullman AL 35057
Cullman County (256)-734-9600	Good Hope Middle School (256)-734-9704	210 Good Hope School Rd	Cullman AL 35057
Cullman County (256)-352-6111	Hanceville High School (256)-352-6491	801 Commercial St	Hanceville AL 35077
Cullman County (256)-352-9196	Hanceville Elementary School (256)-352-9221	799 Commercial St SE	Hanceville AL 35077
Cullman County (256)-352-6175	Hanceville Middle School (256)-352-9741	805 Commercial St	Hanceville AL 35077
Cullman County (256)-796-5169	Holly Pond High School (256)-796-5199	PO Box 70	Holly Pond AL 35083
Cullman County (256)-796-0046	Holly Pond Elementary School (256)-796-5753	PO Box 70	Holly Pond AL 35083
Cullman County (256)-747-1427	Jones Chapel Elementary School (256)-747-8352	192 County Road 940	Cullman AL 35057
Cullman County (256)-747-2259	Logan Elementary School (256)-747-1642	PO Box 120	Logan AL 35098
Cullman County (256)-734-0571	Vinemont High School (256)-739-8605	PO Box 189	Vinemont AL 35179
Cullman County (256)-734-0314	Vinemont Elementary School (256)-739-8308	PO Box 187	Vinemont AL 35179
Cullman County (256)-739-1943	Vinemont Middle School (256)-737-1664	PO Box 187	Vinemont AL 35179
Cullman County (256)-734-4956	Welti Elementary School (256)-734-4855	8545 County Road 747	Cullman AL 35055

Cullman County (256)-734-5375	West Point High School (256)-775-6047	4314 County Road 1141	Cullman AL 35057
Cullman County (256)-775-6178	West Point Elementary School (256)-734-5381	4300 County Road 1141	Cullman AL 35057
Cullman County (256)-734-5904	West Point Middle School (256)-736-2354	4545 County Road 1141	Vinemont AL 35179
Jefferson County (205)-379-4750	Minor High School (205)-379-4795	2285 Minor Pkwy	Adamsville AL 35005
Jefferson County (205)-379-4850	Mortimer Jordan High School (205)-590-2002	8601 Old Highway 31	Morris AL 35116
Jefferson County (205)-379-4900	Mount Olive Elementary School (205)-608-0372	1301 Brookside Rd	Mount Olive AL 35117
Jefferson County (205)-379-4950	North Highland Elementary School (205)-379-4951	2021 29th Ave N	Hueytown AL 35023
Jefferson County (205)-379-3800	Gresham Middle School (205)-969-6271	2650 Gresham Dr	Birmingham AL 35243
Jefferson County (205)-379-2450	Oak Grove Elementary School (205)-379-2451	9000 Tiger Cub Trail	Bessemer AL 35023
Jefferson County (205)-379-5000	Oak Grove High School (205)-379-5045	9494 Oak Grove Pkwy	Bessemer AL 35023
Jefferson County (205)-379-5050	Pinson Elementary School (205)-680-8132	4200 School Dr	Pinson AL 35126
Jefferson County (205)-379-5100	Pinson Valley High School (205)-680-8121	6895 No 75 Hwy	Pinson AL 35126
Jefferson County (205)-379-5150	Pittman Middle School (205)-497-3812	701 Sunrise Blvd	Hueytown AL 35023
Jefferson County (205)-379-5250	Pleasant Grove High School (205)-379-5295	805 7th Ave Box 69	Pleasant Grove AL 35127
Jefferson County (205)-379-5200	Pleasant Grove Elementary School (205)-379-5245	601 Park Rd	Pleasant Grove AL 35127
Jefferson County (205)-379-5300	Rudd Middle School (205)-680-8124	4526 Rudd School Rd	Pinson AL 35126
Fayette County (205)-932-6313	Fayette County High School (205)-932-8361	202 14th Court NE	Fayette AL 35555
Fayette County (205)-932-7660	Fayette Middle School (205)-932-7661	418 3Rd Ave NE	Fayette AL 35555
Fayette County (205)-487-2845	Hubbertville School (205)-487-3375	7360 County Road 49	Fayette AL 35555
Fayette County (205)-932-3161	Fayette Elementary School (205)-932-5285	509 2nd St NE	Fayette AL 35555

Hale County (205)-372-3787	Akron Community School East (205)-372-3782	PO Box 38	Akron AL 35441
Hale County (205)-372-4246	Akron Community School West (205)-372-0003	PO Box 48	Akron AL 35441
Hale County (334)-624-4005	Greensboro Public East School (334)-624-4006	PO Box 167	Greensboro AL 36744
Hale County (334)-624-7932	Greensboro Public West School (334)-624-0470	PO Box 40	Greensboro AL 36744
Hale County (205)-371-2514	Hale County High School (205)-371-6800	PO Box 188	Moundville AL 35474
Hale County (205)-371-2679	Moundville Elementary School (205)-371-4279	537 Alabama Ave	Moundville AL 35474
Hale County (334)-624-8747	Sunshine High School (334)-624-8781	3125 County Road 10	Newbern AL 36765
Henry County (334)-585-2185	Abbeville Middle School (334)-585-6378	PO Box 547	Abbeville AL 36310
Henry County (334)-585-3679 (334)-257-3784	Abbeville Elementary School (334)-585-1122 (334)-257-3978	100 Elm St	Abbeville AL 36310
Tuscaloosa County (205)-342-2939	Taylorville Primary School (205)-759-3995	350 Bobby Miller Parkway	Tuscaloosa AL 35405
Tuscaloosa County (205)-342-2650	Holt Elementary School (205)-507-0022	1001 Crescent Ridge Rd	Holt AL 35404
Tuscaloosa County (205)-342-2668	Brookwood Elementary School (205)-553-3722	16049 Highway 216	Brookwood AL 35444
Tuscaloosa County (205)-342-5005	Brookwood High School (205)-556-8972	15981 Highway 216	Brookwood AL 35444
Tuscaloosa County (205)-342-2640	Buhl Elementary School (205)-333-3951	PO Box 97	Buhl AL 35446
Tuscaloosa County (205)-342-2642	Cottondale Elementary School (205)-556-6979	2301 Cottondale Ln	Cottondale AL 35453
Tuscaloosa County (205)-342-2695	Crestmont Elementary School (205)-339-1097	2400 34th Ave	Northport AL 35476
Tuscaloosa County (205)-342-2656	Maxwell Elementary School (205)-366-8625	11370 Monticello Dr	Duncanville AL 35456
Tuscaloosa County (205)-339-1064	Echols Middle School (205)-339-5086	2701 Echols Ave	Northport AL 35476
Tuscaloosa County (205)-342-2644	Englewood Elementary School (205)-750-0579	10300 Old Greensboro Rd	Tuscaloosa AL 35405

Tuscaloosa County (205)-342-2648	Flatwoods Elementary School (205)-333-5814	3800 66th Ave	Northport AL 35476
Tuscaloosa County (205)-342-2800	Hillcrest High School (205)-758-3018	300 Patriot Pkwy	Tuscaloosa AL 35405
Tuscaloosa County (205)-342-2820	Hillcrest Middle School (205)-752-2467	401 Hillcrest School Rd	Tuscaloosa AL 35405
Tuscaloosa County (205)-342-2768	Holt High School (205)-556-6243	3801 Alabama Ave	Holt AL 35404
Tuscaloosa County (205)-342-2652	Huntington Place Elementary School (205)-336-8641	11601 Huntington Pl	Northport AL 35476
Tuscaloosa County (205)-342-2654	Matthews Elementary School (205)-391-2169	1225 5th St	Northport AL 35476
Tuscaloosa County (205)-342-2658	Myrtlewood Elementary School (205)-345-7259	14701 Gainsville Rd	Fosters AL 35463
Tuscaloosa County (205)-342-2690	Lloyd Wood Middle School (205)-339-6642	2300 26th Ave	Northport AL 35476
Tuscaloosa County (205)-342-2755	Northside High School (205)-339-3437	12945 Northside Rd	Northport AL 35476
Tuscaloosa County (205)-342-2660	Sprayberry Regional Education Center (205)-345-9547	1324 Rice Mine Rd	Northport AL 35476
Tuscaloosa County (205)-342-2680	Collins-Riverside Middle School (205)-752-8024	1400 3Rd St	Northport AL 35476
Tuscaloosa County (205)-342-2670	Tuscaloosa County High School (205)-339-5086	12500 Wildcat Dr	Northport AL 35475
Tuscaloosa County (205)-342-2662	Tuscaloosa County Alternative School (205)-507-0686	7 Nunnelly Dr	Tuscaloosa AL 35404
Tuscaloosa County (205)-349-3131	Tusc Regional Detention Ctr (205)-349-3196	6001 12th Avenue East	Tuscaloosa AL 35405
Tuscaloosa County (205)-342-2697	Vance Elementary School (205)-553-9132	PO Box 208	Vance AL 35490
Tuscaloosa County (205)-342-2646	Faucett-Vestavia Elementary School (205)-339-3072	1150 Vestavia Cir	Northport AL 35476
Tuscaloosa County (205)-342-2664	Walker Elementary School (205)-333-5491	13051 Northside Rd	Northport AL 35476
Walker County (205)-924-8821	Carbon Hill High School (205)-924-8877	PO Box 579	Carbon Hill AL 35549
Walker County (205)-483-7245	Bankhead Middle School (205)-483-7244	110 School Rd	Cordova AL 35550
Walker County (205)-483-7666	Cordova Elementary School (205)-483-1026	35 North St	Cordova AL 35550

Walker County (205)-483-7404	Cordova High School (205)-483-1934	1 Blue Devil Way	Cordova AL 35550
Walker County (205)-387-7845	Curry Elementary School (205)-387-7871	85 Yellow Jacket Dr	Jasper AL 35503
Walker County (205)-384-3441	Curry Middle School (205)-384-1110	115 Yellow Jacket Dr	Jasper AL 35503
Walker County (205)-384-3887	Curry High School (205)-221-7381	155 Yellow Jacket Dr	Jasper AL 35503
Walker County (205)-648-6863	Dora High School (205)-648-4709	330 Glenn C Gant Dr	Dora AL 35062
Walker County (205)-221-2001	Farmstead Junior High School (205)-221-2009	2760 Highway 195	Jasper AL 35503
Walker County (205)-384-5838	Lupton Junior High School (205)-387-0434	1110 Prospect Rd	Nauvoo AL 35578
Walker County (205)-686-5580	TW Martin School (205)-686-9060	PO Box 157	Goodsprings AL 35560
Walker County (205)-622-3611	Oakman Elementary School (205)-622-2322	Box 287	Oakman AL 35579
Walker County (205)-622-3381	Oakman High School (205)-622-3542	Box 286	Oakman AL 35579
Walker County (205)-686-5061	Parrish Elementary School (205)-686-7998	Box 109	Parrish AL 35580
Walker County (205)-686-7701	Parrish High School (205)-686-9350	35 Tornado Alley	Parrish AL 35580
Walker County (205)-648-5083	Sipsey Junior High School (205)-648-5031	PO Box 30	Sipsey AL 35584
Walker County (205)-648-2390	Sumiton Elementary Middle School (205)-648-0183	275 1st St N	Sumiton AL 35148
Walker County (205)-648-5912	TS Boyd Elementary School (205)-648-5996	Box 697	Dora AL 35062
Walker County (205)-924-8424	Townley Junior High School (205)-924-8801	PO Box B	Townley AL 35587
Walker County (205)-483-7410	Walker County Alternative School (205)-483-8676	6670 Old Birmingham Hwy	Jasper AL 35501
Walker County (205)-483-9381	Valley Junior High School (205)-483-9509	155 Valley School Rd	Jasper AL 35504
Walker County (205)-924-4133	Carbon Hill Start School (205)-924-4133	9558 Highway 124	Carbon Hill AL 35549
Winston County (256)-747-1665	Addison Elementary School (256)-747-9970	PO Box 241	Addison AL 35540

Winston County (205)-489-2190	Double Springs Elementary School (205)-489-5159	PO Box 550	Double Springs AL 35553
Winston County (205)-489-5593	Double Springs Middle School (205)-489-8204	PO Box 549	Double Springs AL 35553
Winston County (205)-893-5471	Lynn High School (205)-893-2484	PO Box 128	Lynn AL 35575
Winston County (205)-893-5471	Lynn Elementary School (205)-893-2484	PO Box 128	Lynn AL 35575
Winston County (205)-384-5825	Meek High School (205)-221-9425	PO Box 168	Arley AL 35541
Winston County (205)-387-5825	Meek Elementary School (205)-387-6825	PO Box 168	Arley AL 35540
Winston County (205)-489-5593	Winston County High School (205)-489-8204	PO Box 549	Double Springs AL 35553

APPENDIX 31

Appendix 32
Project R.O.S.E. Collection Sites

Collection sites for used motor oil in the Black Warrior River Basin are listed on the following pages.

APPENDIX

PROJECT R.O.S.E. USED OIL COLLECTION SITES WITHIN THE BLACK WARRIOR RIVER BASIN

Name	Address	City	County	State	Zip	Phone
Advance Auto Parts	1001 Second Avenue East	ONEONTA	BLOUNT	AL	35121	2052742237
AutoZone Parts Store	204 2nd Avenue West	ONEONTA	BLOUNT	AL	35121	2056254266
Blountsville Pure Service Station	69025 Main Street	BLOUNTSVILLE	BLOUNT	AL	35031	2054293030
Jeff Shirley Quality Muffler and Quick Oil	404 6th Street	ONEONTA	BLOUNT	AL	35121	2056255499
Texaco Express Lube	303 6th Street South	ONEONTA	BLOUNT	AL	35121	2056255023
Wal-Mart Tire and Lube Express	2453 2nd Avenue East	ONEONTA	BLOUNT	AL	35121	2056256474
Advance Auto Parts	1642 Second Avenue, Southwest	Cullman	Cullman	AL	35055	2567375449
AutoZone Parts Store	301 5th Avenue Southwest	CULLMAN	CULLMAN	AL	35055	2567370030
Cullman County Road Department	3190 County Road 438	CULLMAN	CULLMAN	AL	35057	2567750367
Express Oil Change	1711 2nd Avenue Southwest	CULLMAN	CULLMAN	AL	35055	2567375465
Skill Lube	208 2nd Avenue Northwest	CULLMAN	CULLMAN	AL	35055	2567398702
Texaco Express Lube	117 Second Avenue Southwest	CULLMAN	CULLMAN	AL	35055	2567395888
Wal-Mart Tire and Lube Express	1700 2nd Avenue Southwest	CULLMAN	CULLMAN	AL	35055	2567391664
Advance Auto Parts	2239 Temple Avenue	FAYETTE	FAYETTE	AL	35555	2059325977
Berry Service Center	17815 Highway 18 East	Berry	FAYETTE	AL	35546	2056894966
Frankie's Garage	317 Columbus St. E.	Fayette	Fayette	AL	35555	2059328236
Legacy Pontiac GMC	218 Boligee Street	EUTAW	GREENE	AL	35462	2053729336
Greensboro Express Lube	1485 State Street	GREENSBORO	HALE	AL	36744	3346240004
Parker Tire	508 State Street	GREENSBORO	HALE	AL	36744	3346243311
Acme Muffler and Brake	2613 6th Avenue South	BIRMINGHAM	JEFFERSON	AL	35233	2053247697
Advance Auto Parts	1500 North 9th Avenue	BESSEMER	JEFFERSON	AL	35020	2054261339
Advance Auto Parts	410 Caldwell Drive	WARRIOR	JEFFERSON	AL	35180	2056472355
Advance Auto Parts	821 3rd Avenue West	BIRMINGHAM	JEFFERSON	AL	35204	2057810922
Advance Auto Parts	318 Main Street	TRUSSVILLE	JEFFERSON	AL	35173	2056612959
Advance Auto Parts	1045 Courson Boulevard, Northeast	LEEDS	JEFFERSON	AL	35094	2056995664
Advance Auto Parts	7001 1st Avenue North	BIRMINGHAM	JEFFERSON	AL	35206	2058365577
Advance Auto Parts	1004 Forestdale Boulevard	BIRMINGHAM	JEFFERSON	AL	35214	2057989800
Advance Auto Parts	6556 Aaron Arnov Drive	FAIRFIELD	JEFFERSON	AL	35064	2057868200
Advance Auto Parts	2116 Center Point Road	BIRMINGHAM	JEFFERSON	AL	35215	2058564644
Advance Auto Parts	901 Dennison Avenue, Southwest	BIRMINGHAM	JEFFERSON	AL	35211	2053261301
Advance Auto Parts	1701 Pinson Valley Parkway	BIRMINGHAM	JEFFERSON	AL	35217	2058080161
Anthony's Car Clean Up	1009 Vestavia Parkway	BIRMINGHAM	JEFFERSON	AL	35266	2058229274
AutoZone Parts Store	1331 9th Avenue North	BESSEMER	JEFFERSON	AL	35020	2054250560
AutoZone Parts Store	2032 Center Point Road	BIRMINGHAM	JEFFERSON	AL	35215	2058561046
AutoZone Parts Store	6600 First Avenue North	BIRMINGHAM	JEFFERSON	AL	35206	2055918770
AutoZone Parts Store	724 3rd Avenue West	BIRMINGHAM	JEFFERSON	AL	35204	2057888310
AutoZone Parts Store	2616 3rd Avenue North	BIRMINGHAM	JEFFERSON	AL	35207	2053287535

AutoZone Parts Store	1545 Bessemer Road	BIRMINGHAM	JEFFERSON	AL	35208	2059257464
AutoZone Parts Store	1121 Huffman Road	BIRMINGHAM	JEFFERSON	AL	35215	2058534461
AutoZone Parts Store	1640 Forestdale Boulevard	BIRMINGHAM	JEFFERSON	AL	35214	2057912300
AutoZone Parts Store	204 Fieldstown Road	GARDENDALE	JEFFERSON	AL	35071	2056316036
AutoZone Parts Store	100 B Greensprings Hwy.	BIRMINGHAM	JEFFERSON	AL	35209	2059429235
AutoZone Parts Store	3010 Warrior River Road	BESSEMER	JEFFERSON	AL	35023	2057449150
AutoZone Parts Store	1608 Ashville Road	LEEDS	JEFFERSON	AL	35094	2056992886
AutoZone Parts Store	656 Bessemer Highway	BIRMINGHAM	JEFFERSON	AL	35228	2054266840
Express Oil Change	1711 Ashville Road	LEEDS	JEFFERSON	AL	35094	2057024790
Express Oil Change	747 3rd Avenue	BIRMINGHAM	JEFFERSON	AL	35204	2057872526
Express Oil Change	922 9th Avenue	BESSEMER	JEFFERSON	AL	35020	2054280318
Express Oil Change	2013 Center Point Road	BIRMINGHAM	JEFFERSON	AL	35215	2058563425
Express Oil Change	600 Allison-Bonnet Memorial Dr	DOLOMITE	JEFFERSON	AL	35061	2057444141
Express Oil Change	2008 2nd Avenue S	BIRMINGHAM	JEFFERSON	AL	35233	2052268088
Express Oil Change	8400 1st Avenue North	BIRMINGHAM	JEFFERSON	AL	35206	2058382640
Express Oil Change	5101 Oporto-Madrid Boulevard	BIRMINGHAM	JEFFERSON	AL	35210	2059566648
Express Oil Change	901 Forestdale Boulevard	BIRMINGHAM	JEFFERSON	AL	35214	2057985007
Express Oil Change	316 Fieldstown Road	GARDENDALE	JEFFERSON	AL	35071	2056312054
Express Oil Change	1717 27th Court	HOMEWOOD	JEFFERSON	AL	35209	2058794499
Express Oil Change	2325 Highway 150	HOOVER	JEFFERSON	AL	35244	2059877750
Express Oil Change	502 Cahaba Park Circle	BIRMINGHAM	JEFFERSON	AL	35243	2059913464
Express Oil Change	111 Midfield Street	BIRMINGHAM	JEFFERSON	AL	35228	2059230117
Express Oil Change	407 Hollywood Boulevard	HOMEWOOD	JEFFERSON	AL	35209	2058793887
Express Oil Change	4665 Center Point Road	PINSON	JEFFERSON	AL	35126	2056811341
Express Oil Change	1412 Pinson Valley Parkway	BIRMINGHAM	JEFFERSON	AL	35217	2058418555
Express Oil Change	3635 Lorna Road	BIRMINGHAM	JEFFERSON	AL	35216	2059850770
Express Oil Change	2556 Rocky Ridge Road	BIRMINGHAM	JEFFERSON	AL	35243	2058238175
Express Oil Change	5979 Chalkville Mountain Road	BIRMINGHAM	JEFFERSON	AL	35235	2056555581
Express Oil Change	425 Main Street	TRUSSVILLE	JEFFERSON	AL	35173	2056559690
Express Oil Change	2644 Valleydale Road	BIRMINGHAM	JEFFERSON	AL	35244	2059913494
Express Oil Change	1479 Montgomery Highway	BIRMINGHAM	JEFFERSON	AL	35216	2058230466
Express Oil Change	1201 Bankhead Highway West	BIRMINGHAM	JEFFERSON	AL	35204	2052519645
Express Oil Change	196 West Valley Avenue	BIRMINGHAM	JEFFERSON	AL	35209	2059458845
Jones Alton Auto Svc	5218 Valey Rd	Fairfield	Jefferson	AL	35064	2057860423
Precision Tune Auto Care	312 Valley Avenue	BIRMINGHAM	JEFFERSON	AL	35209	2059458863
Quick Oil Change	1821 26th Avenue North	BESSEMER	JEFFERSON	AL	35023	2054287755
SMB Tire Company and Automotive	3000 Messer Airport Highway	BIRMINGHAM	JEFFERSON	AL	35203	2053231051
Texaco Express Lube	2331 Center Point Parkway	BIRMINGHAM	JEFFERSON	AL	35215	2058542225
Texaco Express Lube	2916 Morgan Road	BESSEMER	JEFFERSON	AL	35022	2054280098
Texaco Express Lube	1282 Oakgrove Road	BIRMINGHAM	JEFFERSON	AL	35209	2059425001
Texaco Xpress Lube	2428 Decatur Highway	GARDENDALE	JEFFERSON	AL	35071	2056310000

Texaco Lube Express	2618 18th Place South	BIRMINGHAM	JEFFERSON	AL	35209	2058709122
Texaco Xpress Lube	6720 Highway 79	PINSON	JEFFERSON	AL	35126	2056814724
Texaco Xpress Lube	2161 Forestdale Boulevard	BIRMINGHAM	JEFFERSON	AL	35214	2057980079
Tire Engineers, Inc.	3200 6th Avenue South	BIRMINGHAM	JEFFERSON	AL	35222	2053237282
Wal-Mart Tire and Lube Express	5919 Trussville Crossings Parkway	TRUSSVILLE	JEFFERSON	AL	35173	2056611973
Wal-Mart Tire and Lube Express	1301 Whitfield Avenue	LEEDS	JEFFERSON	AL	35094	2056995396
Wal-Mart Tire and Lube Express	750 Academy Drive	BESSEMER	JEFFERSON	AL	35022	2054245890
Advance Auto Parts	2300 McFarland Boulevard	NORTHPORT	TUSCALOOSA	AL	35476	2053398484
Advance Auto Parts	2816 McFarland Boulevard East	TUSCALOOSA	TUSCALOOSA	AL	35405	2055535582
Advance Auto Parts	1447 2nd Court East	TUSCALOOSA	TUSCALOOSA	AL	35401	2057586688
Advance Auto Parts	1401 Martin Luther King, Jr. Boulevard	TUSCALOOSA	TUSCALOOSA	AL	35401	2057582884
Advance Auto Parts	4412 Old Birmingham Highway	TUSCALOOSA	TUSCALOOSA	AL	35404	2055536314
Advance Auto Parts	720 Skyland Boulevard	TUSCALOOSA	TUSCALOOSA	AL	35405	2057523477
AutoZone Auto Parts	3500 Greensboro Avenue	TUSCALOOSA	TUSCALOOSA	AL	35401	2057588351
AutoZone Auto Parts	2424 University Boulevard East	TUSCALOOSA	TUSCALOOSA	AL	35404	2055568063
AutoZone Parts Store	2329 McFarland Boulevard	NORTHPORT	TUSCALOOSA	AL	35476	2053390855
Express Oil Change	6322 Highway 69 South	TUSCALOOSA	TUSCALOOSA	AL	35405	2053430403
Express Oil Change	604 East 15th Street	TUSCALOOSA	TUSCALOOSA	AL	35401	2053452280
Express Oil Change	238 Rice Mine Road Northeast	TUSCALOOSA	TUSCALOOSA	AL	35406	2057585002
Norman's Chevron Service Center	201 Hargrove Road	TUSCALOOSA	TUSCALOOSA	AL	35401	2057582224
Northport Public Works	1781 Harper Road	NORTHPORT	TUSCALOOSA	AL	35476	2053333003
Precision Tune Auto Care	2821 McFarland Boulevard East	TUSCALOOSA	TUSCALOOSA	AL	35405	2055568863
Snappy Express Oil Change	6509 Highway 69 South	TUSCALOOSA	TUSCALOOSA	AL	35405	2057599730
Speedy Oil Change	2494 Highway 82	NORTHPORT	TUSCALOOSA	AL	35473	2053397655
Speedy Oil Change	100 15th Street	TUSCALOOSA	TUSCALOOSA	AL	35401	2053450343
Speedy Oil Change	5901 Highway 69 South	TUSCALOOSA	TUSCALOOSA	AL	35405	2053450066
Speedy Oil Change	2201 University Boulevard East	TUSCALOOSA	TUSCALOOSA	AL	35404	2055530013
Tuscaloosa City Curbside Recycling		TUSCALOOSA	TUSCALOOSA	AL	35406	2053490260
Tuscaloosa City Shop	914 28th Avenue	TUSCALOOSA	TUSCALOOSA	AL	35401	2053490240
Wal-Mart Tire and Lube Express	5710 McFarland Boulevard	NORTHPORT	TUSCALOOSA	AL	35476	2053337820
Wal-Mart Tire and Lube Express	1501 Skyland Boulevard East	TUSCALOOSA	TUSCALOOSA	AL	35405	2057500823
Mitchell's Service and Parts Center	14980 Highway 82 East	Duncanville	TUSCALOOSA	AL	35456	2057520962
Advance Auto Parts	608 Highway 78 East	JASPER	WALKER	AL	35501	2053871099
Advance Auto Parts	484 Highway 78	SUMITON	WALKER	AL	35148	2056482305
AutoZone Parts Store	232 Highway 78 West	JASPER	WALKER	AL	35501	2052216710
Express Lube	2789 Highway 78	SUMITON	WALKER	AL	35148	2056480559
Express Oil Change	1750 Highway 78 East	JASPER	WALKER	AL	35501	2053840256
Pit Stop Lube Center	3904 Highway 78 East	JASPER	WALKER	AL	35501	2053872405
Texaco Express Lube	500 Airport Road South	JASPER	WALKER	AL	35501	2052215006
Wal-Mart Tire and Lube Express	690 Highway 78	SUMITON	WALKER	AL	35148	2056484100
Wal-Mart Tire and Lube Express	1801 Highway 78 East	JASPER	WALKER	AL	35501	2053841100

Car Care Center	Curry Plaza 5100 Curry Hwy, Suite 106	Jasper	Walker	AL	35504	2052216822
(owner Dwayne Moody, Jr. PO Box 248 Double Springs)						
Argo Automotive Repair, Paint, and Body	6707 Highway 78	Cordova	WALKER	AL	35550	2056481990
AutoZone Parts Store	1305 11th Avenue	HALEYVILLE	WINSTON	AL	35565	2054859733
Double Springs Automotive (Ricky King, mgr)	PO Box 997, 25287 Hwy 195	Double Springs	Winston	AL	35553	2054892570
Moody's Car Care Center	Gateway Shopping Center, 26263 Hwy 195	Double Springs	Winston	AL	35553	2054893029
(owner Dwayne Moody, Jr. PO Box 248 Double Springs)						
Taylor Tire and Service Center, Inc.	14405 Hwy 278 (PO Box 187)	Double Springs	Winston	AL	35553	2054895599

APPENDIX G

Management Methods

APPENDIX

Appendix 33
Floodplain Stormwater Erosion

Floodplain, Stormwater and Erosion/Sediment Control Within the Black Warrior River Basin

FLOODPLAIN REGULATION IN WATERSHED CITIES

POPULATION	# CONTACTED	LOCAL	COOPERATIVE/CONSULTANT	STATE/FED ONLY
< 5,000	19	0%	0%	100%
5,000-9,999	4	0	0	100
10,000-24,999	5	0	0	100
25,000-49,000	1	0	0	100
>50,000	2	100	0	0

FLOODPLAIN REGULATION IN WATERSHED COUNTIES

POPULATION	# CONTACTED	LOCAL	COOPERATIVE/CONSULTANT	STATE/FED ONLY
5,000-9,999	1	0%	0%	100
10,000-24,999	3	0	0	100
25,000-49,000	2	0	0	100
>50,000	5	40	0	60

STORMWATER REGULATION IN WATERSHED CITIES

POPULATION	# CONTACTED	LOCAL	COOPERATIVE/CONSULTANT	STATE/FED ONLY
< 5,000	19	21%	42%	37%
5,000-9,999	4	25	50	25
10,000-24,999	5	40	60	0
25,000-49,000	1	0	100	0
>50,000	2	100	0	0

FLOODPLAIN REGULATION IN WATERSHED COUNTIES

POPULATION	# CONTACTED	LOCAL	COOPERATIVE/CONSULTANT	STATE/FED ONLY
5,000-9,999	1	0%	0%	100
10,000-24,999	3	0	0	100
25,000-49,000	2	50	0	50
>50,000	5	100	0	00

EROSION/SEDIMENTATION REGULATION IN WATERSHED CITIES

POPULATION	# CONTACTED	LOCAL	COOPERATIVE/CONSULTANT	STATE/FED ONLY
< 5,000	19	0%	42%	58%
5,000-9,999	4	0	50	50
10,000-24,999	5	0	60	40
25,000-49,000	1	0	100	0
>50,000	2	100	0	0

FLOODPLAIN REGULATION IN WATERSHED COUNTIES

POPULATION	# CONTACTED	LOCAL	COOPERATIVE/CONSULTANT	STATE/FED ONLY
5,000-9,999	1	0%	0%	100
10,000-24,999	3	0	0	100
25,000-49,000	2	50	0	100
>50,000	5	20	20	60

APPENDIX 33

APPENDIX H

Additional Data and Information

APPENDIX

Appendix 34
Alabama Water Watch Groups

Map of Alabama Water Watch Groups on Black Warrior River