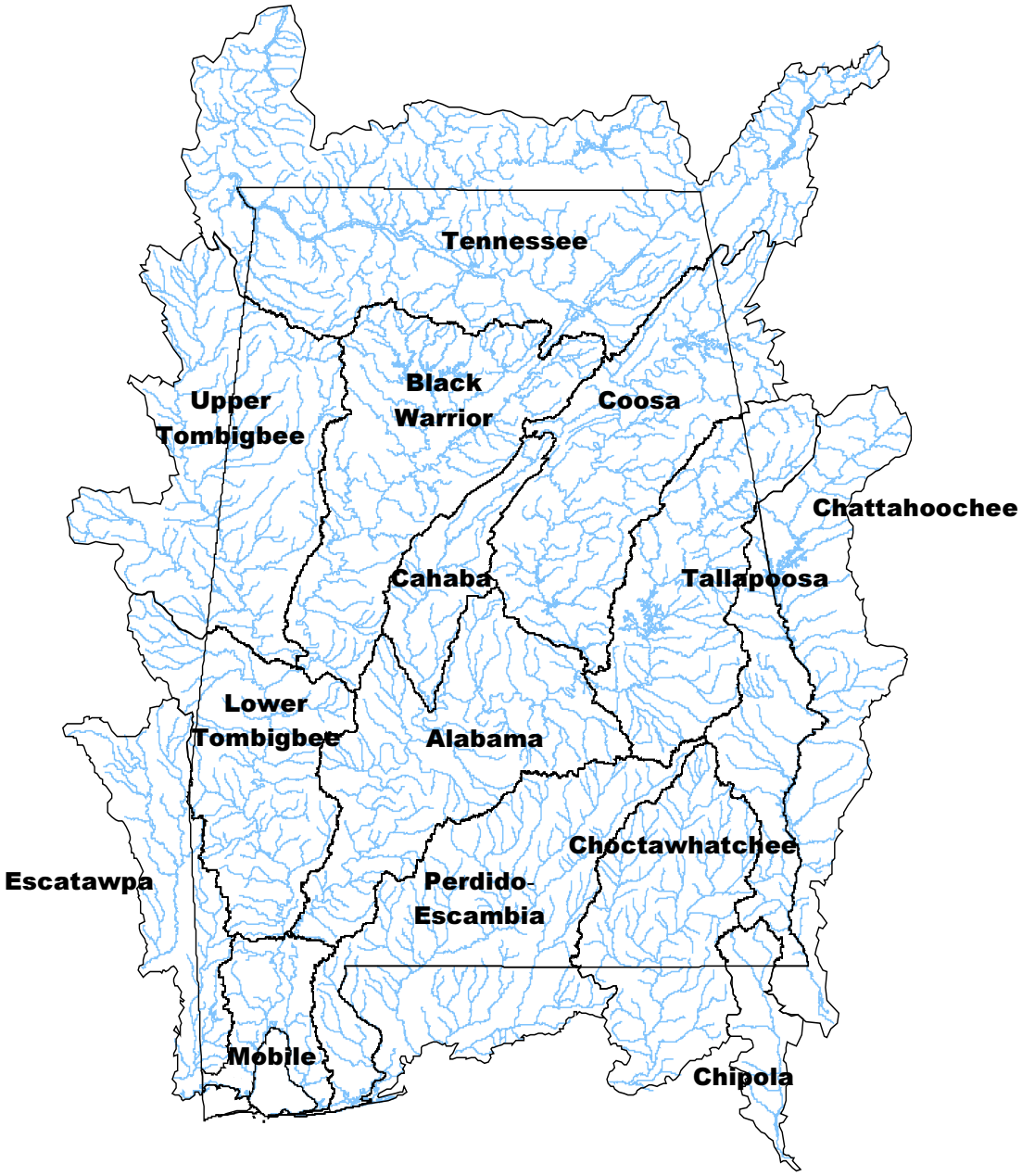
Alabama's 2000 Water Quality Report to Congress

(Clean Water Act §305(b) Report)



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Alabama
2000 Water Quality Report to Congress

ADEM

With much appreciation to all contributors!

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Table of Contents

Part IV-The Nonpoint Source Management Program

Part V-Public Health

Part VI-River and Stream Water Quality/1998 Final §303(d) List

List of Acronyms

A&I	Agriculture and Industry water supply use classification
AAES	Alabama Agricultural Experiment Station
ACES	Alabama Cooperative Extension Service
ACT/ACF	Alabama-Coosa-Tallapoosa/Apalachicola-Chattahoochee-Flint River Basins study
ACWI	Alabama Coastal Waters Initiative
ADAI	Alabama Department of Agriculture and Industries
ADCNR	Alabama Department of Conservation and Natural Resources
ADE	Alabama Department of Education
ADEM	Alabama Department of Environmental Management
ADPH	Alabama Department of Public Health
AEEI	Alabama Environmental Education Initiative
AEMA	Alabama Emergency Management Agency
AEMC	Alabama Environmental Management Commission
AFC	Alabama Forestry Commission
AGPT	Algal Growth Potential Test
ALUS	Aquatic Life Use Assessment
ANHP	Alabama Natural Heritage Program
ASCS	Agricultural Stabilization & Conservation Service
ASMC	Alabama Surface Mining Commission
ASWCC	Alabama Soil and Water Conservation Committee
AWPCA	Alabama Water Pollution Control Act
B/H	Biological/Habitat data
BMP	Best Management Practices
CBEP	Community-Based Environmental Protection
CERS	Center for Environmental Research and Service at Troy State University
CLP	Clean Lakes Program
CNPCP	Coastal Nonpoint Pollution Control Program
CSO	Combined Sewer Overflow
CWA	Clean Water Act
DA	Drainage Area
DIZ	Discharge Information Zone for NPDES coastal permits
DO	Dissolved Oxygen
EMAP	Environmental Monitoring Assessment Program
EPA	U.S. Environmental Protection Agency
ERL-A	EPA's Environmental Research Laboratory at Athens, GA
ERL-C	EPA's Environmental Research Laboratory at Corvallis, OR
F&W	Fish and Wildlife use classification
FDA	U.S. Food and Drug Administration
FDER	Florida Department of Environmental Regulation
GIS	Geographical Information System
GPS	Global Positioning System
GDNR	Georgia Department of Natural Resources
GSA	Geological Survey of Alabama
IO	Industrial Operations
MBP	Multihabitat Bioassessment Protocol
MCL	Maximum Contaminant Level
MESC	Marine Environmental Sciences Consortium of Dauphin Island, AL
MGD	Million Gallons per Day
MOPC	Mississippi Office of Pollution Control
MOU	Memorandum of Understanding

MPSs	Hester-Dendy Multiplate Samplers
MRD	Marine Resources Division of the ADCNR
NEP	National Estuary Program
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPL	Superfund National Priority Listed Sites
NRCS	Natural Resource Conservation Service of the USDA
NWI	National Wetland Inventory of the USFWS
OAW	Outstanding Alabama Water use classification
ONRW	Outstanding National Resource Water designation
P/C	Physical/Chemical data
PACE	Pollution Abatement Costs and Expenditures
PCBs	Polychlorinated Biphenyls
PWS	Public Water Supply use classification
RBP	Rapid Bioassessment Protocol
RC&Ds	Resource Conservation and Development Councils of the USDA
RM	River Mile
RWC	Receiving Water Concentration
S	Swimming and Other Whole Body Water contact Sports use classification
SH	Shellfish Harvesting use classification
SM/LG	Sand Mountain/Lake Guntersville watershed study
SMZ	Streamside Management Zone
SOC	Synthetic Organic Compound
SOD/NR	Sediment Oxygen Demand/Nutrient Release studies
SOP	Standard Operating Procedures
SRF	State Revolving Fund of Alabama
SSO	Sanitary Sewer Overflow
STP	Sewage Treatment Plant
SWCD	Soil and Water Conservation District
SWCP	State Wetland Conservation Plan
TMDL	Total Maximum Daily Loads
TOT	Time-of-travel studies
TRE	Toxicity Reduction Evaluation
TSI	Trophic State Index
UAA	Use Attainability Analysis
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service of the Department of the Interior
USGS	U.S. Geological Survey
WCAMI	Wetlands Conservation and Management Initiative
WLA	Wasteload Allocation
WWTP	Wastewater Treatment Plant
VOC	Volatile Organic Compound

Introduction

Alabama has a population in excess of 4,040,587 (1990 Census) and covers a surface area of 51,609 square miles. The cities of Birmingham, Huntsville, Montgomery, Mobile, and their surrounding suburbs contain approximately half of Alabama's population. The state is comprised of sixty-seven (67) counties. A large percentage of Alabama's industries are related to forestry, agriculture, and mining. The State is divided into fourteen (14) major river basins containing 47,072 miles of perennial rivers and streams, 30,170 miles of intermittent streams, and thirty-two (32) miles of ditches and canals. Alabama has ponds, lakes, and reservoirs in excess of 490,472 acres. Freshwater wetlands occupy an estimated 3,600,000 acres. Alabama's coastal wetlands are estimated at 27,600 acres. Coastal Alabama also contains an estimated 610 square miles of estuaries and a coastal shoreline that is 337 miles long (includes Mobile Bay and island shorelines).

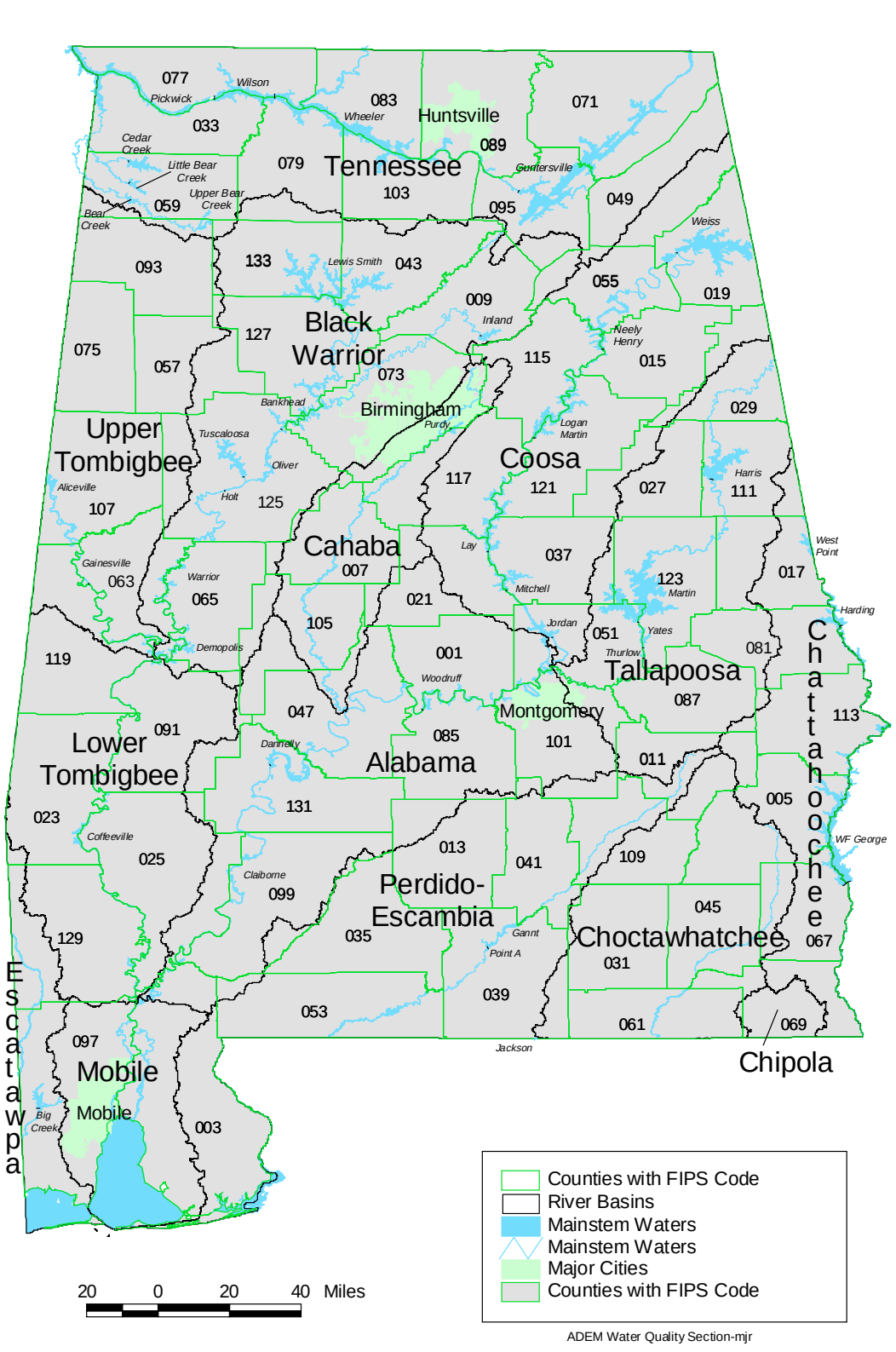
Alabama's surface water is of generally high overall quality. An indication of full support of rivers and streams can be determined by analyzing Alabama's Final 1998 §303(d) List. The total mileage for rivers and streams not supporting designated uses is approximated 1,930 miles. This total is 4.1% of the total perennial rivers and streams. This is a good indication that Alabama has a high percentage of full use support for rivers and streams. Following the fifth year of random sampling of wadeable riverine waters, EPA-Gulf Breeze staff will be able to generate statistically defensible statewide use support percentages. Lake and reservoir acres, according to Table 3-1, have a 75% full support status. Much of the non support acreage is related to historic as well as recent PCB contamination and eutrophic conditions in the Coosa River Basin reservoirs. Naturally higher nutrients in the soils of the Coosa River Basin, to a large extent, dictate its reservoirs' eutrophic conditions. In an effort to manage eutrophic conditions more directly, the Department is presently developing nutrient criteria beginning with Weiss Lake, Alabama's northernmost reservoir in the Coosa River Basin. Alabama's estuaries enjoy overall good health considering these two facts: the majority of estuaries are affected by a single pollutant category, pathogens, and the random coastal sampling performed over the last 7 years (1993-1999) indicates generally full support of dissolved oxygen, temperature and pH criteria (exceptions to full support: 1993-partial support of dissolved oxygen, 1995-partial support of dissolved oxygen, 1999-partial support of temperature). Although Alabama has yet to qualify and, to a certain extent, quantify its wetlands, management and mitigation of impacts continues to be a high priority in the water quality certification processes of Section 401 and 404 of the Clean Water Act.

Alabama's ground water continues to be managed effectively through efforts under the Underground Storage Tank (UST) Program, the Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the Underground Injection Control (UIC) Program, as well as the recent Wellhead Protection Program (WHPP). The lack of chronic detections of pollutants in public water supply groundwater sources is a good indication of Alabama's high ground water quality and effective management of the resource.

There is much new work to be done regarding water quality management with the §303(d) process in Alabama and the recent management efforts of the Source Water Protection Program and the Wellhead Protection Program. Management efforts continue in the UST, RCRA, CERCLA, and UIC Programs and through National Pollutant Discharge Elimination System (NPDES) permitting. Continuing watershed coordination efforts in Alabama are vital to coordinate limited resources for effective surface and ground water management. Implementation of controls for nonpoint source runoff is an integral component of watershed management in Alabama.

Figure Intro-1

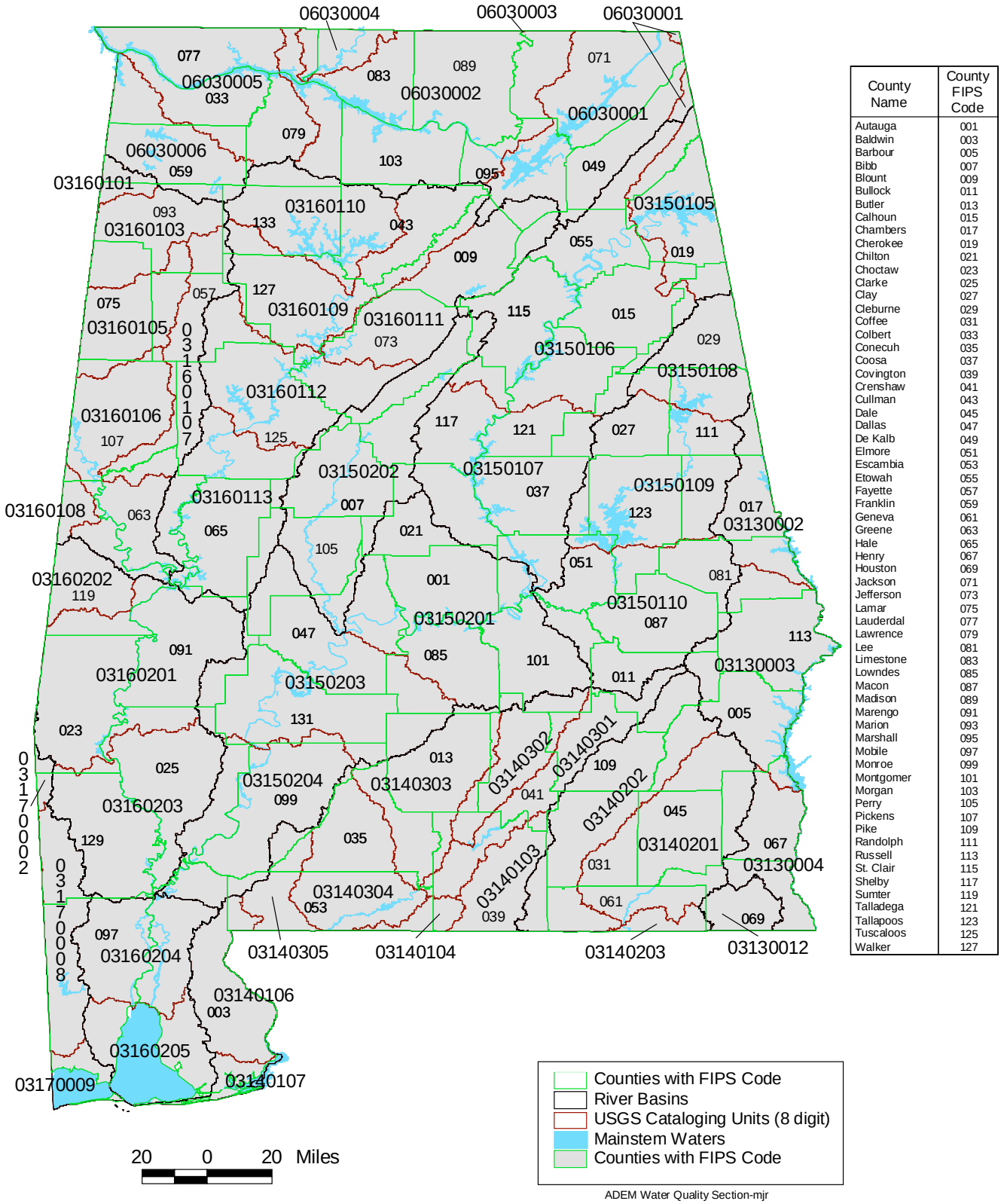
Alabama River Basins, Lakes and Reservoirs, Counties, and Major Cities



County Name	County FIPS Code
Autauga	001
Baldwin	003
Barbour	005
Bibb	007
Blount	009
Bullock	011
Butler	013
Calhoun	015
Chambers	017
Cherokee	019
Chilton	021
Choctaw	023
Clarke	025
Clay	027
Cleburne	029
Coffee	031
Colbert	033
Conecuh	035
Coosa	037
Covington	039
Crenshaw	041
Cullman	043
Dale	045
Dallas	047
De Kalb	049
Elmore	051
Escambia	053
Etowah	055
Fayette	057
Franklin	059
Geneva	061
Greene	063
Hale	065
Henry	067
Houston	069
Jackson	071
Jefferson	073
Lamar	075
Lauderdal	077
Lawrence	079
Lee	081
Limestone	083
Lowndes	085
Macon	087
Madison	089
Marengo	091
Marion	093
Marshall	095
Mobile	097
Monroe	099
Montgomer	101
Morgan	103
Perry	105
Pickens	107
Pike	109
Randolph	111
Russell	113
St. Clair	115
Shelby	117
Sumter	119
Talladega	121
Tallapoos	123
Tuscaloos	125
Walker	127

Figure Intro-2

USGS Cataloging Units in Alabama



County Name	County FIPS Code
Autauga	001
Baldwin	003
Barbour	005
Bibb	007
Blount	009
Bullock	011
Butler	013
Calhoun	015
Chambers	017
Cherokee	019
Chilton	021
Choctaw	023
Clarke	025
Clay	027
Cleburne	029
Coffee	031
Colbert	033
Conecuh	035
Coosa	037
Covington	039
Crenshaw	041
Cullman	043
Dale	045
Dallas	047
De Kalb	049
Elmore	051
Escambia	053
Etowah	055
Fayette	057
Franklin	059
Geneva	061
Greene	063
Hale	065
Henry	067
Houston	069
Jackson	071
Jefferson	073
Lamar	075
Lauderdal	077
Lawrence	079
Lee	081
Limestone	083
Lowndes	085
Macon	087
Madison	089
Marengo	091
Marion	093
Marshall	095
Mobile	097
Monroe	099
Montgomer	101
Morgan	103
Perry	105
Pickens	107
Pike	109
Randolph	111
Russell	113
St. Clair	115
Shelby	117
Sumter	119
Talladega	121
Tallapoos	123
Tuscaloos	125
Walker	127

Figure Intro-3

Subregions of Alabama's Ecoregions

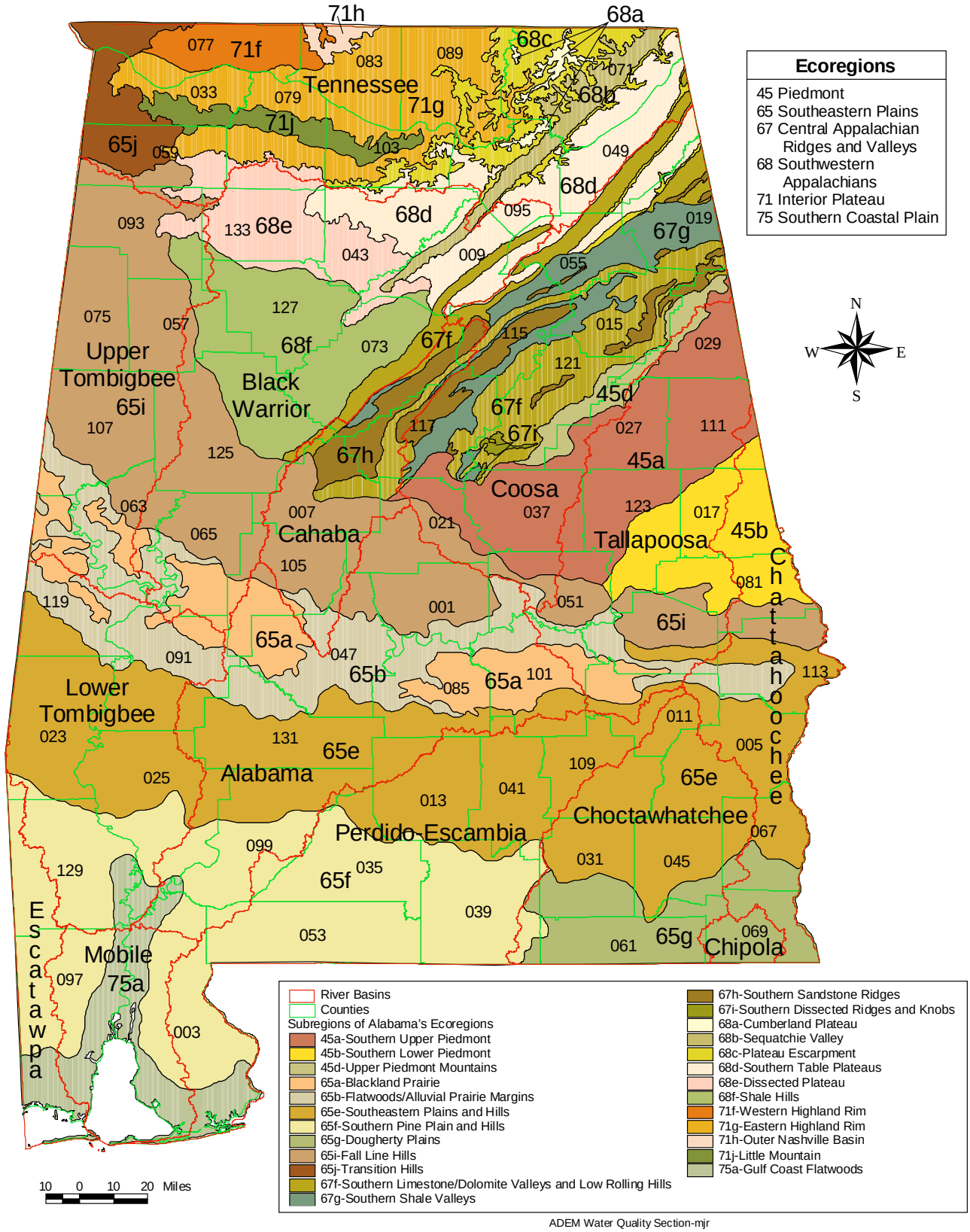


Figure Intro-4

Physiographic Provinces in Alabama

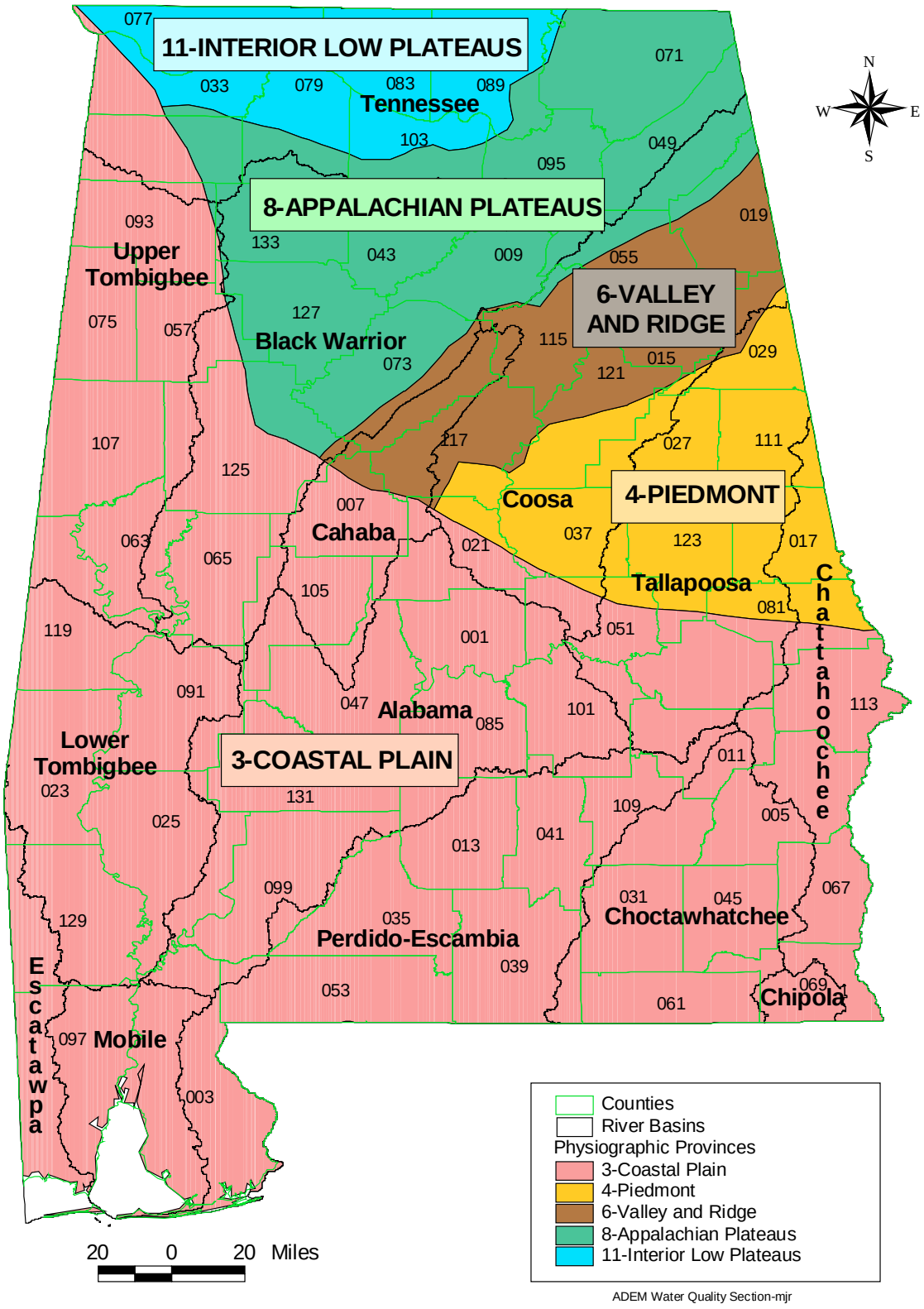


Figure Intro-5

Groundwater Recharge Areas in Alabama

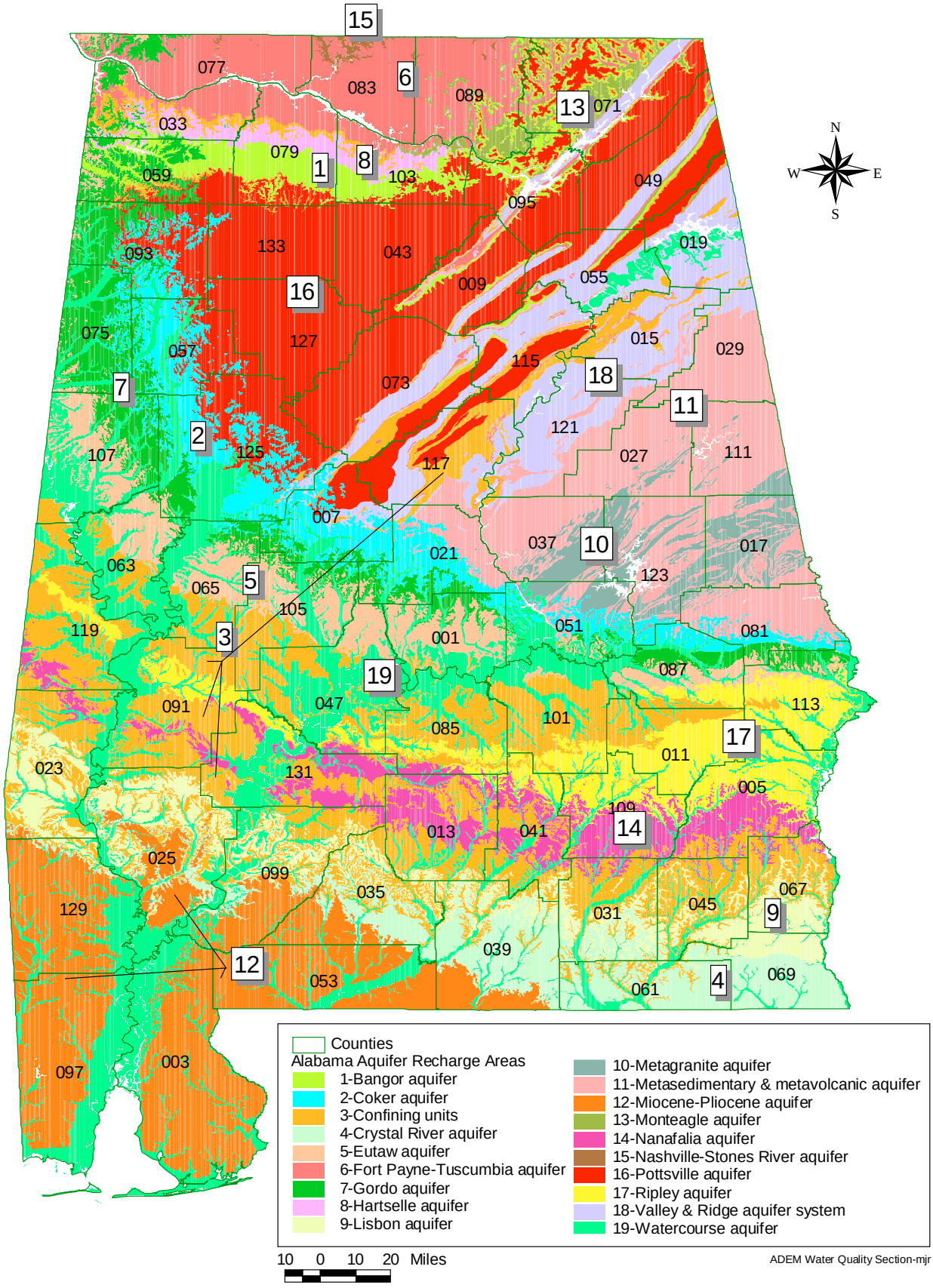


Table Intro-1

Atlas

Topics	Value
State population	4,040,587
State surface area	51,609
Number of waterbodies	14
Total miles of rivers and streams	77,274
Miles of perennial rivers/streams	47,072
Miles of intermittent (nonperennial) streams	30,170
Miles of ditches and canals	32
Border miles of shared rivers/streams	210
Number of lakes/reservoirs/ponds	7,694
Number of significant publicly-owned lakes/reservoirs/ponds	43
Acres of lakes/reservoirs/ponds	490,472
Acres of significant publicly-owned lakes/reservoirs/ponds	380,939
Square miles of estuaries/harbors/ponds	610
Miles of ocean coast	337
Miles of Great Lake shore	0
Acres of freshwater wetlands	3,600,000
Acres of tidal wetlands	27,600

Table Intro-2
Waterbody Classifications and Designations

Use Classifications	
Public Water Supply	PWS
Swimming and Other Whole Body	S
Shellfish Harvesting	SH
Fish and Wildlife	F&W
Agricultural and Industrial	A&I
Industrial Operations	IO
Navigation	N
Outstanding Alabama Water	OAW
Special Designations	
Outstanding National Resource Water	ONRW

Part I Coastal Area Assessment

Summary and Background

Water Pollution Control Program-Nonpoint Source Control Program

The United States Congress as part of the Coastal Zone Act Reauthorization Amendments of 1990 enacted Section 6217. Section 6217 requires coastal states to develop and implement a Coastal Nonpoint Pollution Control Program (CNPCP) to control land and water uses associated with Agriculture, Forestry, Urban Areas, Hydro-modification and Marinas and Recreational Boating. The Alabama Department of Environmental Management (ADEM or the Department), in cooperation with the Alabama Department of Economic and Community Affairs (ADECA), developed Alabama's CNPCP and, in July, 1995, submitted it to National Oceanic and Atmospheric Administration (NOAA) and the United States Environmental Protection Agency (USEPA or EPA) for their approval.

In June 1998, the U.S. Department of Commerce Office of Coastal and Resource Management and USEPA awarded conditional approval to the Alabama Coastal Nonpoint Source Pollution Control Program. Since achieving conditional approval, ADEM has sought to more fully develop the program, seek full approval of the program, and to see that program parts in place are implemented to the maximum extent practicable. This is being accomplished through the development of additional work elements and by developing partnerships and strategies.

Preliminary meetings and several teleconferences have been held with NOAA, EPA, Mobile-NEP, and Alabama-Clean Water Action Plan facilitators to further Administrative Coordination and Interagency Cooperation. The ADEM Coastal Programs staff continues to work with ADECA Coastal Programs and federal agencies to further develop the ADEM 6217 Program. To establish a process for coordination among state and local agencies, ADEM initiated the Coastal Alabama NPS Resources MATRIX. A forum of partners was convened and has conducted meetings inclusive of other local partners (federal, state, county, and local municipal entities). The purpose of the "MATRIX" is to explore strategies to enhance the effectiveness of nonpoint source management through identifying and working with agencies at all governmental levels and determining the resources and programs that can be utilized to improve the quality of the water environment throughout the Alabama 6217 Management Area.

ADEM is currently developing and engaged in many ongoing projects pertinent to the ACNPCP that monitor the effectiveness of nonpoint source pollution controls and management measures. The Alabama Coastal Nonpoint Pollution Control Program has been submitted for inclusion in ADEM's "Alabama NPS Management Plan", being currently prepared by ADEM's Office of Education and Outreach, Nonpoint Source Unit. ADEM recently hosted a workshop entitled "The Status and Trends of Wetlands and Submersed Aquatic Vegetation in Mobile and Baldwin Counties, Alabama". Extensive field efforts to conduct monitoring of AL-6217 Management Area waters and development sites is being conducted. ADEM has developed a dual strategy demonstrating that ADEM has program authority to enforce its programs and standards. This dual strategy focuses on a definition of legal authorities and a documented demonstration of field and enforcement efforts to illustrate what the program is achieving.

The ADEM Coastal Nonpoint Pollution Control Program has been working diligently to attain full program approval. An important step in that process has been the designation, and

federal approval by OCRM and USEPA, that all of Mobile and Baldwin Counties is the Alabama 6217 Management Area. Various other issue areas have been targeted for priority program development to further enhance the management of land and water uses and to develop an effective approach to improving overall water quality.

Surface Water Assessment

Surface Water Monitoring Program

Three monitoring programs were in place during the reporting period to monitor the quality of Alabama's coastal waters. First, described in ADEM's Technical Report entitled "Water Quality and Natural Resource Monitoring Strategy For Coastal Alabama" (March 1993) is a statistically based long-term monitoring program with probabilistically chosen stations distributed throughout Mobile Bay, Mississippi Sound, Perdido Bay, Mobile River, Tensaw River and the Mobile River Delta. The monitoring program's design is based on the USEPA's Environmental Mapping and Assessment Program (EMAP) and ADEM's knowledge of its estuarine system. The strategy provides a design that allows unbiased estimates of the status of Alabama's coastal water environment as a whole or within each of nine sub-areas (regions) and will allow long-term statistical trends to be identified by once-per-year sampling during a summer index period. This program is incorporated into the Alabama's "ASSESS (ADEM's Strategy for Sampling Environmental indicators of Surface water quality Status) Program" as Coastal ALAMAP in October 1997. Sampling has recurred annually since 1993. Sixty-eight (68) sites were sampled during 1998 and eighty-nine (89) sites were sampled in 1999.

Second, 18 fixed ambient monitoring stations were sampled six times during the reporting period. In addition to the State's monitoring efforts, water quality data is also gathered by the volunteers of the Baywatch Citizen's Volunteer Water Quality Monitoring Program as administered by the Alabama Coastal Foundation. Data gathered during the reporting period is summarized in the "Baywatch Program Progress Report" (November 1997).

Finally, one coastal watershed survey was conducted during this reporting cycle. The Mobile Branch of ADEM surveyed the Little Lagoon watershed (A Survey of the Little Lagoon Watershed (*in press*).

Estuary and Coastal Assessment

A. Eutrophication

Hypoxic and anoxic conditions are common in Alabama's coastal waters and are generally most prevalent during the summer months. Naturally occurring conditions combine to result in frequently stressed water quality conditions marked by stratification with low dissolved oxygen. These conditions include: relatively shallow water depths found in all of Alabama's open bays and sounds; low average wind and tidal energies; variable fresh water inflow; and constricted tidal passes. This persistent pattern of hypoxia manifests itself in "Jubilees", an infrequently occurring summer condition in Mobile Bay that results when winds blowing from the mainland drive surface waters from shore, causing deeper, poorly oxygenated water to move into the shallows. Fish, shrimp and crabs get caught in the poorly oxygenated water and generally rise to the surface in stress. The Jubilee phenomenon was first recorded in 1821 indicating that its underlying causes are naturally occurring. At this time it has not been determined if anthropogenic sources exacerbate those underlying causes.

B. Habitat Modification

Alabama's coastal counties are experiencing tremendous population growth. Statistics indicate that the population of Baldwin County increased from 115,266 in 1994 to 132,828 in 1998. This shows a four year increase of 15.2%. Mobile County's population increased by 1.4% (from 393,826 to 399,429) during the same time interval. Much of that growth is occurring within Alabama's defined coastal area, particularly in Baldwin County where there has been explosive growth in the beach communities of Orange Beach and Gulf Shores and on the Eastern Shore of Mobile Bay. The area of west Mobile, inside and outside of the current city boundary, is undergoing rapid commercial and residential development. Sedimentation from erosion at the numerous construction sites and the increased post development storm water runoff have placed a heavy burden on the receiving streams in the area increasing the incidence of flooding and stream bank erosion. All of Alabama's estuarine waters are being affected by this population growth.

Applications to the Department for coastal permits and certifications are growing in terms of numbers and complexity. Many of these applications propose projects that would have significant adverse impacts to coastal resources if approved as proposed. Projects having direct and significant adverse wetland impacts are routinely reviewed by Department personnel pursuant to the provisions of ADEM Administrative Code R.335-8 (Coastal Program) and Section 404 of the Clean Water Act and are routinely denied due to the impacts that would occur. Generally, permits are issued for projects having wetland impacts only if all of the following conditions are satisfied:

1) the activity is related to an existing or approved water dependent use, or use of regional benefit or related to an approved beach nourishment, shoreline stabilization or marsh creation, restoration or enhancement project, elimination of dead-end canals or boat slips exhibiting poor water quality or other similar beneficial use,
2) no other feasible alternatives exist;
3) impacts to wetlands on the project site have been minimized by project design, and
4) mitigation through creation of wetlands is incorporated into the project proposal.

There have been no coastal area wide surveys completed of wetland acreage for submersed aquatics, tidal emergence, or swamp forest during the reporting period. Due to the State's restrictive approval process, including mitigation requirements, it is believed that wetland losses that do occur are minimal for those wetlands regulated by the program and that other losses that may occur are due to natural erosion, unpermitted activities, and minimal losses due to Nationwide permitting of permissible uses by the U.S. Army Corps of Engineers. While it is believed that submersed aquatic vegetation acreage may be on an upward trend, a concern exists that many acres of native species are being replaced by an undesirable exotic, Eurasian water milfoil (Myriophyllum spicatum).

Coastal wetland data provided in Table 8-1 is based on 1991 studies and essentially confirms older data generated locally.

Data is not kept on the miles of shoreline in stabilized versus undeveloped form. The explosive coastal population growth has resulted in continuous shoreline development, with certain areas developing more rapidly than others. The Gulf shoreline is unstabilized along its length in Alabama, except at the passes from interior estuarine waters to the Gulf of Mexico at

Perdido Pass, Little Lagoon Pass, and on the eastern tip of Dauphin Island at the entrance to Mobile Bay.

C. Changes in Living Resources

The Alabama Department of Conservation and Natural Resources-Marine Resources Division (ADCNR-MRD) manages Alabama's marine resources. According to ADCNR-MRD personnel, populations are cyclic and vary by species. Generally, population levels are all within expected levels and there are no significant declines observed, expected, or predicted.

ADCNR-MRD reports that oyster harvests are showing recovery after having been affected by Hurricanes Danny (1997) and Georges (1998). ADCNR oversees the replanting of oyster reefs and believes that there has been an increase in reef size over time. Shrimp populations are cyclic and are doing well (3.1 million pounds of shrimp are harvested each year from the area). Crab populations are stable as well with 2.9 million pounds landed in Alabama per year.

D. Toxic Contamination

ADEM's Mobile Branch Office has directed a portion of their resources towards toxic contamination investigations in sediments and fish. The Coastal Program staff has conducted studies to determine metals enrichment in coastal water bottom sediments and has sampled water bottom sediments in proximity to shipyards, petroleum storage terminals, and industrial point source discharges. Beginning in 1993 the Mobile Branch Office implemented Coastal ALAMAP to provide a statistically defensible characterization of Alabama's coastal waters. Its parametrical coverage includes metals and selected organic compounds in water bottom sediments. However, no statement is being made as to the extent of areas having elevated levels of toxicants because no state or EPA criteria for toxins in sediments exist.

E. Pathogen Contamination

Alabama's coastal waters are monitored for pathogens and are subject to closings, advisories, or warnings. During the reporting period, all of Alabama's oyster harvest areas were closed at one time or another through closing orders issued by the State Health Officer of the Alabama Department of Public Health (ADPH). Those orders were issued when excess fresh water entered Mobile Bay from the Mobile River. Table 5-3 of Part V Public Health Information contains a list of all shellfish harvesting notices.

ADPH also issued several precautionary advisories for surface water bodies contaminated due to sanitary sewer collection system failures. The advisories are summarized in Table 5-4 of Part V Public Health Information.

F. Other State Activities

1. National Estuary Program

The ADEM is an active participant in the Mobile National Estuary Program (Mobile NEP). Staff are involved on its various boards, committees, subcommittees, and workgroups.

2. Near Coastal Waters

The ADEM continues to actively participate in Near Coastal Water projects.

3. Gulf of Mexico Program

The ADEM has continued its active participation in the Gulf of Mexico Program (GOMP) by participation on its various boards, committees, subcommittees, and workgroups, including the Policy Committee, Management Committee, and Focus Teams.

4. Other Related Activities

The Oil Pollution Act of 1990 has resulted in Mobile Office staff participation in many oil spill-planning efforts. Staff participate as co-chair and participants on committees of the United States Coast Guard's (USCG) Mississippi/Alabama Area Plan. Through its participation on the Region IV Rapid Response Team (RRT) and Response Technology Committee, ADEM has worked on dispersant use and in-situ burning plans for the RRT. Staff has gained experience from participation in both drills and real spill situations, including use of the Unified Command organizational structure.

Table 1-1

2000 305(b)

SUMMARY OF MONITORED and EVALUATED COASTAL and NON-COASTAL WATERS in the MOBILE AREA

WATER BODY	TOTAL AREA MONITORED ($MILES^2$) OR ($MILES_{RIVER}$)	Classification			
REGION I MOBILE BAY	27(mi^2)	F&W	Total 610 square miles (sq. mi.) Monitored	Coastal ALAMAP Sampling Program Trends & Citizen's Volunteer Data	
REGION II MOBILE BAY	85(mi^2)	S/F & W			
REGION III MOBILE BAY	168(mi^2)	S/SH/F&W			
REGION IV MOBILE BAY	104.85(mi^2)	S/SH/F&W			
REGION V MISSISSIPPI SOUND	145.25(mi^2)	S/SH/F&W			
REGION VI PERDIDO BAY	79(mi^2)	S/SH/F&W			
REGION VII MOBILE RIVER	7 Miles	A&I	289 sq. mi. Total Area 35,000 Acres (55 sq. mi.) of Marsh and Open Water Monitored		276.73 Miles TOTAL
REGION VII MOBILE RIVER	30 Miles	F&W			
REGION VII MOBILE RIVER	9 Miles	PWS			
REGION VIII MOBILE DELTA	116 Miles	F&W			
REGION IX TENSAW RIVER	20 Miles	F&W			
REGION IX TENSAW RIVER	21 Miles	S/F&W			
REGION IX APALACHEE R.	5.4 Miles	F&W			
REGION IX BLAKELEY R.	1.5 Miles	F&W			
CHICKASAW CREEK	4.3 Miles	A&I	42.31 Miles Monitored	Chickasaw Creek Watershed Survey 1997Trends & Citizen's	
CHICKASAW CREEK	7.2 Miles	F&W			
CHICKASAW CREEK	22.61 Miles	S/F&W			
Eight Mile Creek	6.48 Miles	F&W			
Eight Mile Creek	1.72 Miles	PWS			
Halls Mill Creek	10.75 Miles	F&W			
Milkhouse Creek	7.4 Miles	F&W			
Second Creek	5.37 Miles	F&W			
ESCATAWPA RIVER	1 Miles	S/F&W	Monitored	Trend Data	

Table 1-2
Summary of Percent Violations
of Alabama's Coastal Criteria for Dissolved Oxygen, pH, and Temperature
for the 1993-99 Coastal Alamap Sampling Program

1999 Coastal ALAMAP DO, pH & Temperature Summary	
Dissolved Oxygen Violations were 7.9% (7 of 89 Stations) with 5.0 mg/L as criteria	Full Support
Dissolved Oxygen Violations were 4.5% (4 of 89 Stations) with 4.0 mg/L (DO criteria for DO influenced)	Full Support
PH violations were 5.6% (5 of 89 Stations above 8.5)	Full Support
Temperature violations were 19% (17 of 89 Stations), {8.9% (8 of 89) were in shallow waters of the Mobile River Delta, 10.1% (9 of 89) were in the Perdido Bay system} due to drought conditions.	Partial Support

1998 Coastal ALAMAP DO, pH & Temperature Summary	
Dissolved Oxygen Violations were 8.8% (6 of 68 Stations) with 5.0 mg/L as criteria	Full Support
Dissolved Oxygen Violations were 1.5% (1 of 68 Stations) with 4.0 mg/L (DO criteria for DO influenced)	Full Support
PH violations were 2.9% (2 of 68 Stations above 8.5)	Full Support
Temperature violations were 8.8% (6 of 68 Stations)	Full Support

1997 Coastal Alamap DO, pH & Temperature Summary	
Dissolved oxygen violations were 6.1% (8 of 131 stations)	Full Support
pH violations were 4.6% (6 of 130 stations above 8.5 pH s.u.)	Full Support
Temperature violations were1.5% (2 of 130)	Full Support

1996 Coastal Alamap DO, pH & Temperature Summary	
Dissolved oxygen violations were 0.0%	Full Support
pH violations were 2.7% (3 of 112 stations less than 6.5 pH s.u.)	Full Support
Temperature violations were 0.0%	Full Support

1995 Coastal Alamap DO, pH & Temperature Summary	
Dissolved oxygen violations were 17.2% with 5.0 mg/L as criteria (20 of 109 stations)	Partial Support
Dissolved oxygen violations were 6.0% with 4.0 mg/L (DO criteria for DO influenced by natural conditions) as criteria (7 of 109 stations)	Full Support
pH violations were 2.8% (2 of 109 stations less than 6.5 pH s.u. & 1 of 109 above 8.5 pH s.u.)	Full Support
Temperature violations were 0.9% (1 of 109 stations)	Full Support

1994 Coastal Alamap DO, pH & Temperature Summary	
Dissolved oxygen violations were 8.6% with 5.0 mg/L as criteria (11 of 128 stations)	Full Support
Dissolved oxygen violations were 3.9% with 4.0 mg/L (DO criteria for DO influenced by natural conditions) as criteria (5 of 128 stations)	Full Support
pH violations were 4.7% (5 of 128 stations less than 6.5 pH s.u. & 1 of 125 above 8.5 pH s.u.)	Full Support
Temperature violations were 0.0%	Full Support

1993 Coastal Alamap DO, pH & Temperature Summary	
Dissolved oxygen violations were15.3% (13 of 85 using 5.0 mg/L) & 14.1% (12 of 85 using 4.0 mg/L)	Partial Support
pH violations were 5.8% (6 of 85 above 8.5 pH s.u.)	Full Support
Temperature violations were 2.4%	Full Support

Figure 1-1

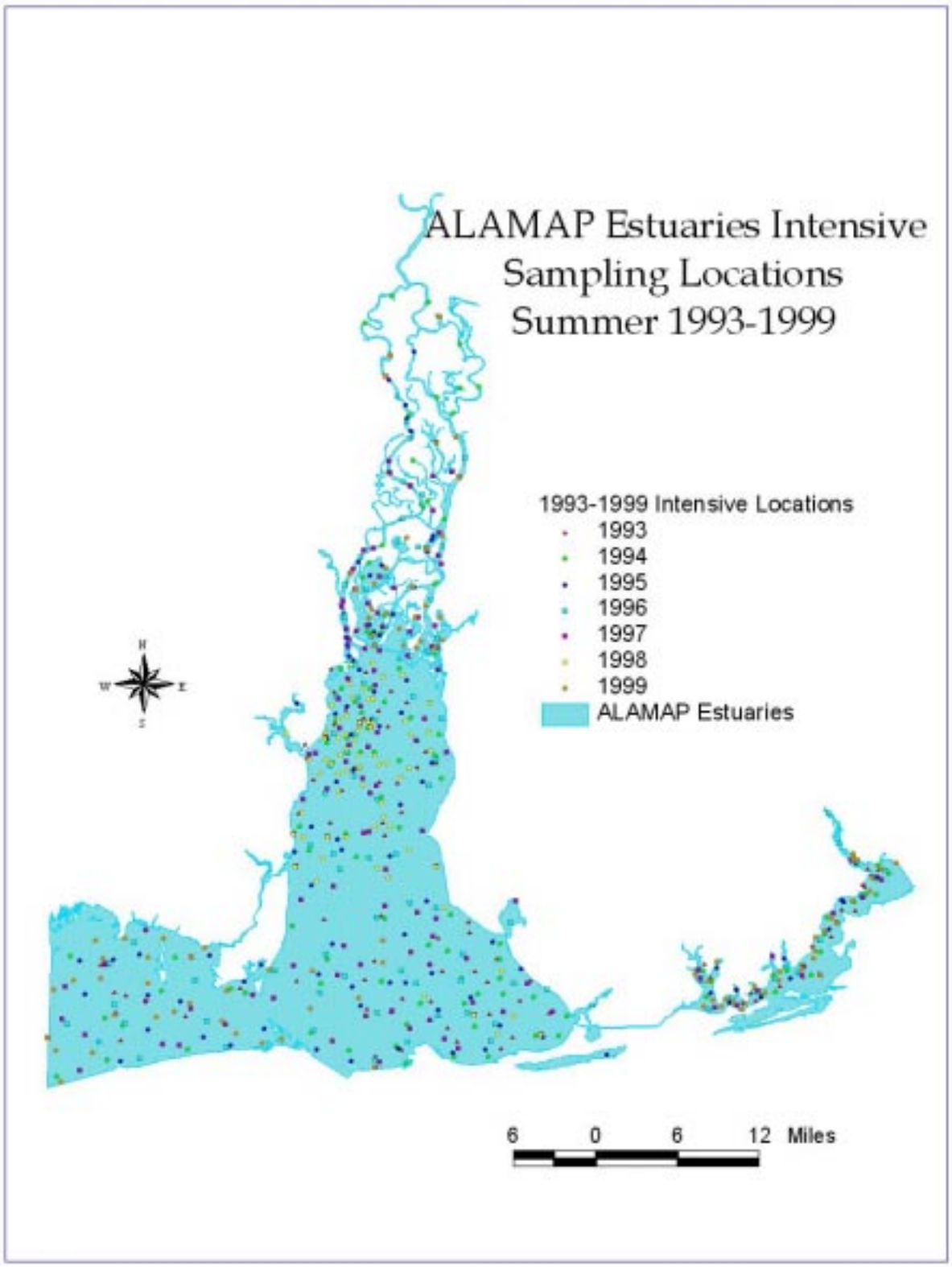

ALAMAP Estuaries Intensive
Sampling Locations
Summer 1993-1999
1993-1999 Intensive Locations
1993
1994
1995
1996
1997
1998
1999
ALAMAP Estuaries
N
W
E
S
6 0 6 12 Miles

Table 1-3
Overall Use Support of 1998 §303(d) Estuaries
(square miles)

Support Status	Monitored
Partially Supporting	517.3
Not Supporting	23.2
Total	540.5

Table 1-4
Total Sizes of Estuaries Not Fully Supporting Uses by Cause Categories
1998 303(d) List Causes
(square miles)

Code	Causes for Impaired Uses	Acres
5	metals	1
12	organic enrichment / DO	50
17	pathogens	489.5

Table 1-5
Total Sizes of Rivers Not Fully Supporting Uses by Source Categories
1998 303(d) List Causes
(miles)

Code	Sources for Impaired Uses	Acres
1	Industrial	23.2
2	Municipal	23.2
41	storm sewers (source control)	516.3
65	on-site wastewater systems (septic tanks etc.)	121.3
74	flow regulation/modification	1
85	in place contaminants	1
87	upstream sources	248.5

Part II: Ground Water Assessment

Overview of State Ground Water Protection Programs

Many of elements of Alabama's ground water programs listed in Table 2-1 are managed by subdivisions within the Alabama Department of Environmental Management (ADEM), including the Land, Field Operations, and Water Divisions. The Ground Water Branch in the Water Division provides the hydrogeological support for these programs. Other programs related to ground water management and protection are managed by other state and federal agencies. The on-site sewage program is managed by the Alabama Department of Public Health and the Class II Underground Injection Control Program is managed by the State of Alabama Oil and Gas Board. Ground water quality issues are addressed by the Alabama Department of Economic and Community Affairs Office of Water Resources. Other ground water monitoring and regulatory programs are managed by the Geological Survey of Alabama and the Alabama Surface Mining Commission. The U.S. Environmental Protection Agency (EPA) provides oversight on all federally funded and delegated ground water programs.

Coordination of State Ground Water Programs

The State of Alabama recognizes that there is a need to coordinate management of ground water programs and as a result set up the Ground Water Programs Advisory Committee (GWPAC) in 1994 to aid in completing the requirements for EPA's Core Comprehensive State Ground Water Protection Program (CSGWPP). The ADEM Ground Water Branch and the GWPAC continue to work toward a fully integrated CSGWPP. This work includes coordinating ground water regulatory programs and addressing program refinements identified during the CSGWPP core review process.

Meetings of the GWPAC are now being held twice a year. This committee includes representatives of other state and federal agencies, consultants, water system representatives, and others who work in ground water related fields. The meetings are used to provide ground water program information, receive feedback and coordinate ground water projects. A subcommittee of agencies involved in area wide ground water monitoring programs was formed in late 1997. This subcommittee is working to maximize resources to provide the best monitoring coverage of the state.

Significant State Ground Water Program Developments

The following items summarize some of the recent ground water developments that are underway in Alabama:

- Integration of the Source Water Assessment Program within the ADEM Water Supply Branch regulations.
- Finalization and implementation of guidance for Risk Based Corrective Action (RBCA) for petroleum fuels.
- A RBCA approach for releases other than petroleum related fuels that are regulated under the State Ground Water Program-under development.
- Initiation of a ground water quality database for reporting.
- The deadline for UST upgrades with spill, overfill and corrosion protection was December 22, 1998. Tanks should have been upgraded, replaced with a new system, or permanently closed by this date. The compliance rate with these regulations is increasing with continuing enforcement of these requirements.

- A contract was signed with the Geological Survey of Alabama in late September 1997 to revise a series of 13 aquifer vulnerability reports by updating geologic names and terms to match the most recent state mapping, revising vulnerability maps from 1:250,000 scale to 1:100,000 scale, revising the vulnerability rating methods, and to include text, maps, and figures in an electronic CDROM format. Area 13 (Baldwin and Mobile Counties) have been completed and published as a compact disc. Area 10 (Washington, Choctaw and Clarke Counties) has been drafted and reviewed, and is currently being finalized.
- The Nonpoint Source Program has provided funding for pesticide sampling of residential wells in vulnerable areas of the Highland Rim Ground Water (Physiographic) Province and also in the Coastal Plain Ground Water (Physiographic) Province. Sampling and analysis is complete. Report preparation is in progress.
- A ground water festival was held at the University of Alabama-Huntsville in March of 1998. Approximately 1200 students participated in ground water activities. In March of 1999, a joint ground water festival was held for Colbert and Lauderdale Counties where approximately 1200 students participated in the various ground water activities. Additionally, in May of 1999, separate ground water festivals were held in Madison and Limestone Counties where 2600 and 800 students, respectively, participated in ground water activities. Exhibits were provided along with demonstrations during these two day events.
- ADEM is writing regulations to deal with Concentrated Animal Feeding Operations (CAFOS). Hydrogeologic site evaluations and ground water monitoring requirements are currently being drafted into the regulations as part of siting and operation requirements for CAFO lagoons and land application sites.
- The U.S. Geological Survey is working on the National Water Quality Assessment (NAWQA) for two study units that include significant parts of Alabama's Mobile River and Lower Tennessee River Basins.
- The Alabama Department of Public Health is revising its on-site sewage regulations.
- The Alabama Department of Public Health has completed a study of nitrates and bacteria in residential wells for the Centers for Disease Control. ADEM is building upon this effort to continue a probabilistic ground water monitoring program

Table 2-1 Summary of State Ground Water Protection Programs

Programs or Activities	Check	Implementation Status	Responsible State Agency (1)
Active Sara Title III Program	x	Under Development	EPA/ADEM/FOD/EMA
Ambient ground water monitoring program	x	Fully established	GSA
Aquifer vulnerability assessment	x	Fully established Being updated	ADEM/GWB
Aquifer mapping	x	Fully established	GSA
Aquifer characterization	x	Fully established	GSA
Comprehensive data management system	x	Under development	ADEM/GWB
EPA-Endorsed Core Comprehensive State Groundwater Protection Program	x	Fully established	ADEM/GWB
Ground water discharge permits	x	Established in UIC Regs.	ADEM/UIC .
Ground water Best Management Practices			
Ground water legislation			
Ground water classification	x	Established in UIC Reg Definition	ADEM/UIC
Ground water quality standards			
Interagency coordination for ground water protection initiatives	x	Continuing efforts	ADEM/GWB
Non-point source controls	x	Under development	ADEM/FOD
Pesticide State Management Plan	x	Generic Draft	ADAI
Pollution Prevention Program	x	Under Development	ADEM/OEO
Resource Conservation and Recovery Act (RCRA) Primacy	x	Fully established	ADEM/HWB
Source Water Assessment Program	x	Fully established	ADEM/WSB
State Superfund	x	Fully established	ADEM/LD
State RCRA Program incorporating more stringent requirements than RCRA Primacy	x	Fully established	ADEM/HWB
State septic system regulations	x	Fully established	ADPH
Underground storage tank installation requirements	x	Fully established	ADEM/GWB
Underground Storage Tank Remediation Fund	x	Fully established	ADEM/GWB
Underground Storage Tank Registration Program	x	Fully Established	ADEM/GWB
Underground Injection Control Program	x	Fully established	ADEM/GWB/OGB
Vulnerability assessment for drinking water/wellhead protection	x	Fully established	ADEM/GWB
Well abandonment regulations	x	WSB Regs & Guidelines	ADEM/WSB GWB
Wellhead Protection Program (EPA-approved)	x	Fully established	ADEM/WSB
Well installation regulations	x	Fully Established	ADEM/WSB
State Ground Water Program	x	Statute Based Program	ADEM/GWB
NPDES Permits for Land Application Sites	x	Fully Established	ADEM/MUN/IIND
Subtitle D Solid Waste Program	x	Fully Established	ADEM/SWB
Ground Water Use	x	Fully Established	ADECA/WRD

1. ADEM = AL Dept Env Mngt, FOD = Field Operations Division, GWB = Ground Water Branch, WSB = Water Supply Branch, LD = Land Division, HWB = Hazardous Waste Branch, OEO=Office of Education and Outreach, SWB=Solid Waste Branch, MUN=Municipal Branch, IND=Industrial Section GSA = Geological Survey of Alabama, ADPH = AL Dept. of Public Health, ADAI = AL. Dept. Agriculture & Industries, OGB = Oil & Gas Board; ADECA=Alabama Department of Economic and Community Affairs, Office of Water Resources, EPA= Environmental Protection Agency, EMA= Emergency Management Agency

Summary of Ground Water Contamination Sources

Southern Pine Hills District

The Alabama Department of Environmental Management has selected the Southern Pine Hills Ground Water District (Figure 2-1), of the East Gulf Coastal Plain Province, for evaluation during this reporting period. This area includes all or portions of 9 counties in south Alabama that are underlain by one major aquifer. Counties in this area include: Baldwin, Choctaw, Clarke, Conecuh, Covington, Escambia, Mobile, Monroe and Washington. The aquifer outcropping in this area includes the Miocene-Pliocene Aquifer of Tertiary age. Data contained in Table 2-2 and 2-3 were queried and retrieved by county and therefore some overlap into adjacent Hatchetigbee Dome Subdistrict, Lime Hills District, Coastal Lowlands District, Dougherty Plain District, and the Alluvial-Deltaic Plain Province is shown.

Data Review and Compilation

Hydrogeologists from the ADEM Ground Water Branch are assigned to the major ground water regulatory programs as part of the Comprehensive State Ground Water Protection Program. The information contained in Table 2-2, Ground Water Contamination Summary, was researched from ADEM's electronic databases and prepared by the hydrogeologists assigned to each of the programs listed under the Source Type column.

Superfund CERCLIS And DOD Sites

ADEM's Land Division works with EPA and the Department of Defense to manage these types of sites. Six (6) facilities identified in Table 2-2 are listed on the National Priority List (NPL). These sites include: Ciba Geigy Corporation, Olin Chemical, Perdido Groundwater Site, Redwing Carriers at Saraland Apartments, and 2 separate NPL sites at Stauffer Chemical Company. Confirmed releases of pesticides, volatiles, semi-volatiles, or metals have been detected in ground water at these facilities. The sources of the ground water contamination have been either stabilized or removed, and the facilities are currently under active remediation under the authority of the Superfund Program.

The CERCLIS listings include 19 non-NPL sites located in the Southern Pine Hills Ground Water District. These are sites where State and federal funds have been used to conduct preliminary and secondary assessments by ADEM and EPA. Three (3) of the 19 sites have had confirmed releases of contaminants into ground water, and none of the 3 sites are currently under active remediation.

Two Department of Defense sites (DOD) are listed in Table 2-2. These sites were identified as Brookley Field in Mobile County, and Barin Field in Baldwin County. The ongoing site assessments and cleanups are being funded by the Defense Environmental Restoration Fund.

Underground Storage Tank Program

The largest category of sites listed in Table 2-2 is underground storage tanks (USTs). These sites are managed by the ADEM Ground Water Branch. Assessment and clean up of eligible sites is funded through the State UST Trust Fund. Many of the cleanups listed include free product as well as source and soil removals. Active ground water remediation systems are also included. Most of these cleanups involve gasoline spills and leaks, but also include diesel and fuel oils. These petroleum fuels include soluble compounds such as benzene, ethyl benzene, toluene, xylene (BETX), polynuclear aromatic hydrocarbons (PAH's), methyl tertiary butyl ether (MTBE) and lead that affect ground water quality. Monitoring for MTBE at UST sites has been required since 1996. A monitoring effort for all public water supplies for MTBE is being conducted in 2000.

Hazardous Waste Management Program (RCRA)

Twenty-four (24) hazardous waste sites (RCRA) were identified in the study area. These sites are managed by the ADEM Land Division. These sites include extensive assessment, permitting and reporting requirements. Releases associated with these sites are persistent and difficult to assess and remediate. Compounds such as chlorinated volatile organic compounds

(VOCs), and non-aqueous phase liquids (dense and light) associated with wood treating activities are present in many instances and have properties that make remediation problematic.

Underground Injection Control Program

The Underground Injection Control (UIC) program is managed in the ADEM Ground Water Branch. Permits are issued to Class V sites for the disposal of treated wastewater and as part of corrective action system to dispose of treated ground water resulting from the remediation of contaminated ground water. Most of these sites are greenfield (new) sites and involve car washes or treated industrial or commercial wastewater. The ADEM Ground Water Branch also manages and has permitted three (3) Class III UIC wells at the Olin Chemical facility in Washington County. Class I and Class IV UIC wells are prohibited in Alabama, and Class II injection wells are managed by the State of Alabama Oil and Gas Board.

State Ground Water Program

State Ground Water Program sites are those that are not regulated by established programs such as RCRA, UST, UIC or CERCLA. Sites such as releases from bulk petroleum storage tanks, pipelines, and otherwise unregulated chemical spills are assessed and remediated using the authority of the Alabama Water Pollution Control Act (AWPCA). Releases from these sites are in many cases reported by the responsible party through company initiated environmental audits or are discovered as a result of real-estate assessments during property transactions. Other ground water incidents are discovered and reported to the Department by citizens or discovered through inspections. Assessment and cleanup of these sites is required to be conducted by the responsible party. Many types of contaminant releases have been addressed by this program.

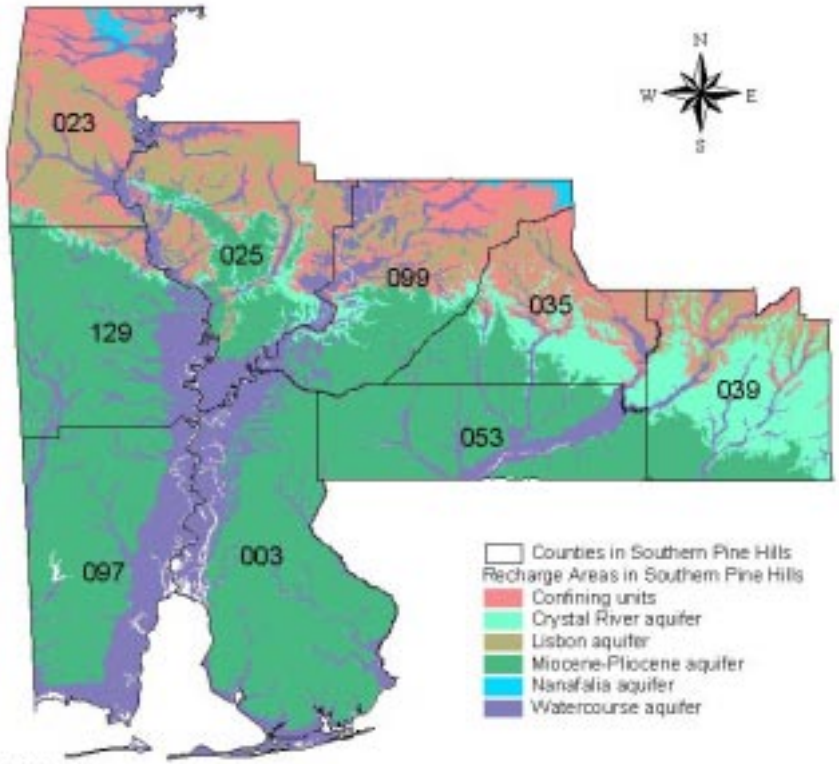
Nonpoint Source Program

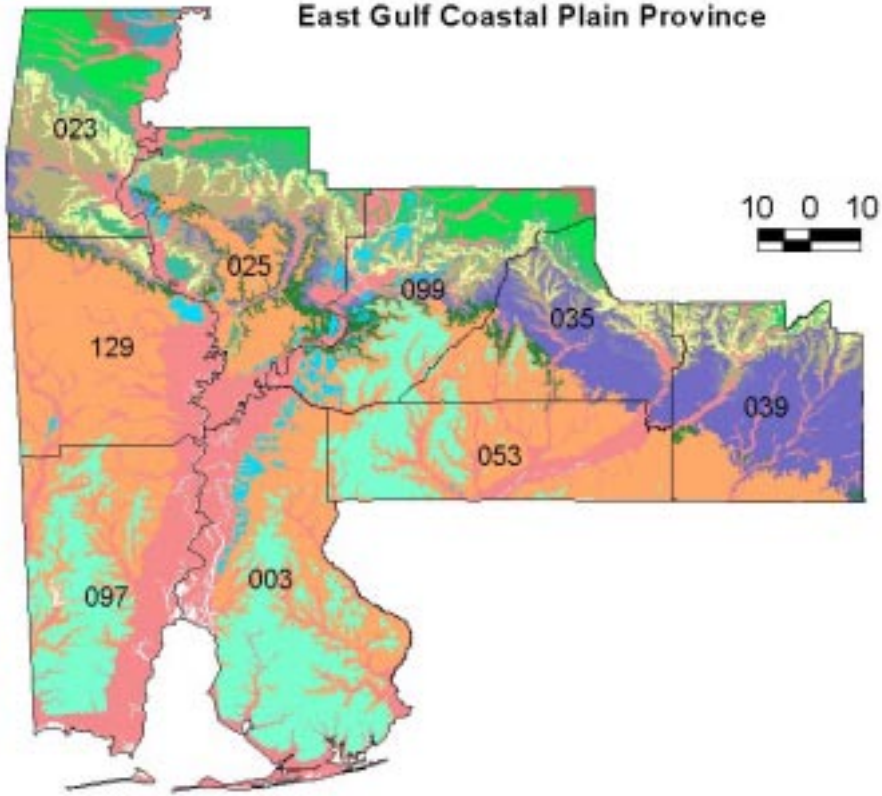
The nonpoint source sites listed in Table 2-2 are new sites where hydrogeologic site evaluations have been conducted by the Department for the land application of treated effluent from two municipal facilities. One facility will be utilizing the typical sprayfield application techniques, whereas the other facility has designed an innovative system where the treated effluent will be applied through a “vegetated rock filter system.”

Counties in Southeastern Pine Hills
Physiographic Provinces
APPALACHIAN PLATEAUS
COASTAL PLAIN
INTERIOR LOW PLATEAUS
PIEDMONT
VALLEY AND RIDGE

Figure 2-1

Groundwater Recharge Areas
and
Geological Formations
for the
Southern Pine Hills Ground Water District
of the
East Gulf Coastal Plain Province





10 0 10 Miles

Code	County
003	Baldwin
023	Choctaw
025	Clarke
035	Conecuh
039	Covington
097	Mobile
099	Monroe
129	Washington

Counties in Southern Pine Hills
Geological Formations in Southern Pine Hills
Alluvial, coastal and low terrace deposits
Citronelle Formation
Gosport Sand and Lisbon Formation undifferentiated in part
Hatchetigbee Formation
High terrace deposits
Jackson Group undifferentiated
Miocene Series undifferentiated
Naheola Formation
Nanafalia Formation
Oligocene Series undifferentiated
Porters Creek Formation
Residuum
Salt Mountain Limestone
Tallahatta Formation
Tuscahoma Sand

Note:
This map of Alabama's geology represents data that were originally presented in Geological Survey of Alabama Special Map 220, "Geologic Map of Alabama," by M.W. Szabo, W.E. Osborne, C.W. Copeland, Jr., and T.L. Neathery, published in 1988.
These data were compiled into GIS format by D.R. Taylor, under the direction of D.H. Tew of the Geological Survey of Alabama.

Table 2-2. Ground Water Contamination Summary

Hydrogeologic Setting: Southern Pine Hills District of the East Gulf Coastal Plain Physiographic Section

Spatial Description: See Figure 4-1

Map Available: See Figure 4-1

Data Reporting Period: 1998-1999.

Source Type	Number of Sites	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of Site Investigations (optional)	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans (optional)	Number of sites with active remediation (optional)	Number of sites with cleanup completed (optional)
NPL	6	6	6	Pesticides, VOCs, SVOCs, Metals	6	6	6	6	0
CERCLIS (non-NPL)	19	3	3	VOCs, SVOCs, Metals	1 - SI's 17 - PA's other	0	0	0	0
DOD/ DOE	2	2	2	VOCs, SVOCs, Metals	2	2	2	2	0
UST	910	332	332	BETX, PAHs, MTBE, Lead	36	332	64	56	16
RCRA Corrective Action	24	21	21	VOCs, SVOCs, Metals, Pesticides, Herbicides, Sulfate, Chloride	10	0	10	14	2
State Sites	61	38	34	VOCs, SVOCs, Metals, Nitrates, Ammonia	28	16	29	20	7
Non-point Sources	2	0	0		0	0	0	0	0
Totals	1,060	410	405		100	357	111	105	25

Aquifer Monitoring

Ambient Monitoring Network

Aquifer monitoring data listed in Table 2-2 were evaluated for counties in and adjacent to the Southern Pine Hills Ground Water District. The monitoring data was obtained from the Geological Survey of Alabama and from information contained in ADEM's computer databases. The Geological Survey of Alabama (GSA) maintains an ambient ground water monitoring network throughout the state. Five hundred and fifty (550) sites are monitored in the fall for water levels. One half of these water level sites are springs. Due to budget restraints, further monitoring of the one hundred and fifty (150) sites monitored annually for inorganic compounds in previous reporting years has been postponed. In addition, the water level measurements obtained in the spring in previous reporting years have also been postponed. Twenty-eight (28) wells and one spring was monitored by the GSA in the Southern Pine Hills Ground Water District. Sixteen (16) of the 28 wells had no nitrate detections, and fifteen (15) of the remaining wells had detectable nitrate concentrations that were less than 5 mg/l. Four (4) of the 28 wells had no detectable manganese concentrations, and five (5) wells had manganese concentrations exceeding the MCL of 0.05 mg/L. Nitrates were detected in the spring identified, but at a concentration less than 5.0 mg/L. The following is a list of those wells identified within the Southern Pine Hills District.

Table 2-3

Wells/Springs in the Southern Pine Hills District of the Coastal Plains Groundwater Province

Well / Spring Number and or Name	County	Aquifer Monitored
D-3	Mobile	Miocene-Pliocene
Z-71	Excambia	Miocene-Pliocene
KK-1	Mobile	Miocene-Pliocene
UU-2	Mobile	Miocene-Pliocene
ZZ-8	Baldwin	Miocene-Pliocene
O-95	Escambia	Lisbon (Lisbon Formation)
NN-04	Baldwin	Miocene-Pliocene
V-37	Escambia	Upper Floridian (Ocala Limestone)
S-2	Conecuh	Lisbon (Tallahatta Formation)
M-8	Covington	Nanafalia-Clayton
U-4	Monroe	Nanafalia-Clayton
HH-6 (Spring)	Clarke	Crystal River
X-02	Escambia	Miocene-Pliocene
HHH-03	Baldwin	Watercourse
H-07	Escambia	Miocene-Pliocene
QQ-01	Monroe	Miocene-Pliocene
DDD-03	Baldwin	Miocene-Pliocene

Table 2-3 (cont.)

Well/Spring Number and/or Name	County	Aquifer Monitored
DDD-21	Baldwin	Miocene-Pliocene
UU-4	Mobile	Miocene-Pliocene
H-2	Clarke	Lisbon (Tuscahoma Sand)
O-12	Clarke	Lisbon
TT-01	Mobile	Miocene-Pliocene
UU-17	Baldwin	Miocene-Pliocene
KK-05	Baldwin	Miocene-Pliocene
CC-10	Baldwin	Miocene-Pliocene
U-02	Baldwin	Miocene-Pliocene
P-3	Washington	Miocene-Pliocene
DDD-05	Baldwin	Miocene-Pliocene
DDD-01	Baldwin	Miocene-Pliocene
S-3	Mobile	Watercourse

Source: Kopaska-Merkel, 1999

Finished Water Quality Data

The Federal Reporting Data System (FRDS) was used to determine the number of public water supply wells in these counties. Three-hundred and fourteen (314) public water supply wells were identified (Table 2-4) for the counties in and adjacent to the Southern Pine Hills Ground Water District. The FRDS data indicates that out of 314 wells 25 had detected volatile organic compounds (VOC's) greater than the method detection limit but less than the maximum contaminant level (MCL) required for drinking water supplies. Two-Hundred and four (204) wells had no nitrate detections above the method detection limit and one-hundred and six (106) wells had nitrate concentrations less than 5 mg/l. Four (4) wells had nitrate concentrations exceeding the MCL required for drinking water supplies. Table 2-4 documents that contamination was not detected in most wells. This can be attributed in part to enforcement of construction and water supply system operation standards by ADEM. Wells are taken out of service, upgraded with treatment or abandoned when detections occur.

Ground Water Use In The Southern Pine Hills District

Ground water use in the 9 counties located in and adjacent to the Southern Pine Hills Ground Water District was approximately 19,139,041,614 gallons in 1999 (Table 2-4b). Over ninety-nine percent of this use was for public water supplies. Less than one percent was for non-public use and for irrigation (Durham,1998).

Table 2-4a. Aquifer Monitoring Data

Hydrogeologic Setting: Southern Pine Hills District of the East Gulf Coastal Plain Physiographic Section (See Figure 1) Reporting Period: Status Up To 1999

			Number of Wells								
			No detections of parameters above MDLSs or background levels		Nitrate concentrations range from background levels to less than or equal to 5 mg/l No detections of parameters other than nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable		Nitrate ranges from greater than 5 to less than or equal to 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	Removed from service	Special Treatment	Background parameters exceed MCLs
Monitoring Data Type	**Total No. of Wells Used in the Assessment**	**Parameter Groups**	**No Detects above the method detection limit**	**Number of wells in sensitive or vulnerable areas (Optional)**	**Nitrate ≤ 5 mg/L; VOC, SOC, and Other parameters not detected**	**Number of wells in sensitive or vulnerable areas**	**Other parameters are detected at concentrations exceeding the MCLs**				
Ambient Monitoring Network	28 Wells, & 1 Spring	VOC									
		SOC									
		NO_3	16		16		0				
		Manganese	4					5			
Raw Water Quality Data from Public Water Supply Wells		VOC									
		SOC									
		NO_3									
		Other*									
Finished Water Quality Data from Public Water Supply Wells	314	VOC	289								
		SOC									
		NO_3	204		106		4				
		Other*									

Table 2-4b Aquifer Monitoring Data

Major uses of the aquifer	X Public water supply	X Irrigation	___ Commercial	___ Mining	___ Baseflow
or hydrologic units Pottsville	X Private water supply	___ Thermoelectric	___ Livestock	___ Industrial	___ Maintenance
Major uses of the aquifer	X Public water supply	X Irrigation	___ Commercial	___ Mining	___ Baseflow
or hydrologic units Tuscumbia Ft. Payne	X Private water supply	___ Thermoelectric	___ Livestock	___ Industrial	___ Maintenance
Major uses of the aquifer	X Public water supply	X Irrigation	___ Commercial	___ Mining	___ Baseflow
or hydrologic units Miocene-Pliocene	X Private water supply	___ Thermoelectric	X Livestock	X Industrial	___ Maintenance

Table 2-5

Estimated Groundwater Withdrawals For Selected Counties

County	Public	Non-Public*	Irrigation*	Total GW Use	% Public	% Non-Public	% Irrigation
	Gal/yr	Gal/yr	Gal/yr	Gal/yr			
Baldwin	6,989,669,335		11,318,142	7,000,987,477			
Clarke	798,959,450			798,959,450			
Conecuh	525,081,700			525,081,700			
Covington	1,719,474,850	826,358	61,000	1,720,362,208	99.94	0.048	0.004
Escambia	2,614,288,775	2,244,456	435,511	2,616,968,742	99.89	0.086	0.0017
Mobile	4,744,137,140	18,655,043	5,272,256	4,768,064,439	99.889	0.393	0.111
Monroe	1,256,516,150	256,055	69,654	1,256,841,859	99.994	0.020	0.006
Washington	446,080,370	5,695,369	1,667	451,775,739	98.739	1.261	0.000368
Totals	19,094,207,770	27,677,281	17,158,230	19,139,041,614	99.6904	0.3616	0.0246

Source: Durham, 1998

* 1998 Data. 1999 Data currently unavailable.

Summary of Ground Water Quality

Hydrogeology

The Southern Pine Hills District in Alabama was described by Sapp and Emplaincourt (1975) as an upland area underlain by Pliocene-Pleistocene terrigenous sediments, whereas younger terrace deposits occur along major streams. The terrain of the Southern Pine Hills District slopes gradually from 350 feet above mean sea level (msl) southward to about 30 feet above msl at the southern limit. (Gillett, Raymond, Moore, and Tew, 1999). The Southern Pine Hills District is dissected along major rivers (Mobile, Tensaw, Tombigbee, and Conecuh Rivers) and associated creeks by broad areas of alluvial and deltaic sediments belonging to the Alluvial-Deltaic Plain Physiographic District. Swampy plains, tidal marshes and barrier islands of the Coastal Lowlands Physiographic District border the southern boundaries of the Southern Pine Hills District in Mobile and Baldwin Counties.

The Southern Pine Hills District is underlain by sediments belonging to the Miocene Series, undifferentiated, the Citronelle Formation, and High Terrace Deposits. In Mobile and Baldwin Counties, the Miocene Series, undifferentiated, consists primarily of laminated to thinly bedded clays, sands, and sandy clays. The sand layers range from fine- to coarse-grained and are locally cross-bedded. In outcrops, the sand layers weather to a variety of colors, some distinctly mottled. In some exposures, beds of sand contain gravel and plant fossils, and clays contain carbonized leaf remains (Gillett, Raymond, Moore, and Tew, 1999). In the remaining portions of the Southern Pine Hills District (Choctaw, Clarke, Conecuh, Covington, Escambia, Monroe, and Washington Counties), the Miocene Series consists of medium- to coarse-grained gravelly sand, fine-grained micaceous silty sand, mottled sandy clay, and fine-grained silty sandstone (Castleberry, Moreland, and Scott, 1989). The thickness of the Miocene sediments throughout the Southern Pine Hills District range from 50 feet in updip areas to 3,400 feet in the subsurface in southern Mobile County.

The Citronelle Formation of Pliocene age overlies the Miocene Series, undifferentiated. The Citronelle sediments consist of nonfossiliferous moderate-reddish-brown fine to very coarse quartz sand; light-gray, orange, and brown sandy clay; and clayey gravel of nonmarine origin (Reed, 1971a,b; Szabo and Copeland, 1988). In many areas, lenses of sandy clay and clayey sand, which range in thickness from 5 to 15 feet, are interbedded with gravelly sand (Gillett, Raymond, Moore, and Tew, 1999). Throughout the Southern Pine Hills District, the Citronelle ranges in thickness between 5 to 200 feet.

The Miocene Series, undifferentiated, and the Citronelle Formation has been combined to form the Miocene-Pliocene Aquifer. Other formations included in the Miocene-Pliocene Aquifer in Clarke, Choctaw and Washington Counties are the Paynes Hammock Sand, the Chickasawhay Limestone and the relatively impermeable Bucatunna Clay member of the Oligocene Byram Formaton. The Bucatunna Clay hydraulically separates the overlying Miocene-Pliocene Aquifer from the underlying Crystal River Aquifer (Raymond, Gillett, and Moore, 1999, unpublished). Groundwater in the Miocene-Pliocene Aquifer flows through sand and gravel beds that are irregular in thickness and of limited lateral extent. The clay intervals between the sand units should be considered aquitards because the clays are not laterally extensive enough to prevent downward movement of ground water, but they do provide semi-confinement to many of the deeper sand and gravel intervals. The Miocene-Pliocene Aquifer is considered a significant source of potable water throughout the Southern Pine Hills District. It is the sole source of potable water for many towns such as: Robertsdale, Fairview, Atmore, Frisco City, Excel, Uriah, Husford, Pollard, Flomaton, Freemanville, Canoe, Kushla, and for the rural areas under the South Alabama Water System Authority. Substantial quantities of ground water from the Miocene-Pliocene Aquifer are also used for domestic potable supplies, industrial supplies, irrigation, and agricultural use. Wells properly constructed in the Miocene-Pliocene Aquifer yield from 0.5 to 2.5 million gallons per day (MGD).

High terrace deposits unconformably overlie Miocene Sediments in the northeastern part of Mobile County and in many parts of Baldwin County. The high terrace deposits are adjacent to

the Mobile River flood plain and range in thickness from 0 to 50 feet with an average thickness of 15 to 30 feet. In other portions of the Southern Pine Hills District the high terrace deposits were not differentiated, but were mapped as part of the Quaternary alluvial, coastal, and deltaic plains. The deposits consist primarily of sandy clay, fine to coarse sand, and sand containing gravel in some places. The high terrace deposits in Mobile and Baldwin Counties are considered part of the Watercourse Aquifer, which also includes the Quaternary alluvial and coastal deposits. Wells constructed in the Watercourse Aquifer have the potential to yield from 0.5 to 1.0 MGD. The Watercourse Aquifer is hydraulically connected to the underlying Miocene-Pliocene Aquifer. The sand and gravel beds in the Watercourse Aquifer and those at shallow depths in the Miocene-Pliocene Aquifer are also hydraulically connected to the land surface. Public water supply systems that have wells completed in the Watercourse Aquifer include Mt. Vernon, Saraland, Satsuma and Dauphin Island. (Gillett, Raymond, Moore, and Tew, 1999)

Several extensive structural features extend through the northern portions of the Southern Pine Hills District. These structures include the Jackson fault, which trends north-northwestward through southwestern Clarke County; the McIntosh Salt dome and Chatom domes in Washington County; and several other extensive faults in Clarke County. Vertical displacement along the Jackson fault is as much as 1,400 feet. These structures influence the occurrence and movement of ground water in a large part of the area.

General Statement of Ground Water Quality and Vulnerability

The Miocene-Pliocene Aquifer is generally of suitable quality for most uses. The ground water is generally soft with a dissolved solids content of less than 75 mg/L. Locally, however, the iron content may exceed 0.3 mg/L, but occur most commonly in areas adjacent to major waterways. Some wells tapping the Miocene-Pliocene Aquifer also yield water that is sufficiently acidic to be corrosive. Salt-water encroachment is a significant problem along the coast in the Watercourse and Miocene-Pliocene aquifers. Likewise, salt seeps also occur at the surface in parts of northern Washington County and in southern Clarke County. Several abandoned salt works are present along the eastern edge of the Tombigbee River and adjacent to the Jackson Fault (Raymond, Gillett, and Moore, 1999, unpublished). The total dissolved solids content of water from wells in this area exceeds 20,000 mg/L Ground water in the high terrace deposits is soft and locally contains iron in excess of 0.3 mg/L (Gillett, Raymond, Moore, and Tew, 1999).

Part III: Lake Water Quality Assessment

A. Background

Section 314 (a) (2) of the Clean Water Act, as amended by the Water Quality Act of 1987, requires states to conduct assessments of publicly-owned lake water quality and report the findings as part of the biennial §305(b) Water Quality Report to Congress. The assessment process is conducted through the use of federal and matching funding, including that available pursuant to Sections 106 and 319 of the Act.

The Department has defined publicly-owned lakes/reservoirs as those that are of a multiple-use nature, publicly accessible, and exhibit physical/chemical characteristics typical of impounded waters. Lakes designated strictly for public water supply, privately owned lakes, or lakes managed by the Alabama Department of Conservation and Natural Resources (ADCNR) strictly for fish production are not included in this definition. Lakes currently meeting the above definition are included in the tables that follow.

In 1985, the need for information on the trophic state of Alabama's publicly-owned lakes led to the initial survey, conducted by the ADEM with the assistance of the U.S. Environmental Protection Agency Region IV. During the survey, limited baseline data was collected and used to rank the lakes according to trophic condition.

In 1989, Clean Lakes Program funds enabled the ADEM to conduct required water quality assessments of thirty-four (34) publicly-owned lakes in the State and submit collected information as part of the **1990 Water Quality Report to Congress**. Trophic state index (TSI) values calculated from data gathered for the water quality assessments indicated potentially significant increases when compared to the TSI values derived from the study conducted in 1985.

In 1990, the Reservoir Water Quality Monitoring (RWQM) Program was initiated by the Field Operations Division of ADEM. Objectives of the program are as follows:

a) to develop an adequate water quality database for all publicly-owned lakes in the State;

b) to establish trends in lake trophic status that can only be established through long-term monitoring efforts; and,

c) to satisfy the requirement of Section 314(a)(1) of the Water Quality Act of 1987 that states conduct assessments of the water quality of publicly-owned lakes and report the findings as part of their biennial "Water Quality Report to Congress".

Acquiring this information enables the ADEM to determine lake water quality and identify lakes in which water quality may be deteriorating. Should a deterioration in water quality be indicated by collected data, more intensive study of the lake can be instituted to establish the causes and extent of the deterioration.

From 1990-1992, thirty-one publicly-owned lakes in the State were monitored at least once. Lakes indicated to be use-threatened or impaired from previously collected data were monitored annually. Additional funding received in 1991 through the Clean Lakes Program allowed the expansion of the Program to include all of the thirty-two (32) publicly-owned lakes in the State, with the exception of those in the Tenessee River

system. These reservoirs are monitored through the TVA Reservoir Vital Signs Program.

Beginning in 1994, the frequency of reservoir monitoring in the RWQM Program was increased to a minimum of once every two years so that the water quality database and trends in trophic status could be more rapidly developed. Lakes indicated to be use-threatened or impaired continued to be monitored annually. Realignment of the reservoir sampling schedule was also initiated in 1994 so that reservoir sampling by basin could be instituted.

In 1997, intensive monitoring of reservoirs by basin was initiated, with spring season sampling for the RWQM Program discontinued to allow allocation of resources toward this effort. Intensive monitoring consists of monthly sampling of multiple stations in each reservoir from April-October. Reservoirs intensively monitored to date are as follows:

a) Coosa and Tallapoosa River Basin reservoirs, 1997;

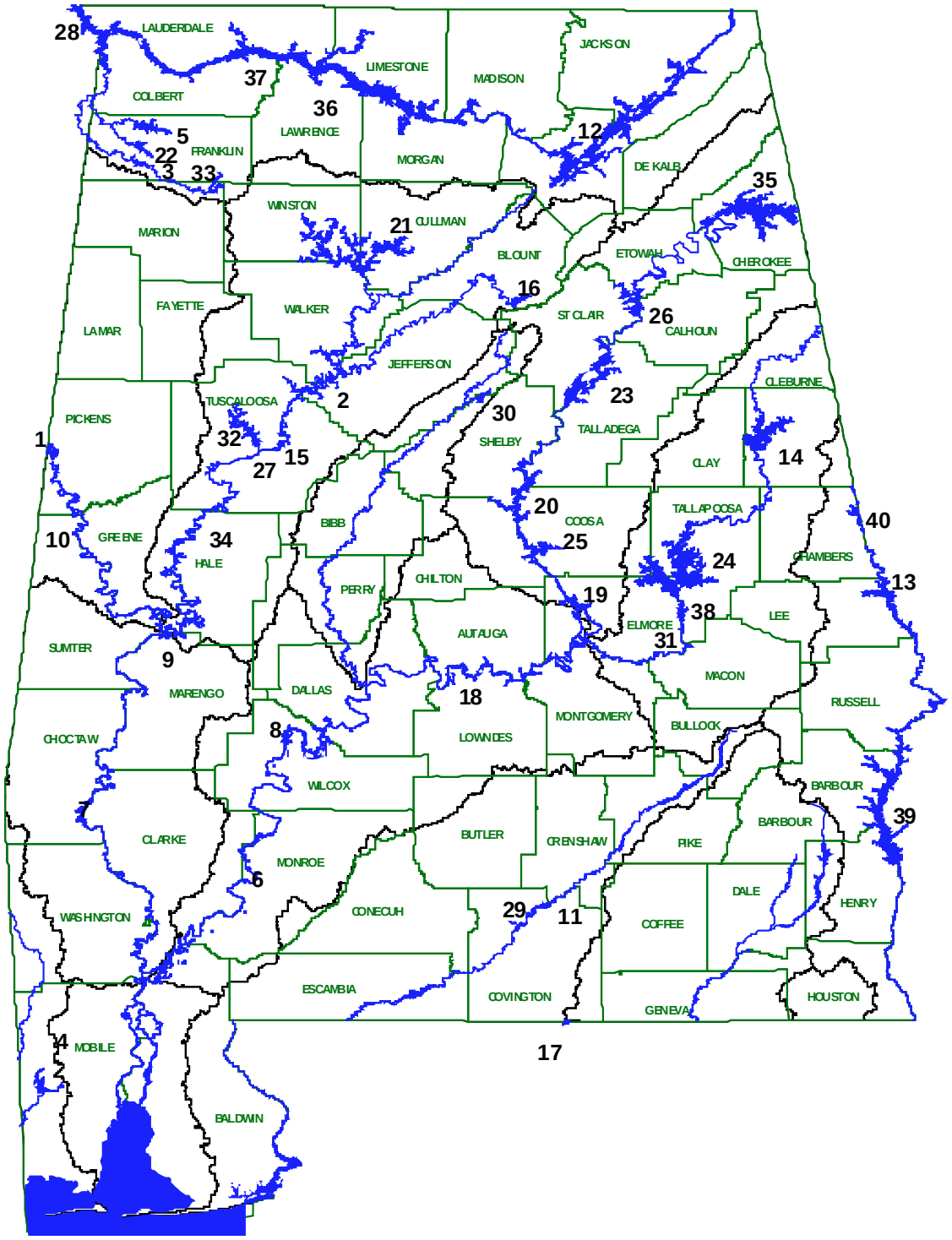
b) Black Warrior River Basin reservoirs, 1998;

c) Chattahoochee and Conecuh River Basin reservoirs, 1999; and,

d) Coosa, Tallapoosa, and Alabama River Basin reservoirs, to be conducted in 2000.

Initiated in 1989, water quality monitoring of lakes of the Tennessee River system continues through the Tennessee Valley Authority (TVA) Reservoir Vital Signs Monitoring Program. The Program provides results of its monitoring activities to the ADEM on an annual basis through Program reports. Activities of the Program are based on the examination of appropriate physical, chemical, and biological indicators in the forebay, mid-region, and headwater areas of each lake. Objectives of the Program are to provide basic information on the “health” or integrity of the aquatic ecosystem in each TVA lake and to provide screening level information describing how well each reservoir meets the “fishable” and “swimmable” goals of the Clean Water Act.

Figure 3-1
Publicly Accessible Reservoirs of Alabama



1) Aliceville
2) Bankhead
3) Bear Creek
4) Big Creek
5) Cedar Creek
6) Claiborne
7) Coffeeville
8) Dannelly
9) Demopolis
10) Gainesville
11) Gantt
12) Guntersville
13) Harding
14) Harris
15) Holt
16) Inland
17) Jackson
18) Jones Bluff
19) Jordan
20) Lay
21) Lewis Smith
22) Little Bear Creek
23) Logan-Martin
24) Martin
25) Mitchell
26) Neely Henry
27) Oliver
28) Pickwick
29) Point A
30) Purdy
31) Thurlow
32) Tuscaloosa
33) Upper Bear Creek
34) Warrior
35) Weiss
36) Wheeler
37) Wilson
38) Yates
39) W. F. George
40) West Point

Table 3-1
Overall Use Support Summary for Lakes and Reservoirs (acres)

Degree of Use Support	Assessment Category		
	Monitored	Evaluated	Total Assessed
Size Fully Supporting	200,216	17,215	217,431
Size Fully Supporting but Threatened	131,587	0	131,587
Size Partially Supporting	67,990	9,580	77,570
Size Not Supporting	36,638	1,585	38,223
TOTAL ASSESSED	436,431	28,380	464,811

B. Trophic Status

In the RWQM Program, the ADEM uses Carlson's trophic state index (TSI) for determination of the trophic state of Alabama lakes. Carlson suggests the use of chlorophyll a concentrations in calculations of the trophic state of lakes during the summer months. Using chlorophyll a concentrations to determine trophic state is considered to give the best estimate of the biotic response of lakes to nutrient enrichment when phytoplankton is the dominant plant community.

Carlson's TSI provides the limnologist and the public with a single number that serves as an indicator of trophic status of a lake but does not necessarily define it. 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).

The number and surface area of lakes for each trophic classification appear in Tables 3-2, which was developed using current monitoring data. Upper and lower portions of both Martin and Tuscaloosa Reservoirs differ in trophic state, with the upper portions eutrophic and the lower portions mesotrophic. These reservoirs were counted in both trophic classifications and the acreage of each divided between the two classifications.

A trophic state ranking of Alabama lakes appears in Table 3-3. The ranking was derived by calculating the mean of all dam forebay values from 1985 to present and may not reflect the current trophic state of the lake.

Table 3-2
Trophic Status of Significant Publicly Owned Lakes

	Number of Lakes	Acreage of Lakes
Total	40	485,846
Assessed	32	277,236
Oligotrophic	1	585
Mesotrophic	7	49,350
Eutrophic	26	227,301
Hypereutrophic	0	0
Dystrophic	0	0
Unknown	8	208,610

C. Control Methods

The ADEM has not defined control methods specifically for lakes. Instead, the pollution controls of ADEM's Point Source Program (NPDES permitting) and the Nonpoint Source Program are applicable for all of the State's surface waters.

D. Restoration Efforts

Water quality data collected by the RWQM Program enabled the ADEM to determine lakes in need of Clean Lakes Program Phase I Diagnostic/Feasibility Studies. A list of the Clean Lakes Program Projects of Alabama appears in Table 3-4.

The final report of the Phase I Diagnostic/Feasibility Study of Lewis Smith Reservoir was completed in 1998. Objectives of the study were as follows:

1. to determine current water quality conditions of Smith Lake and several of its important tributary streams and embayments;
2. to measure nutrient and sediment loading from five (5) tributaries;
3. to determine the land use and land cover in a large portion of the watershed; and
4. to estimate point and nonpoint source loading of Smith Lake.

Table 3-3
Trophic State of Alabama Reservoirs*

Trophic State Designation	Reservoir	River Basin	Trophic State Index Value
Eutrophic	Weiss	Coosa	64
	Neely Henry	Coosa	63
	Logan Martin	Coosa	59
	Lay	Coosa	59
	Mitchell	Coosa	58
	Woodruff	Alabama	57
	Aliceville	Tombigbee	57
	Purdy	Cahaba	56
	Dannelly	Alabama	56
	W.F. George	Chattahoochee	55
	Jordan	Coosa	55
	Gainesville	Tombigbee	54
	Coffeeville	Tombigbee	53
	Warrior	Warrior	53
	Claiborne	Alabama	53
	Harding	Chattahoochee	53
	West Point	Chattahoochee	52
	Demopolis	Tombigbee	52
	Big Creek	Escatawpa	51
	Bankhead	Warrior	51
	Holt	Warrior	51
	Oliver	Warrior	51
Mesotrophic	Point A	Conecuh	49
	Harris	Tallapoosa	47
	Gantt	Conecuh	44
	Yates	Tallapoosa	44
	Smith	Warrior	42
	Martin	Tallapoosa	40
	Jackson	Yellow	40
	Tuscaloosa	Warrior	40
Oligotrophic	Inland	Warrior	35
	Thurlow	Tallapoosa	34

*Mean values (1985-present) from dam forebay stations during August/September. Mean values may not reflect a lakes current trophic state.
Hypereutrophic > 70
Eutrophic 50-69
Oligotrophic < 40
Mesotrophic 40-49

Table 3-4
List of Clean Lakes Program Projects

Name of Project	Type of Project	Federal Funding ($)	Problems Addressed	Management Measures Proposed or Undertaken
West Point Reservoir	Phase I	100,000		See Report
W.F. George	Phase I	70,000		See Report
Neely Henry	Phase I	92,000		See Report
Weiss Reservoir	Phase I	142,583		See Report
Smith Reservoir	Phase I	93,000		See Report

All Clean Lakes Program Phase I Diagnostic/Feasibility Studies were conducted through cooperative agreements between ADEM and Auburn University.

E. Impaired and Threatened Lakes

Summary information on overall use support for Alabama lakes appears in Table 3-1. Summary information on support of individual uses of lakes appears in Table 3-12. Cause categories for lake waters not fully supporting uses and for lake waters considered threatened appear in Tables 3-5 and 3-6. Source categories for lake waters not fully supporting uses appear in Table 3-8. Use support status of individual lakes appears in Table 3-7. In all the tables, surface acres listed as threatened refer to those waters that fully support their designated uses but may not fully support uses in the future because of anticipated sources or adverse pollution trends.

Water quality data collected by the RWQM Program, Clean Lakes Program Phase I Studies, TVA Reservoir Monitoring Program, and ADEM intensive reservoir surveys were used for determination of use support status. Available data from each reservoir was examined for repeated violations of specific water quality criteria established by the ADEM and evaluated with adherence to the **Guidelines For Preparation of the State Water Quality Assessments (305(b) Reports)**. Waters affected by health advisories related to fish consumption were determined to be either partially supporting or not supporting. This determination was dependent upon whether advisories specified limited consumption or no consumption of a particular species as directed in the guidelines mentioned above.

TVA assessed 187,575 acres of reservoirs for three (3) uses: aquatic life, fish consumption, and recreation. Limits on recreation use are due to historic pollution problems; urban runoff, discharges, and/or agricultural runoff. Mine drainage impacts aquatic life in Bear Creek, Little Bear Creek, and Upper Bear Creek Reservoirs. Hypolimnetic oxygen depletion affects all four (4) reservoirs in the Bear Creek Watershed and the Elk River Embayment of Wheeler Reservoir. Fish kills occurred in Wilson and Wheeler Reservoirs from agricultural use of pesticides.

F. Toxic Effects on Lakes

Lake-specific monitoring information for toxic pollutants is limited. Point source control efforts are directed at the source of toxic pollutants through NPDES permitting programs. Total lake acres affected by toxicants appear in Table 3-14. Lake acreage monitored for toxicants consists of lakes for which fish have been collected and analyzed through the ADEM Fish Tissue Monitoring Program and the TVA Reservoir Program. Lake acreage with elevated levels of toxicants consists of lake areas upon which health advisories have been instituted that relate to consumption of fish contaminated with certain priority pollutants.

Fish will continue to be collected from major lakes, rivers, and certain waterbodies of concern and analyzed for toxic pollutants as part of the ADEM Fish Tissue Monitoring Program. Fish tissue sampling results are contained in the Fish Tissue Monitoring section of Part V Public Health Information.

G. Acid Effects on Lakes

The number and acreage of lakes affected by acidity appear in Table 3-9. The number and acreage of lakes affected by sources of high acidity appear in Table 3-10. No reservoirs monitored by the ADEM have been determined to be impacted by high acidity based on data collected through the RWQM Program. However, the following reservoirs are considered vulnerable to acidity based on low alkalinities and pH values observed in monitoring data that were near limits of specific ADEM water quality criteria: Big Creek; Inland; Jackson; Point A; Smith; and Tuscaloosa. Low pH values measured in Big Creek, Jackson, and Point A Reservoirs are determined to be of natural origin and are considered unlikely to cause adverse impacts. In the case of both Smith and Tuscaloosa Reservoirs, mining activities in the watershed were also considered in determining the vulnerability of the reservoirs to acid effects.

According to information supplied by the TVA, mine drainage impacts aquatic life in the Bear Creek, Little Bear Creek, and Upper Bear Creek Reservoirs of the Tennessee River Basin.

H. Trends

Trend information is included in Table 3-11. Trends were determined by reviewing three (3) or more years of water quality data from each reservoir during the period from 1985 to 1997.

The trend of West Point Reservoir is considered to be improving based on data collected through Phase I Studies of the lake and the RWQM Program.

Assignment of a particular reservoir to the “Stable” category does not necessarily indicate desirable water quality but only that the water quality appears stable. Though highly eutrophic, Weiss Reservoir has not exhibited recent increases in trophic state as have lower reservoirs of the Coosa River basin.

Reservoirs considered to be degrading were those that exhibited either increases in trophic state, increases in nutrient concentrations, institution of fish tissue consumption advisories, infestation of filamentous blue-green algal species, violations of ADEM water quality criteria, or a combination of these factors. Reservoirs considered to be degrading include:

a) Neely Henry
b) Logan Martin
c) Lay
d) Mitchell
e) Jordan
f) Harris
g) Martin
h) Gantt
i) Aliceville
j) Gainesville
k) Demopolis

Future data collection is critical in further establishing trends in water quality of these and other reservoirs in the State.

Table 3-5
Total Sizes of Waters Not Fully Supporting Uses by Various Cause Categories for Lakes and Reservoirs (acres)

Cause Category	Size of Waters by Contribution to Impairment	
	Major	**Moderate/Minor**
Cause Unknown	21,525	
Pesticides	4,770	
Priority organics	57,463	
Nonpriority organics		
Metals		1,850
Ammonia		
Chlorine		
Other inorganics		
Nutrients	6,085	
pH		1,850
Siltation	60	
Organic enrichment/low DO	24,285	0
Salinity/TDS/chlorides		
Thermal modifications		
Flow alterations		
Other habitat alterations		
Pathogen indicators	15,155	
Radiation		
Oil and grease		
Taste and order		
Suspended solids		
Noxious aquatic plants		
Filling and draining		
Total toxics		
Turbidity		
Filling and draining		
Exotic species		
Other		

Table 3-6
Total Sizes of Waters Fully Supporting but Threatened by Various Cause Categories for Lakes and Reservoirs (acres)

	Size of Waters by Contribution to Impairment	
Cause Category	**Major**	**Moderate/Minor**
Cause Unknown		
Pesticides		
Priority organics	12,650	
Nonpriority organics		
Metals		
Ammonia		
Chlorine		
Other inorganics		
Nutrients	83,648	
pH		
Siltation		
Organic enrichment/low DO	101,802	
Salinity/TDS/chlorides		
Thermal modifications		
Flow alterations		
Other habitat alterations		
Pathogen indicators		
Radiation		
Oil and grease		
Taste and order		
Suspended solids		
Noxious aquatic plants	18,800	
Filling and draining		
Total toxics		
Turbidity		
Filling and draining		
Exotic species		
Other		

Table 3-7
Individual Use Support Summary for Lakes and Reservoirs (acres)

Use	Size Supporting	Size Supporting but Threatened	Size Partially Supporting	Size Not Supporting	Size Not Attainable	Size Unassessed
Fish Consumption	391,952	12,650	30,200	30,013	0	0
Shellfishing	N/A	N/A	N/A	N/A	N/A	N/A
Aquatic Life Support	243,141	179,054	41,010	8,010	0	0
Swimming and Secondary Contact	318,593	82,955	16,955	200	0	0
Drinking Water Supply	25,093	50,971	0	0	0	0
Agriculture	0	0	0	0	0	0
Outstanding Alabama Water	0	0	0	0	0	0

Table 3-8
Total Sizes of Waters Not Fully Supporting Uses Affected by Various Source Categories for Lakes and Reservoirs (acres)

Source Category	Contribution to Impairment	
	Major	Moderate/Minor
Industrial Point Sources	60,443	
Municipal Point Sources	60	750
Combined Sewer Overflows		85
Agriculture	3,155	200
Silviculture		
Construction	0	
Urban Runoff/Storm Sewers	350	2,110
Resource Extraction	1,850	1,960
Land Disposal		
Hydromodification/Habitat Modification		10,250
Contaminated Sediments	8,000	
Atmospheric Deposition		
Unknown Source	39,785	0
Other (Natural Sources)	6,025	
Other (Wildlife)	11,080	2,250

Table 3-9
Lakes Affected By Acidity

	Number of Lakes	Acreage of Lakes
Assessed for Acidity	40	485,046
Impacted by High Acidity	1	1850
Vulnerable to Acidity	6	32,930

Table 3-10
Sources of High Acidity in Lakes and Reservoirs

Source	Number of Lakes Impacted	Acreage of Lakes Impacted
Acid Deposition	0	0
Acid Mine Drainage	1	1850
Natural Sources	0	0
Other (list)	0	0

Table 3-11
Status of Trends for Lakes and Reservoirs

	Number of Lakes	Acreage of Lakes
Assessed for Trends	40	464,811
Improving	1	2,300
Stable	15	126,996
Degrading	11	128,275
Trend Unknown	13	207,240

Table 3-12
Use Support for Individual Lakes and Reservoirs (acres)

River Basin	Reservoir	Use	Concern[1]	Supports	Supports But Threatened	Partially Supports	Non Support
Alabama	Woodruff	Aquatic Life	None	12,510			
		Rec.	None	8,132			
		Fish Consum.	None	12,510			
	Dannelly	Aquatic Life	Trophic state Nutrients	17,200			
		Rec.	Trophic state Nutrients	13,800			
		Fish Consum.	None	17,200			
	Claiborne	Water Supply	None	904			
		Aquatic Life	D.O.	3,936			
		Rec.	D.O.	2,624			
		Fish Consum.	None	3,936			
Black Warrior	Lewis Smith	Water Supply	Trophic state Mining	1,344			
		Aquatic Life	Trophic state Mining	21,200			
		Rec.	Trophic state Mining	21,200			
		Fish Consum.	Metals	21,200			
	Tuscaloosa	Water Supply	Trophic state		5,885		
		Aquatic Life	Trophic state Mining		5,885		
		Rec.	Trophic state	5,885			
		Fish Consum.	None	5,885			

Table 3-12 (cont.)

River Basin	Reservoir	Use	Concern[1]	Supports	Supports But Threatened	Partially Supports	Non Support
Black Warrior	Inland	Water Supply	None	1,095			
		Aquatic Life	None	1,095			
		Rec.	None	1,095			
		Fish Consum.	None	1,095			
	Bankhead	Water Supply	Trophic state Mining	9,345			
		Aquatic Life	Trophic state Mining		9,345		
		Rec.	Trophic state Mining	9,345			
		Fish Consum.	None	9,345			
	Holt	Aquatic Life	Trophic state Mining	3,300			
		Rec.	Trophic state Mining	3,300			
		Fish Consum.	None	3,300			
	Oliver	Aquatic Life	Nutrients		800		
		Fish Consum.	None	800			
	Warrior	Aquatic Life	Trophic state Mining		7,800		
		Fish Consum.	None	7,800			
Cahaba	Purdy	Water Supply	Trophic state Nutrients		1,050		
		Aquatic Life	Trophic state Nutrients		1,050		
		Rec.	Trophic state Nutrients		1,050		
		Fish Consum.	None	1,050			

Table 3-12 (cont.)

River Basin	Reservoir	Use	Concern[1]	Supports	Supports But Threatened	Partially Supports	Non Support
Chattahoochee	West Point	Aquatic Life	Trophic state Nutrients		2,304		
		Rec.	Trophic state Nutrients		2,304		
		Fish Consum.	None	2,304			
	Lake Harding	Water Supply	None	2,176			
		Aquatic Life	None	2,176			
		Rec.	None	2,176			
		Fish Consum.	None	2,176			
	W. F. George	Aquatic Life	Trophic state Nutrients	12,527			
		Rec.	Trophic state Nutrients	12,352			
		Fish Consum.	None	12,527			
Perdido-Escambia	Gantt	Aquatic Life	Trophic state Nutrients		2,767		
		Fish Consum.	None	2,767			
	Point A	Aquatic Life	None	900			
		Rec.	None	900			
		Fish Consum.	None	900			
Coosa	Weiss	Water Supply	Trophic state Nutrients		21,129		
		Aquatic Life	Trophic state Nutrients		30,200		
		Rec.	Trophic state Nutrients		30,200		
		Fish Consum.	PCB			30,200	

Table 3-12 (cont.)

River Basin	Reservoir	Use	Concern[1]	Supports	Supports But Threatened	Partially Supports	Non Support
Coosa	Neely Henry	Water Supply	Nutrients Trophic state		2,145		
		Aquatic Life	Nutrients Trophic state		11,235		
		Rec.	Nutrients Trophic state		9,335		
		Fish Consum.	PCB	11,235			
	Logan Martin	Aquatic Life	Nutrients Trophic state		15,263		
		Rec.	Nutrients Trophic state		15,263		
		Fish Consum.	PCB				15,263
	Lay	Water Supply	Nutrients Trophic state		11,142		
		Aquatic Life	Nutrients Trophic state Algae		12,000		
		Rec.	Nutrients Trophic state Algae		10,380		
		Fish Consum.	PCB				12,000
	Mitchell	Water Supply	Nutrients Trophic state		5,850		
		Aquatic Life	Nutrients Trophic state		5,850		
		Rec.	Nutrients Trophic state		5,850		
		Fish Consum.	Upstream advisory		5,850		
	Jordan	Aquatic Life	Nutrients Trophic state Algae		6,800		
		Rec.	Nutrients Trophic state Algae		6,800		
		Fish Consum.	Upstream advisory		6,800		

Table 3-12 (cont.)

River Basin	Reservoir	Use	Concern[1]	Supports	Supports But Threatened	Partially Supports	Non Support
Escatawpa	Big Creek	Water Supply	Trophic state		3,600		
		Aquatic Life	Trophic state		3,600		
		Fish Consum.	None	3,600			
Tallapoosa	Harris	Aquatic Life	Trophic state		10,660		
		Fish Consum.	None	10,660			
	Martin	Water Supply	Nutrients Trophic state	1,920			
		Aquatic Life	Nutrients Trophic state		39,000		
		Rec.	Nutrients Trophic state	39,000			
		Fish Consum.	None	39,000			
	Yates	Water Supply	Tributary water quality	1,980			
		Aquatic Life	Tributary water quality	1,980			
		Rec.	Tributary water quality	1,980			
		Fish Consum.	None	1,980			
	Thurlow	Water Supply	None	585			
		Aquatic Life	None	585			
		Rec.	None	585			
		Fish Consum.	None	585			
Tennessee	Guntersville	Aquatic Life	---	66,365			
		Rec.	Pathogens	62,755		3,610	
		Fish Consum.	---	66,365			

Table 3-12 (cont.)

River Basin	Reservoir	Use	Concern[1]	Supports	Supports But Threatened	Partially Supports	Non Support
Tennessee	Wheeler	Aquatic Life	Pesticides Nutrients D.O.	42,550		24,550	
		Rec.	Pathogens	56,545		10,555	
		Fish Consum.	Pesticides	64,350			2,750
	Wilson	Aquatic Life	Pesticides D.O.	5,250		10,250	
		Rec.	Pathogens	40			
		Fish Consum.		15,500			
	Pickwick	Aquatic Life	Unknown	24,450		6,150	
		Rec.	Pathogens	27,650		2,750	200
		Fish Consum.		30,660			
	Upper Bear Creek	Aquatic Life	D.O. Metals pH				1,850
		Rec.		1,850			
		Fish Consum.		1,850			
	Bear Creek	Aquatic Life	D.O.				400
		Rec.		400			
		Fish Consum.		400			
	Little Bear Creek	Aquatic Life	D.O.				1,560
		Rec.		1,560			
		Fish Consum.		1,560			
	Cedar Creek	Aquatic Life	D.O.				4,200
		Rec.		4,200			
		Fish Consum.		4,200			

Table 3-12 (cont.)

River Basin	Reservoir	Use	Concern[1]	Supports	Supports But Threatened	Partially Supports	Non Support
Tombigbee	Aliceville	Aquatic Life	Trophic state		8,300		
		Rec.	Trophic state	8,300			
		Fish Consum.	None	8,300			
	Gainesville	Aquatic Life	Trophic state		6,400		
		Rec.	Trophic state	6,400			
		Fish Consum.	None	6,400			
	Demopolis	Aquatic Life	Trophic state		10,000		
		Rec.	Trophic state	10,000			
		Fish Consum.	None	10,000			
	Coffeeville	Aquatic Life	Trophic state	8,500			
		Fish Consum.	None	8,500			
Yellow	Lake Jackson	Aquatic Life	None	256			
		Rec.	None	256			
		Fish Consum.	None	256			

1. Concern : D.O. = Dissolved Oxygen

Table 3-13
State Owned and Operated Public Fishing Lakes

County	County Fishing Lakes	Acres	County	County Fishing Lakes	Acres
Barbour Co.	Barbour Co. Lake	75	Fayette Co.	Fayette Co. Lake	60
Bibb Co.	Bibb Co. Lake	100	Geneva Co.	Geneva Co. Lakes	65
Chambers Co.	Chambers Co. Lake	183	Lamar Co.	Lamar Co. Lake	68
Clay Co.	Clay Co. Lakes	74	Lee Co.	Lee Co. Lake	130
Coffee Co.	Coffee Co. Lake	80	Madison Co.	Madison Co. Lake	105
Crenshaw Co.	Crenshaw Co. Lake	53	Marion Co.	Marion Co. Lake	37
Dale Co.	Dale Co. Lake	92	Monroe Co.	Monroe Co. Lake	94
Dallas Co.	Dallas Co. Lake	100	Pike Co.	Pike Co. Lake	45
DeKalb Co.	DeKalb Co. Lake	120	Walker Co.	Walker Co. Lake	163
Escambia Co.	Escambia Co. Lake	184	Washington	Washington Co. Lake	84
Totals				**20 State Fishing Lakes**	**1,061**

Table 3-14
Total Reservoir Size Affected by Toxicants

Waterbody	Size Monitored for Toxicants	Size with Elevated Levels of Toxicants
Lakes (acres)	464,811	60,213

Part IV: The Nonpoint Source Management Program

Overview

The 1989 Alabama Nonpoint Source Management Program document provided a good foundation to address nonpoint source (NPS) pollution. However, since 1989, statewide management efforts have greatly expanded in scope in order to adapt to new Section 319 NPS grant guidance directives, as new data and information emerged, and as additional priorities and needs were/are identified. In addition, new resources have been identified; innovative technologies have been produced and/or implemented; new and varied stakeholders have been identified; many partnerships have been formed; various regulatory and non-regulatory efforts have been instituted; and new local, statewide, and holistic watershed protection strategies, plans, and programs have been instituted.

As Alabama's population continues to grow, societal demands on its water resources continue to grow. To address this changing need, the 1989 Alabama NPS Management Program is being updated/revised. The document enhances statewide efforts to bring together statewide NPS stakeholder expertise, management measures and resources, i.e., for all stakeholders to cooperatively "work off the same page." The updated document continues to build on the outdated 1989 management program framework utilizing a flexible, targeted, iterative, broad-based statewide and watershed approach to protect natural resources and prevent and/or remediate NPS pollution impacts.

For the purposes of this CWA Section 305(b) Water Quality Report to Congress, reference to nonpoint source programs and management efforts should be directed to the updated/revised Alabama NPS Management Program document (Draft Jan. 1999; Final July 2000, est.). The document provides a compilation of federal, State, and local programs and resources; strategies, goals, and objectives; funding assistance; assessment information; and new/innovative technologies and best management practices needed to produce measurable water quality improvements and beneficial environmental results. It includes a mix of water quality based and technology based programs, and a combination of regulatory, non-regulatory, financial and technical assistance programs needed to achieve and maintain beneficial uses of surface and groundwater as expeditiously as possible. The program also incorporates coastal NPS stakeholders and efforts related to and including the *Coastal Zone Act Reauthorization Amendment (CZARA),* the *Weeks Bay National Estuary Program (NEP) Management Plan,* and *Clean Water Action Plan* elements.

Alabama has received annual CWA Section 319(h) grant appropriations since 1990 to demonstrate a variety of NPS demonstration projects that target a wide range of NPS problems. During the period 1990-2000, Alabama received approximately $14.5 M of annual CWA Section 319(h) federal grant appropriations to fund a variety of NPS pollution control demonstration projects. Approximately 135 individual cooperative agreements have been funded since 1990 to address NPS pollution. Alabama consistently ranks 4th in the total amount of Section 319(h) grant funds appropriated by Congress to EPA Region IV states. Section 319 funding is used as "seed" money to "kick-start' efficient and cost-effective NPS management measures. Stakeholders are encouraged to institutionalize local efforts by seeking State and local sources of support to address long-term watershed protection and project implementation.

Table 4-1 Nonpoint Source Grant Allocations

Section 319	1990	1991	1992	1993	1994	1995	1996[a]	1997	1998	1999	2000
Clean Water Action Plan										1.95	1.94[c]
Federal ($ M)	0.76	0.61	0.84	1.13	1.46	3.04[b]	2.06	1.95	2.05	1.95	1.94[c]
Non-federal ($ M)	.57	.79	.96	1.0	1.0	2.6	1.4	1.7	1.4	2.6	2.6

[a]Includes an additional appropriation of $110 K above baseline
[b]Includes $775 K federal funds for a the 7-year duration Lightwood-Knot Creek Watershed National NPS Best Management Practice Monitoring Project (Covington County).
[c]Reduced from FY99 due to increase of Tribal allocations nationally

a. Management Program Document Update/Revision

The updated/revised Alabama NPS Management Program document, in addition to NPS Assessment Reports, will be used by resource agencies, interest groups, and citizens as a statewide guide for developing, coordinating, and implementing NPS pollution control programs, acknowledging and assessing the programs of others, and for developing projects and selecting implementation project sites for Section 319 and other federal and State cost-share funding. The updated/revised management program document enhances the 1989 NPS Management Program and is composed of two parts. Part I contains general information and ***non-specific*** EPA NPS categories and subcategories and implementation goals and objectives to address them. Part II addresses ***specific*** EPA NPS categories and subcategories, and implementation goals and objectives to address them.

The draft management program document is available for inspection/download on ADEM's Webpage at http://www.adem.state.al.us. The final document, upon approval by EPA (est. July 2000), will also be made available on the ADEM Webpage in order to provide real time public access opportunities for continuous public input and comments. In addition, hard copies *may* be available from, or stakeholders may direct comments to, the ADEM NPS Unit at Telephone 334-394-4354; fax 334-271-7950; and/or e-mail nb@adem.state.al.us.

b. Nonpoint Source Management Program - Nine Key Elements

The 1987 Clean Water Action Plan, EPA memorandums, and Section 319 grant guidances promote incorporation of EPA's "Nine Key Elements" (**see "Table 4-2" below**) as a cornerstone in the development, revision/approval process, and implementation of NPS management programs.

The Alabama NPS Management Program document (Draft submitted 01/15/00 to EPA) incorporates the "Nine Key Elements" in order to more effectively and efficiently control, prevent, and/or remediate sources of polluted runoff. The Final approved document will be dynamic and is expected to be continually revised/updated as new NPS problems are identified and as priority needs emerge. In addition, instead of the whole management program document being updated every 5 years or so, individual "chapters" will be re-visited on a rotating basis and updated using much stakeholder input.

Table 4-2 Nine Key Elements

1.	Explicit short-and long-term goals, objectives and strategies to protect surface and ground water.
2.	Strong working partnerships and collaboration with appropriate State, interstate, Tribal, regional, and local entities (including conservation districts), private sector groups, citizen groups, and federal agencies.
3.	A balanced approach that emphasizes both statewide nonpoint source programs and on-the-ground management of individual watersheds where waters are impaired or threatened.
4.	The State program (a) abates known water quality impairments resulting from nonpoint source pollution and (b) prevents significant threats to water quality from present and future activities.
5.	An identification of waters and watersheds impaired or threatened by nonpoint source pollution and a process to progressively address these waters.
6.	The State reviews, upgrades, and implements all program components required achieving and maintaining beneficial uses of water as expeditiously as practicable.
7.	An identification of federal lands and objectives which are not managed consistently with State program objectives.
8.	Efficient and effective management and implementation of the State's nonpoint source program, including necessary financial management.
9.	A feedback loop whereby the State reviews, evaluates, and revises its nonpoint source assessment and its management program at least every five years.

c. Progress and Challenges

Much progress has been made and water quality has been protected and/or improved in Alabama. However, nonpoint source pollution or "runoff pollution" remains a primary concern because it is often difficult to ascertain and identify specific sources and causes; management measures are widely variable, complex, and generally "voluntary;" and funding is insufficient to address the problems.

The nonpoint source pollution problem in Alabama is *large*. It represents the dominant fraction of surface water pollution to estuaries, lakes, streams, and rivers. The problem is *complex*. It involves a large number of stakeholders and important sectors of the economy. The problem is also *highly variable* in both time and space. Over time, land use patterns and shifts in population continually occur resulting in increasing and changing NPS environmental stresses upon the limited natural resources and land.

Unlike point source pollution, which usually can be easily collected and treated, NPS pollution in Alabama is controlled primarily utilizing educational outreach and through voluntary adoption of practical and cost-effective land management practices known as best management practices (BMPs). BMPs generally allow for the continuation of everyday activities while reducing or preventing NPS pollution. By promoting and implementing these practices, the management program will maintain, improve and/or protect water quality while preserving and maintaining the economic value of all natural resources.

Many of Alabama's NPS management efforts are focused primarily on "*pollution prevention*" or "*source reduction*." Regardless of what the pollution "source" (e.g., agriculture, silviculture, mining, construction/urban, etc.,) or cause (e.g., pesticides, fertilizers, animal waste, sedimentation, etc.,) is, the management program supports educational outreach programs and BMPs that are cost-effective, reduce or abate runoff

of the contaminant, and effectively protect the environment as part of a holistic watershed plan or program.

A major challenge for resource agencies, policy makers, environmental entities, and citizen stakeholders is to cooperatively and collectively implement the Alabama NPS Management Program while continuing to find ways to integrate and balance new and emerging environmental protection needs and programs with the States' unique economic resources and opportunities.

Since NPS pollution is primarily a "people problem," successful implementation of the Alabama NPS Management Program requires a focused effort on education, training, citizen involvement, and attitude adjustments. When NPS problems do occur, it is generally because of a lack of knowledge. Although difficult at times to measure or quantify "successes", especially short-term (1-5 years), citizen educational outreach and involvement is - and will remain - a primary management measure for all Section 319 pollution control endeavors.

d. Management Priorities and Categories

The large number of potential pollution sources associated with NPS pollution categories place serious resource demands on management program and implementation efforts that will effectively protect land, water, and air quality, as well as other natural resources such as threatened and endangered flora and fauna. Limited State funding, resources, and economic conditions only exacerbates efforts to successfully implement a holistic statewide management program. While NPS categories/subcategory implementation goals, objectives, and strategies may be similar, i.e., maintain, protect, and improve environmental quality, successful implementation requires many very different, creative, and long-term management plan solutions.

Table 4-3
Designated EPA Nonpoint Pollutant Categories/Subcategories

Major Nonpoint Source Pollution Categories And Subcategories	
(10)	**Agriculture**
11:	Non-irrigated crop production
12:	Irrigated crop production
13:	Specialty crop production (e.g., truck farming and orchards)
14:	Pasture land
15:	Range land
16:	Feedlots - all types
17:	Aquaculture
18:	Animal holding/management areas
(20)	**Silviculture**
21:	Harvesting, reforestation, residue management
22:	Forest management
23:	Road construction/maintenance
(30)	**Construction**
31:	Highway/road/bridge
32:	Land development
(40)	**Urban Runoff**
41:	Storm sewers (source control)
42:	Combined sewers (source control)
43:	Surface runoff
(50)	**Resource Extraction/Exploration/Development**
51:	Surface mining
52:	Subsurface mining
53:	Placer mining
54:	Dredge mining
55:	Petroleum activities
56:	Mill tailings
57:	Mine tailings
(60)	**Land Disposal (Runoff/Leachate From Permitted Areas)**
61:	Sludge
62:	Wastewater
63:	Landfills
64:	On-site wastewater systems (septic tanks, etc.)
65:	On-site wastewater systems (septic tanks, etc.)
66:	Hazardous waste
(70)	**Hydrologic/Habitat Modifications**
71:	Channelization
72:	Dredging
73:	Dam construction
74:	Flow regulation/modification
75:	Bridge construction
76:	Removal of riparian vegetation
77:	Streambank modification/destabilization
(80)	**Other**
81:	Atmospheric deposition,,
82:	Waste storage/storage tank leaks
83:	Highway maintenance and runoff
84:	Spills
85:	In-place contaminants
86:	Natural
(90)	**Source unknown**

Table 4-4
Non-Designated EPA Nonpoint Pollutant Categories/Subcategories

Listed below are examples of "non-designated" NPS issues that have been identified by Alabama NPS stakeholders and addressed in the updated/revised management program document.

Marinas
CZARA, NEP, GOMP, and the Coastal Management Program
Water quality monitoring including citizens volunteer monitoring
Lake and reservoir monitoring and protection
Clean Water Action Plan
Environmental and human health
Groundwater/Wellhead Protection
River Basin/Watershed management and assessment approach
Land Acquisition
Education outreach, training, technology transfer, and assistance
Public participation, partnerships, and MOAs
TMDLs
Environmental Indicators and Measurement
Pesticides
Other

e. Management Program Implementation Strategy

Alabama's Nonpoint Source Management Program is designed to prevent or eliminate NPS pollution to all waterbodies in the State. The overall strategy is to promote local capacity and collaboration among and between various stakeholders that can assist resource providers in implementing best management practices (BMPs) and delivering educational outreach programs. The strategy uses a 5-year rotational river basin management approach that emphasizes watershed protection and enhancement, voluntary stewardship, and partnerships in order to achieve resource protection results.

Successful management implementation requires the greatest possible integration of programs within and among agencies and watersheds interests. The Alabama NPS Management Program has a formidable task of integrating many and varied programs including traditional NPDES point source permitted dischargers, surface and groundwater protection, monitoring and assessments; coastal and statewide programs; and TMDLs using very limited resources. Continuous cooperation and collaboration with all stakeholders remains a priority. Voluntary and regulatory management measures, goals, and objectives are in common with other coastal NPS management measures, not in lieu of (e.g., NEP, CZARA, Alabama Coastal Program).

f. Nonpoint Source Assessments

The Alabama Soil and Water Conservation Commission and Districts, using Section 319 and State cost-share funding, assesses each county using locally-led conservation advisory groups. ADEM and other agencies utilize the information to fill in gaps that are identified by other assessment programs and to implement management measures utilizing a "bottoms-up" local watershed, citizen-based approach.

The ADEM NPS Unit initiated a 5-year rotational River Basin Management (NPS Assessment) approach beginning with an FY96 Section 319 grant. Efforts involved assessing and identifying the sources and causes of NPS impacts to water quality, prioritizing impacted watersheds. The first river basin assessments were conducted by ADEM in 1996/97 in the Lower Cahaba and Black Warrior River Basins. Subsequently, funding priority was provided by FY99 Section 319 grant to address NPS impacted watersheds in the two river basins (i.e., Lower Cahaba River and Warrior River Basin Project). The ADEM then assessed the Tennessee River Basin and developed a FY2000 Section 319 Workplan for two priority NPS impacted watersheds (i.e., Bear Creek and Flint River). Assessment of the Coastal Plains River Basin (i.e., Chattahoochee, et. al) is in progress (FY99 grant) with funding to assess the Coosa, Tallapoosa, and Alabama River Basins will be provided by the FY2000 Section 319 grant. The Tombigbee and Mobile River Basins will be assessed using FY2001 Section 319 funds.

Implementation milestones for river basin/watershed programs, including "on-the-ground" best management practices, may vary because of additional water quality and other information needs, logistics, scheduling, and limited and other unanticipated agency resource demands and priorities. Section 319(h) proposals are generally requested the fiscal year following completion of the River Basin's assessment.

Table 4-5
Nonpoint Source River Basin Assessment Groupings

Year	Basin	Adjacent States	Rationale
1997	Cahaba	Not Applicable	Pilot Basin (begin 1995)
	Warrior	Not Applicable	Birmingham Metropolitan Area Spans Both Basins
1998	Tennessee	GA (2000) TN (no date) MS (no date)	Basin Not Hydrologically Connected to other Alabama Basins
1999	Chattahoochee	GA (1999) FL (no date)	GA Schedule Basin Shared with FL in the Same Year
	Chipola	FL (no date)	Basin Shared with FL in the Same Year
	Choctawhatchee	FL (no date)	Basin Shared with FL in the Same Year
	Perdido-Escambia	FL (no date)	Basin Shared with FL in the Same Year
2000	Alabama	Not Applicable	Downstream of Coosa and Tallapoosa
	Coosa	GA (2000)	GA Schedule
	Tallapoosa	GA (2000)	GA Schedule
2001	Escatawpa	MS (no date)	Shared with MS in the Same Year
	Lower Tombigbee	MS (no date)	Shared with MS in the Same Year
	Mobile	Not Applicable	Downstream of the Tombigbee Basin
	Upper Tombigbee	MS (no date)	Shared with MS in the Same Year

g. NPS River Basin Approach Goals

Targeted river basin stakeholders agree on a common set of methods, processes, and measurable criteria for dealing with NPS problems on a priority basis within prescribed time lines (*stakeholders are all agencies, organizations, and citizens that are involved with or affected by resource management decisions*). Projects and resources are prioritized to ensure that limited NPS resources are utilized effectively and wisely. Cooperative partnerships allow for efficient targeting of local watershed priorities in the context of overall *statewide* priorities, thus minimizing resource wasteful "knee-jerk" or forced crisis management decisions and reactions. The ADEM NPS Unit is achieving this goal using the following rotational river basin approach strategy:

Table 4-6
River Basin Approach

1. Assess water quality in all major river basins
2. Incorporate assessment information into the Clean Water Act (CWA) Section 319 project workplans; Alabama NPS Assessment Report; CWA Section 305(b) Report to Congress; the CWA Section 303(d) list; and updating/revision of the Alabama NPS Management Program, as well as other reports and lists
3. Identify impacted sites, sources and causes
4. Form new partnerships and/or provide resources for on-going local watershed efforts
5. Determine and prioritize watershed protection management measures
6. Integrate restoration and protection efforts within a well-defined area on a priority basis [e.g., Section (303(d)/TMDL; 305(b); Unified Watershed Restoration Strategy; Section 319, EQIP, etc.]

The Alabama 5-year river basin management approach neither replaces nor supercedes on-going local or priority watershed initiatives. Instead, it provides a long-term assessment, coordination, and management measure implementation mechanism for NPS pollution control activities.

It is essential that stakeholders understand that planning and implementation goals for river basin management will require substantial long-term commitments, time and effort; proper means and timing; consensus building, partnering; much coordination, and may extend into multiple "5-year" cycles. Measurable water quality improvements may be <1 year, but may be as long as 5, 10, 15, 20, or more years in the future.

Table 4-7
5-Year Rotational Nonpoint Source River Basin Assessment Progress

River Basin(s)	Assessment Schedule
1. Cahaba; Black Warrior	(Year 1. Complete)
2. Tennessee	(Year 2. Complete)
3. Chattahoochee; Chipola; Choctawhatchee; Escambia; Perdido	(Year 3. Report available 2000)
4. Coosa; Tallapoosa; Alabama	(Year 4. 2000-01)
5. Mobile; Escatawpa; Lower Tombigbee; Upper Tombigbee	(Year 5. 2001-02)

The NPS River Basin Assessment cycle continually rotates or repeats upon itself. Each major river basin assessed (or at least one watershed "nested" within a basin "grouping") will be "treated", as resource funding allows, i.e., the Lower Cahaba/Black

Warrior River Basins will again be assessed in Year 6. Fiscal 2003, with watershed/water quality protection projects or "treatments" tentatively to be demonstrated and implemented beginning in Fiscal 2004.

Several uncertainties exist related to implementation and funding of the river basin management approach schedule. The issues below may preempt the basic rotational river basin approach:

- Clean Water Action Plan "NPS incremental" funding availability
- Watershed Restoration Action Strategy planning and implementation
- Development and implementation of Section 303(d)/TMDLs
- Inadequate resources

Part V Public Health
A: Fish Tissue Monitoring Program 1997 - 1999

The ADEM Fish Tissue Monitoring Program was continued in 1998 and 1999. The program, which was initiated in 1991, is a cooperative agreement with the Alabama Department of Public Health (ADPH), the Alabama Department of Conservation and Natural Resources (ADCNR) and the Tennessee Valley Authority (TVA) to monitor fish tissue throughout the State for bioaccumulative contaminants. It involves the collection of fish tissue samples from all of Alabama's major reservoirs and rivers and state-managed public fishing lakes on a rotational basis. Additional water bodies are also monitored based on identified need. Each year's sampling locations are determined based upon information available to the ADEM and input from the cooperative agencies. Waterbodies that have been identified as having elevated concentrations of bioaccumulative fish tissue contaminates, or greater potential for contamination, are closely monitored.

At each location, a composite sample of six individuals (same species) from both the predator and the omnivore/bottom feeding groups is collected (usually six bass and six catfish). Skinless-fillet composite samples are screened for PCBs, arsenic, cadmium, mercury, selenium, chlordane (total), endosulfan I and II, toxaphene (mixture), mirex, DDT (total), dieldrin, endrin, heptachlor epoxide, hexachlorobenzene, and lindane. Screening results will normally dictate the need for additional sampling trips and analyses. Sampling is conducted in the fall of the year when contaminants, if present, would most likely be stored in fatty tissue. All sampling is conducted in accordance with the ADEM Field Operations Standard Operating Procedures for Fish Sampling and Tissue Preparation for Bioaccumulative Contaminants. All fish tissue data generated by the program, as well as that produced by certain permittees, is incorporated into a computerized database making this information readily accessible and more easily managed.

All data gathered in the program is forwarded to the ADPH. The ADPH is responsible for advising the public with regard to fish consumed from State waters. Typically, two types of advisories have been issued when deemed appropriate: a "limited consumption" advisory recommends that pregnant women, women of child bearing age and children under 15 years old should avoid eating the specified species of fish from the specified area, all others should limit their consumption to one meal per month; a "no consumption" advisory recommends that everyone should avoid eating the specified species from the specified area. Please see Table 4-1 for information concerning all current advisories.

In 1997 15 waterbodies were sampled at 26 locations and 326 fish were collected. Sampling was concentrated on the lower Coosa River reservoirs (below Logan Martin Dam), Mobile and Baldwin Counties of South Alabama, and the Black Warrior River reservoirs in West Alabama. Two of the 15 waterbodies sampled were known to have fish contaminant problems and the sampling was done in an effort to monitor the contaminant levels in the fish and to better define the areas of contamination. The other thirteen waterbodies were screening studies and were sampled as part of the Department's routine statewide fish tissue monitoring program. Eight sites on the Bankhead, Holt, Warrior and Demopolis reservoirs were sampled with no concentrations of bioaccumulative contaminants in excess of FDA advisory limits found.

As a result of the 1997 sampling, the ADPH issued a consumption advisory for largemouth bass from the Fowl River in Mobile County and striped bass for the entire length of the Coosa River that extends from Logan Martin Dam to Lay Dam. Of the four waterbodies sampled in south Alabama, three yielded samples of largemouth bass with mercury concentrations at or above the FDA advisory level of 1.0 parts per million (ppm = milligrams per liter (mg/l)). Those waterbodies were Fowl River, Bay Minette Creek and Chickasaw Creek. No other species collected in these areas, to date, have been found to contain elevated concentrations of

mercury. In all cases, there is no known source of mercury to these waterbodies or their watersheds.

These types of mercury contamination problems are not unique to Alabama. Several southern states, including Florida and Mississippi, have similar fish consumption advisories in effect. Researchers are finding that under certain water chemistry conditions, common to "blackwater" coastal streams, mercury is prone to bioaccumulate in predatory fish species. It is theorized that the source of the mercury in these cases may be natural or the result of atmospheric deposition from industrial pollutants. The Department plans to continue monitoring coastal streams throughout south Alabama.

In addition to contaminant analyses, the physical condition of certain commercially and recreationally important species of fish is evaluated using "relative weight". Relative weight is an index of well-being or condition used by fisheries biologists to compare an individual fish or group of fish with a standardized norm for a given species. A fish that scores 80 to 100 is considered in good to excellent condition, while a fish that scores 79 or below is considered fair to poor. Ninety-eight percent of the 54 black crappie and seventy-nine percent of 52 channel catfish collected scored in the good to excellent range for relative weight. Of the 115 largemouth bass and 30 spotted bass collected, 95% and 97%, respectively, scored good to excellent in relative weights. No other species collected was evaluated using relative weights. Also, upon collection, all fish are examined for external anomalies, such as lesions (sores), tumors, parasites, and deformities. Ninety-three percent of the 326 fish collected had no external anomalies. Of those anomalies recorded the most common was that of lesions on the body surface.

In 1998, fish tissue monitoring and screening activities were concentrated on the Warrior River basin, several locations on the Coosa River and in southwest Alabama in Mobile and Baldwin Counties. A total of 259 fish were analyzed from 16 waterbodies at 22 locations. Of the 16 waterbodies sampled, five of them were known to have fish contaminant problems and the sampling was done in an effort to monitor the contaminant levels in the fish and to better define the areas of contamination. The other eleven waterbodies were screening studies and were sampled as part of the Department's routine statewide fish tissue monitoring program. Of these eleven screening studies only one turned up any concentrations of bioaccumulative contaminants in excess of FDA advisory limits.

As a result of the 1998 sampling, the ADPH removed the advisory for the Coosa River between Neely Henry Dam and Riverside. A consumption advisory was issued for Mobile River at and downstream from the confluence of Cold Creek. Additionally, new advisories were added for Chickasaw Creek in Mobile County and Bay Minette Creek in Baldwin County. Four of the seven waterbodies sampled in south Alabama, yielded samples of largemouth bass with concentrations of mercury at or above the FDA advisory level. Those waterbodies were Bay Minette Creek, Chickasaw Creek, Fowl River and Mobile River. This most recent sampling indicates that mercury levels in largemouth bass remain in excess of the FDA limit.

The physical condition of fish collected was evaluated using relative weights. One hundred percent of the 6 black crappie, 6 white crappie, 6 spotted bass, 6 striped bass, 12 hybrid bass and 12 white bass collected, scored in the good to excellent range for relative weight. Of the 119 largemouth bass and 61 channel catfish collected, 94% and 82%, respectively, scored good to excellent in relative weights. No other species collected was evaluated using relative weights. Also, upon collection, all fish are examined for external anomalies, such as lesions (sores), tumors, parasites, and deformities. Of the 259 fish collected only 17 demonstrated some form of external anomalies. Of those anomalies recorded the most common was that of lesions on the body surface.

In 1999, fish tissue monitoring and screening activities were concentrated on the Chattahoochee and Conecuh River basins, several locations on Wheeler and Logan Martin Reservoirs and in southwest Alabama in Mobile County. A total of 397 fish were analyzed from 17 waterbodies at 36 locations. Of the 17 waterbodies sampled, eight were known to have fish contaminant problems and the sampling was done in an effort to monitor the contaminant levels in the fish and to better define the areas of contamination. The other eleven waterbodies were screening studies and were sampled as part of the Department's routine statewide fish tissue monitoring program. Of these eleven screening studies only one turned up any concentrations of bioaccumulative contaminants in excess of FDA advisory limits.

Speckled trout and Atlantic croaker collected from Three Mile Creek downstream of the railroad trestle contained levels of chlordane at or above the FDA advisory level of 0.3 ppm. This is high enough for the ADPH to issue a limited consumption advisory. The previous advisory against the consumption of largemouth bass from the Logan Martin Reservoir and Coosa River upstream from the confluence of Choccolocco Creek was downgraded to a limited consumption advisory. The no consumption advisory for largemouth bass in the Mobile River at and downstream from the confluence of Cold Creek was downgraded to a limited consumption advisory. A previous no consumption advisory for catfish from West Point Lake, Lake Harding and the intervening stretch of the Chattahoochee River due to high levels of chlordane was removed. Similarly, a no consumption advisory for channel catfish, brown bullhead and white bass from Huntsville Spring Branch and Indian Creek due to high levels of DDT was removed.

Eighty-six percent of 328 fish evaluated had no anomalies. Of those anomalies recorded the most common was that of lesions on the body surface. One hundred percent of the 18 black crappie and 8 striped bass collected, scored in the good to excellent range for relative weight. Of the 191 largemouth bass and 111 channel catfish collected, 93% and 89%, respectively, scored good to excellent in relative weights. No other species collected was evaluated using relative weights.

Figure 5-1

2000 Alabama Fish Consumption Advisories

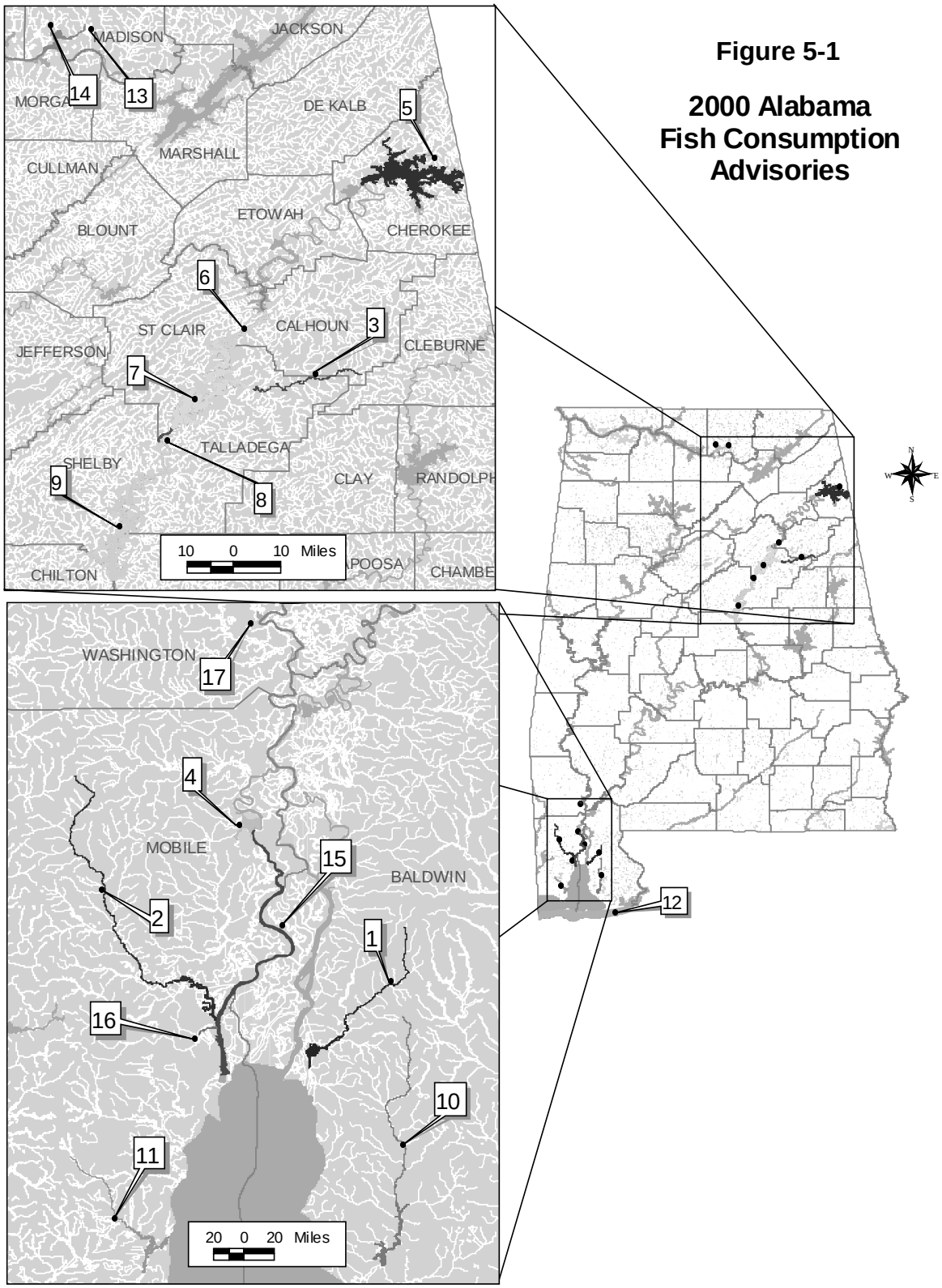


Table 5-1 2000 Alabama Fish Consumption Advisories

Map Index	Waterbody	From	To	Species	Advisory	Pollutant
1	Bay Minette Creek	Mobile Bay	Its Source	Largemouth Bass	No Consumption	Mercury
2	Chickasaw Creek	Mobile Bay	Its Source	Largemouth Bass	No Consumption	Mercury
3	Choccolocco Creek	Logan Martin Reservoir	Hillabee Creek	Any fish species	No Consumption	PCBs
4	Cold Creek Swamp	10 miles S. of Tombigbee River confluence: adjacent to Mobile River		Any fish species	No Consumption	Mercury
5	Coosa River/Weiss Lake	Weiss Dam	AL/GA Stateline	Catfish > 1 pound	Limited Consumption	PCBs
6	Coosa River/Logan Martin Reservoir	Riverside, AL	Neely Henry Dam	Catfish > 1 pound	Limited Consumption	PCBs
7	Coosa River/Logan Martin Reservoir	Vincent, AL	Riverside, AL	Striped Bass Largemouth Bass Spotted Bass	No Consumption	PCBs
8	Coosa River/Lay Lake	RR Bridge near Vincent	Logan Martin Dam	Spotted Bass Crappie Catfish > 1 pound	No Consumption	PCBs
9	Coosa River/Lay Lake	Lay Dam	Logan Martin Dam	Striped Bass Crappie Blue Catfish Spotted Bass	No Consumption	PCBs
10	Fish River	Weeks Bay	Its Source	Largemouth Bass	No Consumption	Mercury
11	Fowl River	Mobile Bay	Its Source	Largemouth Bass	No Consumption	Mercury
12	Gulf Coast	Entire Coast		King Mackerell > 39 inches/ King Mackerell < 39 inches	No Consumption/ Limited Consumption	Mercury
13	Huntsville Spring Branch	Indian Creek	Redstone Arsenal	Smallmouth Buffalo Bigmouth Buffalo	No Consumption	DDT
14	Indian Creek	Tennessee River	Redstone Arsenal	Smallmouth Buffalo Bigmouth Buffalo	No Consumption	DDT
15	Mobile River	At and DS from Cold Creek Swamp	Mobile Bay	Largemouth Bass	No Consumption	Mercury
16	Three Mile Creek	1 mile US of Mobile River	Illinois Central Gulf RR Bridge	Atlantic Croaker/ Speckled Trout Striped Bass	No Consumption/ Limited Consumption	Chlordane
17	Tombigbee River	Olin Basin at River Mile 60.5		Largemouth Bass Channel Catfish	No Consumption	Mercury DDT

DS=Downstream; US=Upstream; > = Greater than; < = Less than **Source:** Alabama Department of Public Health Press Release 3/27/2000

C: Fish Kills 1998-1999

As part of its emergency response responsibilities, the ADEM investigates all reported fish kills. These investigations are usually conducted in conjunction with the Alabama Department of Conservation and Natural Resources (ADCNR). The purpose of the investigation is to determine the cause and severity of the kill. Often an investigation is inhibited by the lapse of time between the actual time of the kill and the receipt of the report by the appropriate authorities.

Depending on the situation, a fish kill examination may include the following: laboratory analysis of soil, water, and/or fish tissue samples; on site measurements of chemical and physical water quality parameters; interviews with associated residents and fishermen; and a total count of individual fish killed and species involved. If a cause can be determined and enforcement action is deemed appropriate, the State Attorney General's Office is authorized to recover, at a minimum, the monetary value of the fish killed for the purpose of restocking the waterbody by the ADCNR.

Table 5-2 Fish Kills During 1998 and 1999

Name of Waterbody	Date	Waterbody Type	Size Affected	Cause(s) of Concern	Source(s) of Pollutants	No. of Fish Killed
Wheeler Res. Morgan Co.	3/25/98	reservoir	< 0.5 mi	undetermined	undetermined	183
Warrior Gulf Creek Mobile Co.	4/17/98	stream	< 0.5 mi	undetermined	private company	undetermined
UT & private pond Shelby Co.	4/23/98	stream/pond	< 0.5 mi	pesticides	land application	undetermined
Lee Brook Shelby Co.	8/14/98	stream	< 0.5 mi	herbicides	undetermined	undetermined
Dry Creek Morgan Co.	9/22/98	stream	< 0.5 mi	low D.O.	undetermined	34,000
UT to Buck Creek Shelby Co.	1/8/99	stream	< 0.5 mi	gasoline from UST	private co.	undetermined
Fowl River Mobile Co.	1/30/99	river	< 0.5 mi	algal die off/low DO	N/A	undetermined
UT to Middle Fork Mobile Co.	1/30/99	stream	< 0.5 mi	toxic paint runoff	private co.	24
UT to Thomas Creek Jefferson Co.	2/26/99	stream	< 0.5 mi	pesticide	private co.	undetermined
UT to Brush Branch Colbert Co.	3/22/99	stream	< 0.5 mi	pesticide	private co.	20
Tallasseehatchee and Shirtee Creeks Talladega Co.	3/23/99	stream	0.5 mi	ammonia toxicity	Municipal WWTP	454
Little Shades Creek Jefferson Co.	5/27/99	stream	< 0.5 mi	undetermined	undetermined	2,233
Clark Springs Branch Morgan Co.	6/4/99	stream	0.5 mi	undetermined	undetermined	7,524
UT to Buck Creek Shelby Co.	6/8/99	stream	< 0.5 mi	hydrated lime	lagoon rupture	8
Upper Bear Creek Res. Marion Co.	6/8/99	reservoir	< 0.5 mi	undetermined	undetermined	97
UT to Miller Creek Montgomery Co.	6/24/99	stream	< 0.5 mi	undetermined	undetermined	474
UT to Cahaba River Jefferson Co.	7/6/99	stream	< 0.5 mi	low D.O.	sewage lift overflow	50
Valley Creek Jefferson Co.	7/13/99	stream	< 0.5 mi	chlorine toxicity	public water pipe rupture	187
Town Creek Limestone Co.	7/18/99	stream	< 0.5 mi	solvents	private co.	535
Dry Creek Dekalb Co.	7/23/99	stream	< 0.5 mi	undetermined	undetermined	undetermined
Bouldin Canal Elmore Co.	7/26/99	stream	0.5 mi	undetermined	undetermined	1,968
Cahaba River Jefferson Co.	8/4/99	river	< 0.5 mi	undetermined	undetermined	356

Table 5-2 Fish Kills (cont.)

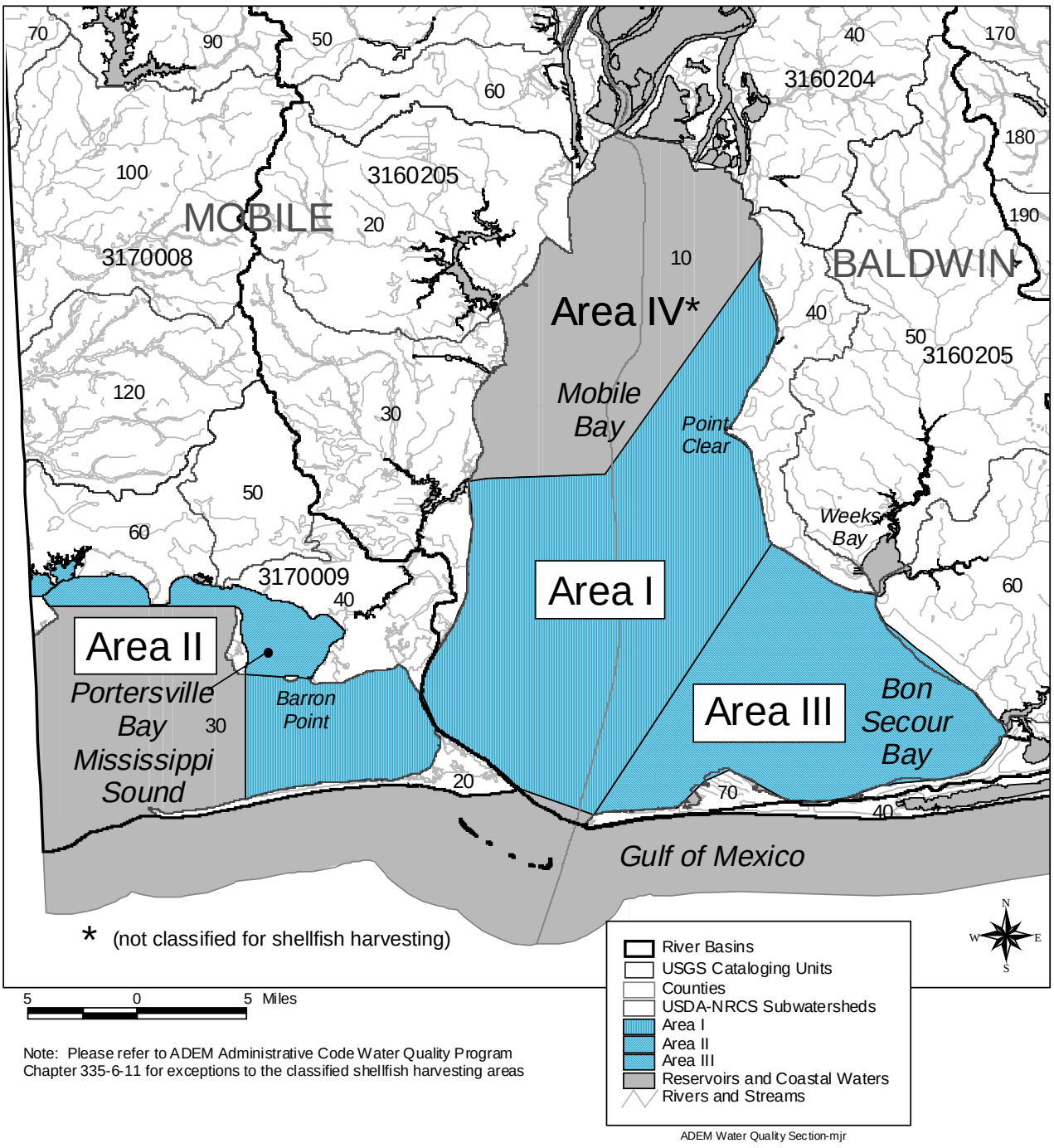
Big Wills Creek Dekalb Co.	8/12/99	stream	0.5 mi	low D.O.	Municipal WWTP	4,812
Opossum Creek Jefferson Co.	8/23/99	stream	0.5 mi	low D.O.	accidental WWTP release	2,983
Allen Branch Dekalb Co.	8/26/99	stream	< 0.5 mi	low D.O.	sewage lift overflow	undetermined
UT to Town Creek Limestone Co.	10/19/99	stream	< 0.5 mi	undetermined	undetermined	443
Big Wills Creek Dekalb Co.	10/26/99	stream	0.5 mi	low D.O.	sewage lift overflow	3,261
Indian Creek Madison Co.	10/28/99	stream	< 0.5 mi	toxicity & low DO	accidental sewage spill	20
White Oak Creek Walker Co.	11/13/99	stream	< 0.5 mi	undetermined	undetermined	200

D: Shellfish Harvesting Area Closures/Reopenings

Shellfish harvesting area closures are issued when the Mobile River stage rises above 8 feet at the Barry Steam Plant. For reopening the closed areas, the river stage must be below 8 feet, ambient fecal coliform counts must be below a geometric mean of 14 MPN (most probable number) in 100 milliliters of sample water, and E. coli count in oyster meat must be below 230 MPN. Figure 5-2 depicts the shellfish harvesting closure areas in Alabama's coastal waters. For exceptions to these areas such as around outfalls, marinas, or other specific waters refer to the ADEM Administrative Code Water Quality Program Volume II Chapter 335-6-11. Table 5-3 contains the notices pertaining to shellfish harvesting area closures and subsequent reopenings since the early 1990s. Further recent information can be obtained from the Alabama Department of Public Health's website, http://www.alapubhealth.org/index.htm under Press Releases. Although river stage is not usually a factor considered for §303(d) listing, the affected shellfish harvesting areas will remain on Alabama's 2000 §303(d) List. For the past 5 years the time of closure for the 3 areas falls between 13% and 15%.

Figure 5-2

Classified Shellfish Harvesting Areas in Coastal Alabama



Note: Please refer to ADEM Administrative Code Water Quality Program Chapter 335-6-11 for exceptions to the classified shellfish harvesting areas

Table 5-3
Shellfish Harvesting Area Closures/Reopenings

Action Time of Notice	Action Date of Notice	Areas Classified for Shellfish Harvesting		
		Area I	Area II	Area III
6:00 a.m.	3/26/99	Open	Open	Open
4:00 p.m.	3/17/99	Closed	Closed	Closed
6:00 a.m.	2/19/99	Open	Open	Open
6:00 a.m.	2/18/99	Closed	Open	Closed
6:00 a.m.	2/1/99	Closed	Closed	Closed
6:00 a.m.	10/27/98	Open	Open	Open
7:00 a.m.	10/9/98	Open	Open	Closed
4:00 p.m.	9/28/98	Closed	Closed	Closed
3:00 p.m.	1/10/98	Closed	Closed	Closed
7:00 a.m.	12/30/97	Open	Open	Open
7:00 a.m.	12/29/97	Closed	Closed	Closed
6:00 a.m.	7/29/97	Open	Open	Open
4:00 p.m.	7/23/97	Closed	Closed	Closed
6:00 a.m.	7/2/97	Open	Open	Open
4:00 p.m.	6/24/97	Closed	Closed	Closed
6:00 a.m.	6/20/97	Open	Open	Open
4:00 p.m.	6/13/97	Open	Closed	Open
7:00 a.m.	5/16/97	Open	Open	Open
4:00 p.m.	5/10/97	Closed	Closed	Closed
7:00 a.m.	5/9/97	Open	Open	Open
4:00 p.m.	5/4/97	Closed	Closed	Closed
7:00 a.m.	2/11/97	Open	Open	Open
4:00 p.m.	11/10/96	Closed	Closed	Closed
7:00 a.m.	4/10/96	Open	Open	Open
7:00 a.m.	3/26/96	Open	Open	Open
4:00 p.m.	3/12/96	Closed	Closed	Closed
4:00 p.m.	12/22/95	Closed	Closed	Closed
4:00 p.m.	5/2/94	Open	Open	Open
4:00 p.m.	4/4/94	Closed	Closed	Closed
4:00 p.m.	3/23/94	Open	Open	Open
12:01 a.m.	11/12/90	Closed	Open	Closed

E: Bathing Area Closures

For the reporting period of 1998 and 1999, all area offices of the Alabama Department of Public Health-Bureau of Environmental Services were contacted regarding swimming advisories issued due to sewage contamination (sewer line breaks, pumping station failures, WWTP overflows). All offices outside of coastal Alabama reported that either no such advisories had been issued or they were of very limited issuance. Table 5-4 lists advisories issued from the Mobile Office of the Bureau of Environmental Services as well as those outside coastal Alabama.

Table 5-4
Public Notices of Sewage Release-Alabama Department of Public Health-Bureau of Environmental Services

Date	Location	Coastal Area Waterbody	Pollutant	Comments
1/6/98	399 Lakeview Dr. off Cody Rd.	Optimist Lake	Fecal coliform	one-time event
1/7/98	Kooiman Rd. and I-10	Rattlesnake Bayou	Fecal coliform	one-time event
1/7/98	Carre Dr. east of Moffett	Three Mile Cr	Fecal coliform	one-time event
1/16/98	Stanton Rd. Bridge-manholes	Three Mile Cr	Fecal coliform	one-time event
1/22/98	Druid Dr. S. and Peabody Dr.	Mun. Park Lake (Three Mile Cr)	Fecal coliform	one-time event
1/22/98	Yorkwood Dr., W. Mobile	Spring Creek (Halls Mill Cr)	Fecal coliform	one-time event
1/26/98	Sugar Creek Dr.	Milkhouse Br	Fecal coliform	one-time event
1/27/98	Old Shell Road	Twelve Mile Cr	Fecal coliform	one-time event
2/9/98	Sugar Creek Dr.	Milkhouse Br	Fecal coliform	one-time event
2/9/98	Wall St. off Hillcrest Rd.	Milkhouse Br	Fecal coliform	one-time event
2/20/98	Kooiman Rd	Rattlesnake Bayou	Fecal coliform	one-time event
3/19/98	Michael Blvd.	Montlimar Cr	Fecal coliform	one-time event
4/10/98	Buford Dr.	Three Mile Cr	Fecal coliform	one-time event
4/28/98	UniversityDr./Old Shell Rd.	Twelve Mile Cr	Fecal coliform	one-time event
5/1/98	Forrest Ridge Rd. W.	Langan Park	Fecal coliform	one-time event
8/13/98	Stanton Rd. near Levert Ave.	Three Mile Cr	Fecal coliform	one-time event
9/16/98	I-10 and D.I.P.	Eslava Cr	Fecal coliform	one-time event
10/23/98	Kooiman Rd. and Hamilton Blvd.	Rabbitt Cr	Fecal coliform	one-time event
10/26/98	Wall St. off Hillcrest Rd.	Optimist Lake and Second Cr	Fecal coliform	one-time event
12/9/98	South of I-10 and D.I.P.	Eslava Cr	Fecal coliform	one-time event
1/19/99	Mauvilla Dr.-Chickasaw	Eight Mile Cr	Fecal coliform	one-time event
2/3/99	Providence Hospital	Rabbit Cr	Fecal coliform	one-time event
2/5/99	Hamilton Blvd. & Gibbon Rd.	Milkhouse Br	Fecal coliform	one-time event
3/9/99	Stanton Rd.	Three Mile Cr	Fecal coliform	one-time event
4/14/99	Gulf Lumber Co.-Conception st.	Three Mile Cr	Fecal coliform	one-time event
4/19/99	Wall St. off Hillcrest Rd.	Milkhouse Br	Fecal coliform	one-time event
5/21/99	Airport Blvd. Near Bel Air Mall	Eslava Cr	Fecal coliform	one-time event
6/4/99	Wall St. off Hillcrest Rd.	Milkhouse Br	Fecal coliform	one-time event
6/30/99	Levert St. at Woodlawn Dr.	Three Mile Cr	Fecal coliform	one-time event
7/9/99	Lift Station Riviere Du Chien at I-10	Halls Mill Cr	Fecal coliform	one-time event
7/23/99	Rolling Green Dr.-Sugar Creek	Milkhouse Br	Fecal coliform	one-time event
11/14/99	Highway 90 and I-10	Rattlesnake Bayou	Fecal coliform	one-time event
12/21/99	Airport Blvd.	Montlimar Cr	Fecal coliform	one-time event
2/26/98	Robertsdale-Co Rd. 52	Rock Creek	Fecal coliform	one-time event
1998	Hoover area	UT-Cahaba River Basin	Fecal coliform	one-time event

F: Public Water Supply/Drinking Water

Approximately 800,000,000 gallons of water are taken from ground and surface sources each day, provided with treatment, and made available to approximately four million citizens in Alabama. More than 579 community systems, 93 transient non-community systems and forty-two (42) non-transient non-community systems are permitted by the ADEM.

Approximately sixty-five (65) percent of the water used is obtained from surface sources such as lakes, rivers, and streams and provided with full treatment to include coagulation, sedimentation, filtration, and disinfection. One hundred (100) percent of these systems meet turbidity requirements, ninety-six (96) percent meet trihalomethane standards, and one hundred (100) percent meet inorganic and radiological drinking water standards. These water treatment facilities are required to employ Grade III Certified Operators to ensure that proper doses of chemicals are applied and hourly tests are performed to demonstrate a satisfactory water quality.

Thirty-five (35) percent of the water is obtained from ground water sources such as wells and springs. An adequate source of ground water is generally available in this State; however, the ground water is extremely limited in the Piedmont area. Ground water sources are required to provide disinfection and monitor the draw down (water level change) in wells ensuring that a satisfactory available quantity of water remains. In FY99 more than ninety-seven (97) percent of the Community Systems and ninety (90) percent of the Non-community Systems met the bacteriological quality standard of the Department. More than ninety-three (93) percent of the community systems and approximately eighty (80) percent of the non-community systems were in full compliance with the bacteriological monitoring requirements. One hundred (100) percent of the public water systems were able to meet the inorganic and radiological maximum contaminant levels. These figures demonstrate that the majority of the water provided to the citizens in Alabama is excellent.

All water systems continue to monitor for lead and copper. Five (5) systems have exceeded the lead or copper action level. of the 540 community and non-transient, non-community systems that were sampled in 1998 and 1999, These systems are required to begin a public education program for lead violations, formulate a corrosion control plan, and continue sampling every six (6) months.

All community and non-transient non-community water system sources continued to be monitored for volatile organic chemicals (VOCs) and synthetic organic chemicals (SOCs). All sources with contaminants above an existing MCL are either provided with proper treatment or are taken out of service. More than ninety (90) percent of the community systems and approximately eighty-six (86) percent of the non-transient non-community systems were in full compliance with the VOC and SOC monitoring requirements. Of the contaminants found, tetrachloroethylene (TCE) is the most common regulated VOC and di(2-ethylhexyl)phthalate is the most common regulated SOC.

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Table 5-5
Surface Source Public Water Systems with Compliance Violations

Name of Facility	Municipality Served	Name of Waterbody	Contaminants with Percent Violations
Gaston Steam Plant	None	Yellow Leaf Creek	Total Trihalomethanes-12.5%
Miller Steam Plant	None	Warrior River-Mulberry Fork	Total Trihalomethanes-12.5%
Scottsboro Water Works	Scottsboro	Tennessee River	Total Trihalomethanes-12.5%

During the past two years there have been no public water supply ground water systems that have chronic contaminant detections. The 3 systems reported as having chronic TCE violations in the ***1998 Alabama Water Quality Report to Congress*** have remedied the respective problems.

Table 5-6
Public Water Supply Elemental Contaminants

Elemental Contaminants	MCL in mg/L
Antimony	0.006
Arsenic	0.05
Asbestos	7 million fibers*/L
Barium	2
Beryllium	0.004
Cadmium	0.005
Chromium	0.1
Cyanide	0.2
Fluoride	4
Lead	0.015
Mercury	0.002
Nickel	0.1
Nitrate (as N)	10
Nitrite (as N)	1
Total Nitrate/Nitrite (as N)	10
Selenium	0.05
Sulfate	500
Thallium	0.002

* Longer than 10 micrometers

Table 5-7
Public Water Supply Radiological Contaminants

Radiological Contaminants	Concentrations
Gross alpha particle	15pCi/L
Combined radium^{226} and radium^{228}	5 pCi/L
Tritium	20,000 pCi/L
Strontium^{90}	8 pCi/L
Beta particle and photon radioactivity	4 millirem/Yr

Table 5-8
Public Water Supply Synthetic Organic Chemicals (non-volatile/SOVs)

Synthetic Organic Chemicals (non-volatile)	
Alachlor	0.002
Aldicarb	0.003
Aldicarb Sulfone	0.002
Aldicarb Sulfoxide	0.004
Atrazine	0.003
Carbofuran	0.04
Chlordane	0.002
Dibromochloropropane	0.0002
2,4-D	0.07
Endrin	0.002
Ethylene Dibromide	0.00005
Heptachlor	0.0004
Heptachlor Epoxide	0.0002
Lindane	0.0002
Methoxychlor	0.04
Polychlorinated Biphenyls	0.0005
Pentachlorophenol	0.001
Toxaphene	0.003
2,4,5-TP	0.05
Benso(a)pyrene	0.0002
Dalapon	0.2
Di (2-ethylhexyl) adipate	0.4
Di (2-ethylhexyl) phthalate	0.006
Dinoseb	0.007
Diquat	0.02
Endothall	0.1
Glyphosate	0.7
Hexachlorobenzene	0.001
Hexachlorocyclopentadiene	0.05
Oxamyl (Vydate)	0.2
Picloram	0.5
Simazine	0.004
2,3,7,8-TCDD (Dioxin)	$3x10^{-8}$

Table 5-9
Public Water Supply Total Trihalomethanes

Total Trihalomethanes	MCL in mg/L
the annual average of quarterly samples	0.1

Table 5-10
Public Water Supply Volatile Synthetic Organic Chemicals (VOCs)

Volatile Synthetic Organic Chemicals (VOC)	MCL in mg/L
Benzene	0.005
Carbon Tetrachloride	0.005
1,2-Dichloroethane	0.005
Trichloroethylene	0.005
para-Dichlorobenzene	0.075
1,1-Dichloroethylene	0.007
1,1,1-Trichloroethane	0.2
Vinyl chloride	0.002
cis-1,2-Dichloroethylene	0.07
1,2-Dichlorpropane	0.005
Ethylbenzene	0.7
Monochlorobenzene	0.1
0-Dichlorobenzene	0.6
Styrene	0.1
Tetrachloroethylene	0.005
Toluene	1
Trans-1,2-Dichloroethylene	0.1
Xylene (Total)	10
Dichloromethane	0.005
1,2,4-Trichlorobenzene	0.07
1,1,2-Trichloroethane	0.005

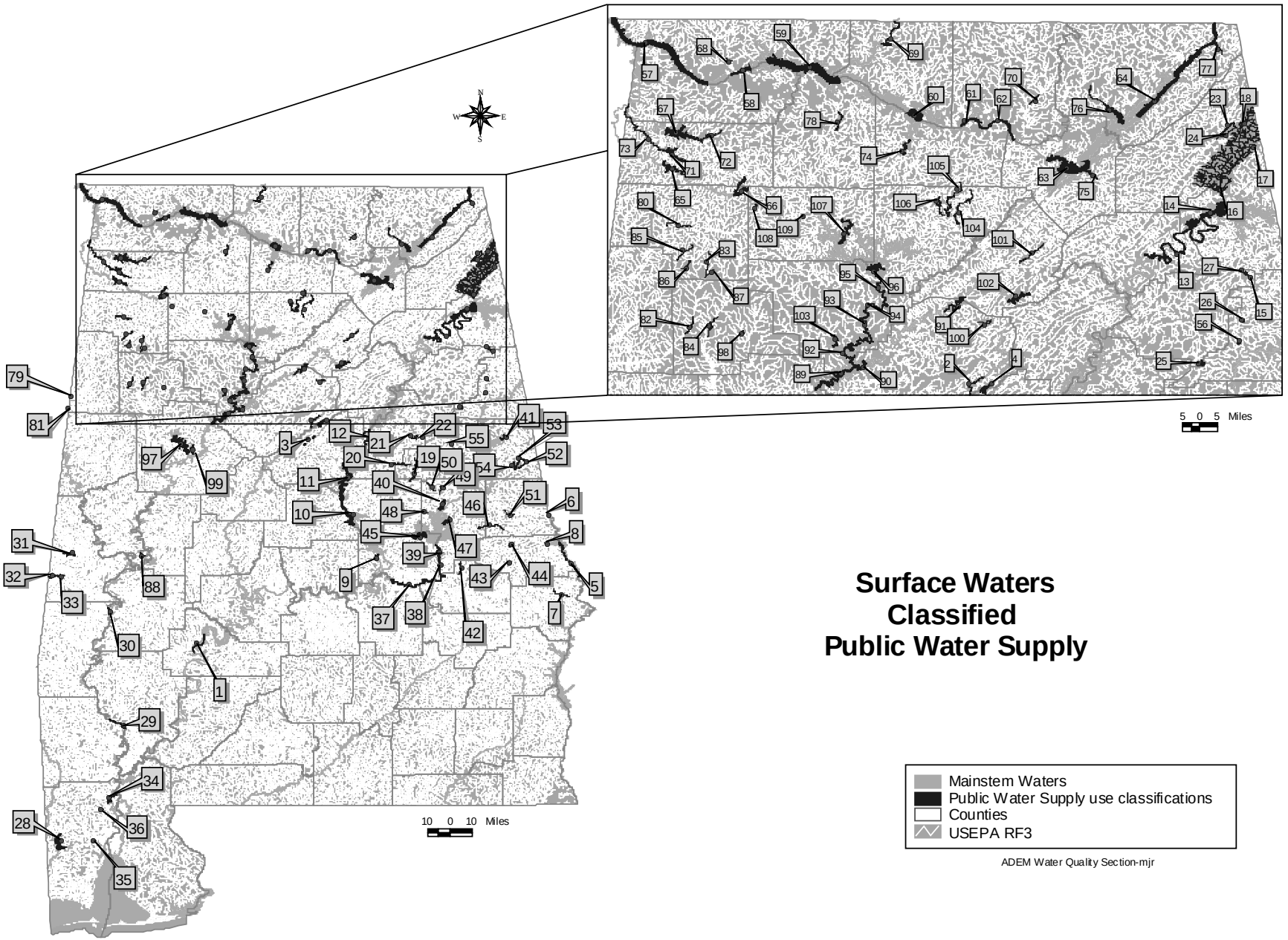

Surface Waters
Classified
Public Water Supply
Mainstem Waters
Public Water Supply use classifications
Counties
USEPA RF3
ADEM Water Quality Section-mjr
10 0 10 Miles
5 0 5 Miles

Table 5-11 Surface Waters Classified as Public Water Supply

Index	Waterbody	From	To	Classification
1	Alabama R	River Mile 131	Millers Ferry Lock and Dam	PWS
2	Cahaba R	Dam near U.S. Highway 280	Grant's Mill Road	OAW/PWS
3	Oak Mountain State Park Lakes			PWS
4	Little Cahaba R (Jefferson-Shelby Co.s)	Cahaba River	Head of Lake Purdy	PWS
5	Chattahoochee R	14th Street Bridge between Columbus and Phenix City	Osanippa Creek	PWS/S/F&W
6	Chattahoochee R	West Point Manufacturing Co. water supply intake at Lanett	West Point Dam	PWS
7	Uchee Cr	County Road 39	Alabama Highway 169	PWS/S/F&W
8	Halawakee Cr	Chattahoochee River	Three miles upstream of Co. Rd. 79	PWS/F&W
9	Coosa R (Lake Jordan)	Bouldin Dam	Alabama Highway 111	PWS/S/F&W
10	Coosa R (Lake Mitchell)	Mitchell Dam	Lay Dam	PWS/S/F&W
11	Coosa R (Lay Lake)	Lay Dam	Southern RR Bridge (1-1/3 miles above Yellowleaf Creek)	PWS/S/F&W
12	Coosa R (Lay Lake)	River Mile 89 (1-1/2 miles above Talladega Creek)	Logan Martin Dam	PWS/F&W
13	Coosa R (Lake Henry)	City of Gadsden's water supply intake	Weiss Dam powerhouse	PWS/F&W
14	Coosa R (Weiss Lake)	Weiss Dam and Weiss Dam powerhouse	Spring Creek	PWS/S/F&W
15	Terrapin Cr	U.S. Highway 278	Calhoun Co. Rd. 70, E of Vigo	PWS/F&W
16	Little R and tributaries	Coosa River (Weiss Lake)	Junction of E Fork of Little River and West Fork of Little River	PWS/S/F&W[1]
17	East Fk of Little R and tributaries	Little River	Alabama-Georgia state line	PWS/S/F&W[1]
18	West Fk of Little R and tributaries	Little River	Alabama-Georgia state line	PWS/S/F&W[1]
19	Hatchet Cr	Norfolk Southern Railway	Junction of E Fork Hatchet Creek and West Fork Hatchet Creek	PWS/S/F&W
20	Tallasseehatchee Cr	City of Sylacauga's water supply reservoir dam	Its source	PWS/F&W
21	Talladega Cr	County Road 303	Alabama Highway 77	PWS/F&W
22	Mump Cr	City of Talladega's water supply reservoir dam	Its source	PWS/F&W
23	Big Wills Cr	100 yds. below Allen Branch	Its source	PWS/F&W
24	Allen Branch	Ft. Payne public water supply dam	Its source	PWS/F&W
25	Sweetwater Lake	Within Talladega National Forest		PWS/S/F&W
26	Hillabee Lake	Within Talladega National Forest		PWS/S/F&W
27	Ladiga Cr	Terrapin Creek	Terrapin Creek	PWS
28	Big Cr	Big Creek Reservoir	Its source	PWS/F&W
29	Tombigbee R	One-half mile DS from Southern Railway Crossing	Five miles upstream from U. S. Highway 43	PWS/S/F&W
30	Tombigbee R	One-half mile DS from Alabama Highway 114	Three miles upstream from Alabama Highway 114	PWS/F&W
31	Sucarnoochee R	U. S. Highway 11	Five miles upstream from Livingston city limits	PWS/S/F&W
32	Toomsuba Cr	AT&N Railroad	Alabama-Mississippi state line	PWS/F&W
33	UT SW of York (Lake Louise)	Toomsuba Creek	Its source	PWS
34	Mobile R	Tensaw River	Barry Steam Plant	PWS/F&W
35	Eight Mile Cr	City of Prichard's water supply intake	U. S. Highway 45	PWS/F&W
36	Cold Cr	Dam 1 1/2 miles west of U. S. Highway 43	Its source	PWS/F&W
37	Tallapoosa R	U. S. Highway 231	Thurlow Dam	PWS/F&W
38	Tallapoosa R	Thurlow Dam	Yates Dam	PWS/S/F&W

Table 5-11 Surface Waters Classified as Public Water Supply (cont.)

Index	Waterbody	From	To	Classification
39	Tallapoosa R	Yates Dam	Martin Dam	PWS/S/F&W
40	Tallapoosa R (Lake Martin)	Highway 280	Hillabee Creek	PWS/S/F&W
41	Little Tallapoosa R	Five miles upstream of U.S. Highway 431	U.S. Highway 431	PWS/F&W
42	Chinquapin Cr (Bulger Cr)	Uphapee Creek	Its source	PWS/F&W
43	Chewacla Cr	Chewacla State Park Lake	Its source	PWS/F&W
44	Sougahatchee Cr	Opelika water supply reservoir	Its source	PWS/F&W
45	Little Kowaliga Cr (Lake Martin)	Big Kowaliga Creek (Lake Martin)	Reservoir Limits	PWS/S/F&W
46	Little Sandy Cr	Central Georgia RR	Its source	PWS/F&W
47	Manoy Cr (Lake Martin)	Tallapoosa River (Lake Martin)	Reservoir Limits	PWS/S/F&W
48	Elkahatchee Cr	Alabama Highway 63	Alabama Highway 22	PWS/F&W
49	Hillabee Cr	Jct. of Oaktasasi and Town Creeks	Co. Rd. bridge 3 miles E of Hackneyville	PWS/F&W
50	Hackney Cr	Hillabee Creek	Its source	PWS/F&W
51	Finley Cr	Mill Creek	Its source	PWS/F&W
52	High Pine Cr	Highway 431 crossing	Its source	PWS
53	Jones Cr	High Pine Creek	Its source	PWS
54	UT to Jones Cr NW of Roanoke	Jones Creek	Its source	PWS
55	Crooked Cr	Alabama Highway 9	Its source	PWS/F&W
56	Cahulga Cr	U .S. Highway 78	Its source	PWS/F&W
57	Tennessee R (Pickwick Lake)	Alabama-Tennessee state line	Lower end of Seven Mile Island	PWS/S/F&W
58	Tennessee R (Pickwick Lake)	Sheffield water intake	Wilson Dam	PWS/F&W
59	Tennessee R (Wilson/Wheeler Lakes)	Five miles upstream of Wilson Dam	Elk River (RM 289.3)	PWS/S/F&W
60	Tennessee R (Wheeler Lake)	U. S. Highway 31	Flint Creek	PWS/S/F&W
61	Tennessee R (Wheeler Lake)	Cotaco Creek	Indian Creek	PWS/S/F&W
62	Tennessee R (Wheeler Lake)	Indian Creek	Flint River	PWS/F&W
63	Tennessee R (Guntersville Lake)	Guntersville Dam	Upper end of Buck's Island (see Note 2 this basin)	PWS/S/F&W
64	Tennessee R (Guntersville Lake)	Roseberry Creek	Alabama-Tennessee state line	PWS/S/F&W[2]
65	Bear Cr (Bear Cr Reservoir)	Bear Creek Reservoir Dam	Alabama Highway 187	PWS/S/F&W
66	Bear Cr (Upper Bear Cr Reservoir)	Upper Bear Creek Reservoir Dam	Alabama Highway 243	PWS/S/F&W
67	Cedar Cr (Cedar Cr Reservoir)	Cedar Creek Reservoir Dam	Alabama Highway 24	PWS/S/F&W
68	Cypress Cr	City of Florence Water Treatment Plant	Little Cypress Creek	PWS/F&W
69	Elk R	Alabama Highway 99	Alabama-Tennessee state line	PWS/F&W
70	Flint R	Big Cove Creek	Hurricane Creek	PWS/F&W
71	Little Bear Cr (Little Bear Cr Res.)	Little Bear Creek Reservoir Dam	Alabama Highway 187	PWS/S/F&W
72	Dunkin Cr	Cedar Creek	Its source	PWS
73	Little Bear Cr	Bear Creek	Its source	PWS/S/F&W
74	Flint Cr	L & N Railroad	Alabama Highway 36	PWS/F&W
75	Short Cr	Tennessee River	Scarham Creek	PWS/F&W
76	North Sauty Cr	Tennessee River	Its source	PWS

Table 5-11 Surface Waters Classified as Public Water Supply (cont.)

Index	Waterbody	From	To	Classification
77	Long Island Cr	Tennessee River	Long Creek	PWS/S/F&W
78	Turkey Cr	Clear Fork	Its source	PWS/F&W
79	Yellow Cr	At Alabama-Mississippi state line		PWS
80	Buttahatchee R	U.S. Hwy. 278 1 mile east of U.S Hwy. 43 and 78 in Hamilton	U.S. Hwy 278 7 miles E of U.S. Hwy. 43 and 78 in Hamilton	PWS/F&W
81	Luxapallila Cr	At Alabama-Mississippi state line		PWS
82	Luxapallila Cr	County Road 37	Co. Rd. crossing approx. 6 miles upstream from AL Hwy 18	PWS/F&W
83	Luxapallila Cr	U. S. Highway 78	Its source	PWS/F&W
84	Sipsey R	U. S. Highway 43	Alabama Highway 102	PWS/F&W
85	Beaver Cr	U. S. Highway 78	Its source	PWS/F&W
86	Purgatory Cr	U. S. Highway 278	Its source	PWS/F&W
87	East Fk Luxapallila Cr	Luxapallila Creek At Winfield	Its source	PWS/F&W
88	Black Warrior R	Five miles upstream from Big Prairie Creek	Eight miles upstream from Big Prairie Creek	PWS/S/F&W
89	Black Warrior R	Bankhead Lock and Dam	Junction of Locust and Mulberry Forks	PWS/S/F&W
90	Locust Fk	Junction of Locust and Mulberry Forks	Jefferson County Highway 61 (Maxine)	PWS/S/F&W
91	Locust Fk	U. S. Highway 31	Co. Rd. between Hayden and County Line	PWS/F&W
92	Mulberry Fk	Junction of Locust and Mulberry Forks	Burnt Cane Creek (9 miles below Cordova)	PWS/S/F&W
93	Mulberry Fk	Burnt Cane Creek (9 miles below Cordova)	Frog Ague Creek (Cordova)	PWS/F&W
94	Mulberry Fk	Frog Ague Creek (Cordova)	Junction of Mulberry and Sipsey Forks	PWS/F&W
95	Sipsey Fk	Junction of Mulberry and Sipsey Forks	Lewis Smith Dam	PWS/F&W
96	Lewis Smith Lake	Lewis Smith Dam	Three miles upstream from Lewis Smith Dam	PWS/S/F&W
97	North R	City of Tuscaloosa's water supply reservoir dam	Binnion Creek	PWS/S
98	Clear Cr	Bays Lake Dam	Its source	PWS
99	Yellow Cr	City of Tuscaloosa's water supply reservoir dam	Its source	PWS
100	Self Cr	Town of Bradford's water supply intake	Its source	PWS
101	Calvert Prong	City of Oneonta's water supply intake	Its source	PWS
102	Blackburn Fk	Inland Lake Dam	Its source	PWS/S
103	Lost Cr	Two miles upstream from Wolf Creek	Cane Creek	PWS/F&W
104	Brindley Cr	Broglen River	Its source	PWS
105	Eightmile Cr	Cullman water supply reservoir dam	Its source	PWS
106	Pope Cr	Cullman water supply dam	Its source	PWS
107	Brushy Cr	Lake Lewis Smith (Sipsey Fork)	U.S. Highway 278	PWS/F&W
108	Clear Cr	City of Haleyville water supply reservoir dam	Its source	PWS
109	Curtis Mill Cr	Town of Double Springs water supply reservoir dam	Its source	PWS

NOTE 1. The Outstanding National Resource Water designation applies to this segment.

NOTE 2. Those portions of Guntersville Lake in the immediate vicinity of discharges from the City of Guntersville's sewage treatment plants are not considered suitable for SWIMMING and OTHER WHOLE BODY WATER-CONTACT SPORTS nor for sources of PUBLIC WATER SUPPLY.

Corrections that will be made at the next Rule Making to Public Water Supply use classifications

- Hackney Creek needs to be From Town Creek (instead of Hillabee Creek) To Its Source – Hackneyville Quadrangle
- Chinquapin Creek needs to be renamed Bulger Creek to be consistent with name on La Place Quadrangle
- East Fork Luxapallila Creek needs to be renamed East Branch Luxapallila Creek to be consistent with name on Winfield Quadrangle
- Bays Lake Dam needs to be renamed Bugs Lake Dam (Clear Creek) to be consistent with name on Bankston Quadrangle
- Sinking Creek From Clear Fork To Its Source needs to be classified for Public Water Supply - Moulton Water Works Board-Masterson Quadrangle
- Coldwater Spring needs to be classified for Public Water Supply - Anniston Water and Sewer Board- Munford Quadrangle

The following narrative is taken from the ADEM Public Water Supply Branch's FY99 Annual Report and is a summary of activities in Alabama related to the Source Water Assessment Program and the Wellhead Protection Program. Annual Fiscal Year Reports prepared by ADEM's Public Water Supply Branch contain additional information on activiites involving drinking water.

Source Water Assessment Program

Source Water Assessment regulations became effective on January 25, 1999. A deadline of February 6, 2003 was established for completion of the Source Water Assessment Program for all existing sources. These regulations included the requirement for all public water systems (surface and ground sources) to delineate the source water area, develop a potential contaminant source inventory, complete a susceptibility analysis, and provide public awareness of the source water assessment process and documents that are available for review. Although not required by USEPA guidance, ADEM's Source Water Assessment Program (SWAP) requires water systems with surface sources to develop contingency plans. The above items are defined in ADEM Admin. Code R. 335-7-6.

ADEM submitted its proposed Source Water Assessment Plan to USEPA Region IV in early February 1999. At the end of FY99, ADEM was continuing to negotiate with USEPA Region IV on several areas of the Plan in which Region IV had expressed concerns. ADEM intends to respond to Region IV's concerns to portions of the Plan in early FY2000. One area of concern for Region IV was the implementation of a consistent susceptibility analysis throughout the State. In order to promote a consistent statewide susceptibility analysis, several training sessions were held with ADEM Water Supply Branch technical staff during FY99.

A contract between ADEM and the Tennessee Valley Authority (TVA) was activated in October 1998. This $410,000 contract will include the preparation of watershed and Source Water Protection Area (SWPA) maps for each of the 26 water systems and 31 watersheds or subwatersheds within the Tennessee River Basin. The contract for this project is scheduled to be complete in April 2000. TVA, however, is willing to post to SWPA maps contaminant data gathered from field surveys by water systems. This will be done with no change to the original contract provided the information is furnished in a timely manner. This may extend the completion time for the TVA work to a date beyond April 2000. Two progress meetings were held with TVA to discuss the work that had been conducted during FY99. TVA submitted documents to ADEM on the Decatur watershed and SWPA, including a CDROM. A copy was forwarded to the Decatur Field Office. A review of TVA's work indicated satisfactory progress and compliance with the scope of work for the project.

The contract with Auburn University to perform a similar data-gathering exercise for the three surface plants withdrawing water from reservoirs along the Chattahoochee River and one plant located on Halawakee Creek, was not completed during the contract period and is to be renegotiated during early FY2000. A meeting between members of the Department's Water Quality Section and Water Supply Branch and a representative of Auburn University is scheduled to be held at ADEM in early FY2000 to review the scope of the project.

The Water Supply Branch has developed a contract "Scope of Work" by which matching funds up to a maximum limit can be provided to water systems to conduct data-gathering activities, to contract the work out to consultants, or to spend on other direct expenses associated with source water assessment. Susceptibility analyses for all water systems will remain a joint responsibility of ADEM and the water system.

The Water Supply Branch has developed a schedule for assessing the remaining water system source waters, by fiscal year, for those systems requesting matching funds from ADEM. Most of the remaining water system assessment data-gathering activities not covered in the above contracts will be accomplished during FY2000 and FY 2001 with a handful remaining for FY2002. Some systems, like Gadsden and Sylacauga, are pursuing source water assessment data collection independently of receiving financial assistance from ADEM.

Wellhead Protection Program

With the adoption of Source Water Assessment Regulations by ADEM, the new regulations included most of the Wellhead Protection Program regulations for delineation and contaminant inventory. Wellhead Protection Regulations were maintained for management as a voluntary option to water systems who have completed delineations and contaminant inventories. ADEM's Ground Water Branch staff are assigned to the ADEM Public Water Supply Branch to support Source Water Assessment (SWA) and Drinking Water State Revolving Fund (DWSRF) grants and contracts, to manage the Wellhead Protection Program, and to conduct technical reviews of ground water source delineations and contaminant inventories.

The DWSRF set-aside funds are used to provide financial assistance for the SWA delineation and contaminant inventory for community public water supply systems that utilize ground water. The financial assistance program is based on a rate schedule and it requires a 1:1 match by the water system. In addition, the SWAP ground water delineation and contaminant inventory reports will be reviewed by the Ground Water Branch for accuracy and compliance with the regulations.

Thus far, 64 DWSRF set-aside grants and contracts were processed and executed for a total of $652,226. Sixty-five applications for grants were received in FY99 for a proposed $550,000. A database was created to manage and track these SWAP financial assistance applications.

Thirty-six Source Water Assessment (SWA) reports have been reviewed. Each report included delineation of the recharge area and a potential contaminant source inventory. These SWA reports were reviewed for compliance with the SWA delineation and contaminant inventory regulations. Five requests for waiving the full delineation requirements were reviewed. A waiver could allow the water system to avoid the high cost of delineation based on aquifer characteristics and to use a fixed radius delineation method.

The Wellhead Protection Program will support the Source Water Assessment Program (SWAP) by providing a mechanism for communities and water systems to develop and implement drinking water protection strategies. The Ground Water Branch will continue to provide assistance and guidance to systems in developing a Wellhead Protection Plan, promote the Ground Water Guardian program, coordinate drinking water protection signs, coordinate with the Alabama Rural Water Association (ARWA) in recognizing water systems that have completed a Wellhead Protection Plan, attend meetings, conferences and workshops, and coordinate inspections and compliance issues in wellhead protection areas with ADEM Branches and other State agencies.

ADEM is working to insure that delineated source water area maps and location information are available for use within and outside of the Department. Delineation maps were shipped to the Geological Survey of Alabama where they were digitized for use in developing a GIS layer. A meeting was held with ADEM's Information Systems Branch programmer to plan for upgrades to the Hydrogeology Unit Project Database. The upgrades should provide detailed information on SWA locations.

ADEM personnel conducted inspections of underground storage tank (UST) and underground injection control (UIC) facilities in SWA areas during the first half of FY99. Records indicate that 85 UST and 39 UIC inspections were conducted in delineated SWA areas during this period.

Wellhead Protection Management Plans were reviewed for Bayou La Batre, Hodges, Uniontown and Vina. In March 1999, certificates of recognition were given to six water systems at the Alabama Rural Water Association Annual Conference. The Department was awarded the Ground Water Guardian Affiliate designation for a second year by the Ground Water Foundation. Also, four water systems in Alabama were awarded the Ground Water Guardian designation: Madison County Water Department, Madison. Water Works and Sewer Board, Rogersville Water Works, and Tuscumbia Water Works. Ten additional systems were contacted in January and February 1999 for application to the 1999 Ground Water Guardian program. Four of the 10 water systems applied to the Ground Water Guardian Program.

Three Water Festivals were hosted for approximately 4,500 elementary school students in 1999. These water festivals were held in March and May for 1,100 fourth grade students from Colbert and Lauderdale Counties, 800 fourth grade students from Limestone County, and 2,600 fourth grade students from Madison County.

The Department and the Alabama Rural Water Association (ARWA) have been working closely to redefine the wellhead protection program. Proposed items include preparing a packet of materials for the water systems to use in implementing a management or contingency plan.

In addition, the ADEM and ARWA are working together to install Drinking Water Protection signs in those communities with completed Wellhead Protection Plans. The job and payment requests for the manufacture and installation of Wellhead Protection signs were finalized with the Department of Transportation. There are currently 11 systems that have requested signs. The sign installations will be reported in both the local media as well as the ARWA journal.

A Wellhead Protection Plan Guidance Document is in the final stages of preparation. The guidance document provides important information for developing and implementing a Wellhead Protection Program at the local level. The Department proposes to mail the guidance document to each water system that utilizes ground water.

Part VI Rivers and Streams/§303(d) List

Alabama has abundant freshwater resources. Rivers and creeks comprise the main part of this natural freshwater heritage. From the hydropower production of mainstem rivers to the canoeist's favorite backyard float, rivers and streams are utilized and enjoyed by Alabama's citizens. Some waters have become the focus of national or State significance through special designation as an Outstanding National Resource Water (ONRW) or classification as an Outstanding Alabama Water (OAW) as seen in Figure 6-1. With the exception of Weeks Bay, the ONRW Designation and the OAW Classification have been applied to rivers and streams as listed in Table 6-4.

Figure 6-1

Outstanding Alabama Water Classifications
and
Outstanding National Resource Water Designations

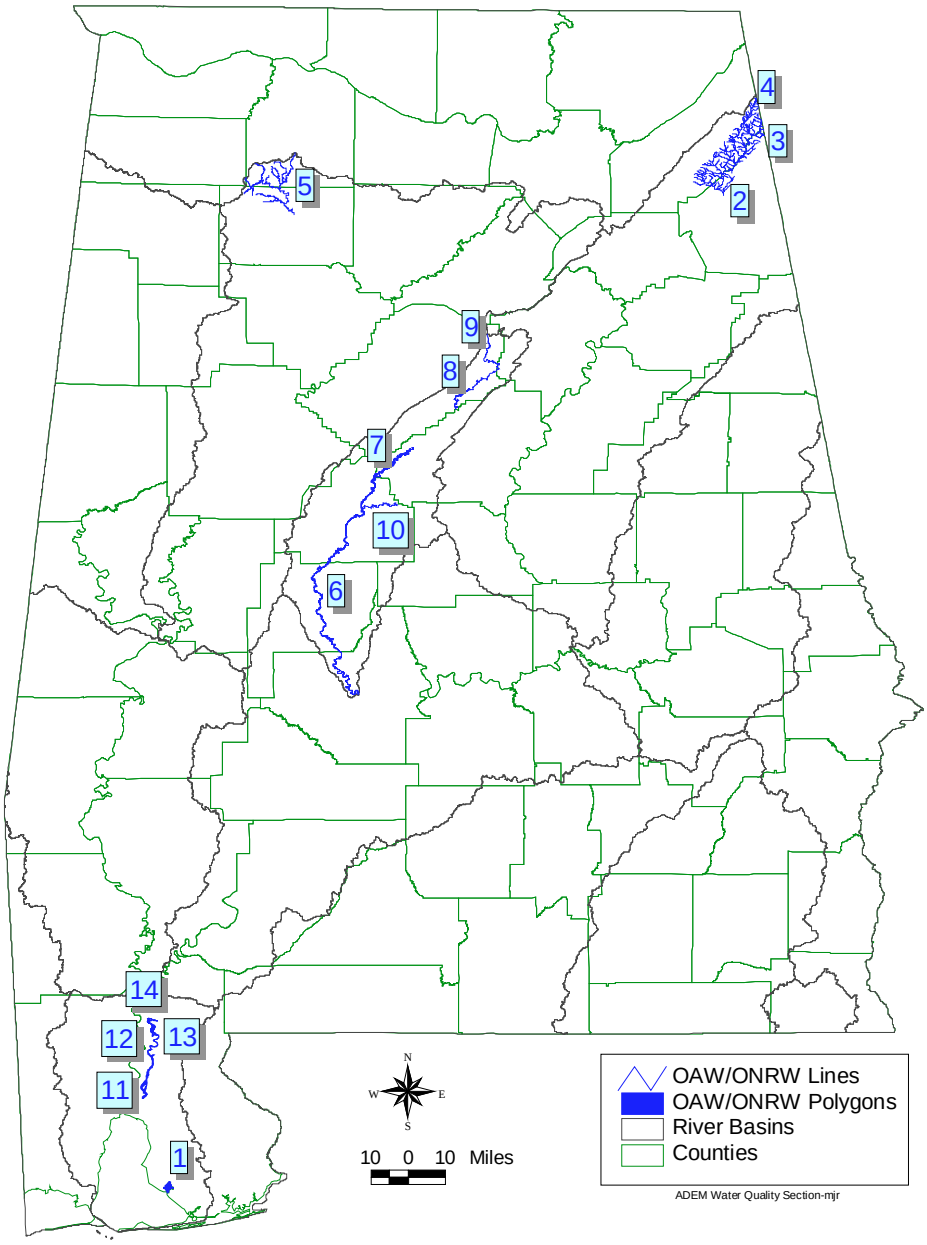


Table 6-1
Outstanding Alabama Water Classifications and Outstanding National Resource Water Designations

Index	Waterbody	From	To	Classification
1	Weeks Bay	Bon Secour Bay	Fish River	S/F&W[3]
2	Little R and tributaries	COOSA RIVER (Weiss Lake)	Junction of East Fork of Little River and West Fork of Little River	PWS/S/F&W[3]
3	East Fork of Little R and tributaries	Little River	Alabama-Georgia state line	PWS/S/F&W[3]
4	West Fork of Little R and tributaries	Little River	Alabama-Georgia state line	PWS/S/F&W[3]
5	Sipsey Fork and tributaries	Sandy Creek	Its source	F&W[3]
6	CAHABA RIVER	ALABAMA RIVER	Junction of lower Little Cahaba River	OAW/S
7	CAHABA RIVER	Junction of lower Little Cahaba River	Shelby County Road 52	OAW/F&W
8	CAHABA RIVER	Dam near U.S. Highway 280	Grant's Mill Road	OAW/PWS
9	CAHABA RIVER	U.S. Highway 11	Its source	OAW/F&W
10	Little Cahaba River (Bibb County)	CAHABA RIVER	Its source (junction of Mahan and Shoal Creeks)	OAW/F&W
11	Tensaw River	Junction of Tensaw and Apalachee Rivers	Junction of Briar Lake	OAW/S/F&W
12	Tensaw River	Junction of Briar Lake	Junction of Tensaw Lake	OAW/F&W
13	Briar Lake	Junction of Tensaw River	Junction of Tensaw Lake	OAW/F&W
14	Tensaw Lake	Junction of Tensaw River	Bryant Landing	OAW/F&W

3. The Special Designation Outstanding National Resource Water applies to this segment.
R= River

Section 303(d) of the Clean Water Act has specific requirements for waters when use support status is determined to be less than full support of the classified uses. Tables 6-1, 6-2 and 6-3 are compiled from the 1998 Final §303(d) List for §305(b) reporting requirements. The remaining pages of this chapter contain Alabama's Final 1998 §303(d) List broken down by river basin. Significant resources have been dedicated to the §303(d) List in Alabama and have priority over tracking fully supporting rivers and creeks for §305(b) reporting. With the completion of Alabama's Upland Alamap Monitoring Program in 2001 it is anticipated that a statewide statistical estimate of overall use support for Alabama's wadeable riverine waters, to include a percentage for those fully supporting, will be reported in the 2002 §305(b).

Table 6-2
Overall Use Support of 1998 §303(d) River Miles

Support Status	Evaluated	Monitored
Fully Supporting	698.4*	
Partially Supporting		634.3
Not Supporting		775.5
Less than Full Support		519.7
Total	**698.4**	**1929.5**

* FY99 Modeling-Table 6-19

Table 6-3
Total Sizes of Rivers Not Fully Supporting Uses by Cause Categories
1998 303(d) List Causes
(miles)

Code	Causes for Impaired Uses	Miles
1	unknown toxicity	39.8
2	pesticides	55.5
3	priority organics	52.8
4	nonpriority organics	19.6
5	metals	297.1
6	ammonia	145.7
7	chlorine	0.2
9	nutrients	344.1
10	pH	346.5
11	siltation	899
12	organic enrichment / DO	884.6
14	temperature/thermal modification	15
15	flow alteration	18
16	other habitat alterations	458.7
17	pathogens	545.3
25	turbidity	86.4
28	biology	3

Table 6-4
Total Sizes of Rivers Not Fully Supporting Uses by Source Categories
1998 303(d) List Causes
(miles)

Code	Sources for Impaired Uses	Miles
1	Industrial	65.9
2	Municipal	151.3
6	Collection system failures	77.8
10	Agriculture	111.2
11	non-irrigated crop production	297.1
13	specialty crop production	12
14	pasture land	463.8
16	feedlots - all types	159.3
19	pasture land - riparian	5
31	highway / road / bridge	72.4
32	land development	89.6
41	storm sewers (source control)	282.6
43	surface runoff	119.1
51	surface mining	46.2
52	subsurface mining	25.6
56	mill tailings	46.2
57	mine tailings	25.6
63	landfills	34
65	on-site wastewater systems (septic tanks etc.)	17.1
73	dam construction	31
74	flow regulation/modification	51.3
76	removal of riparian vegetation	55
77	streambank modification	55
85	in place contaminants	45.8
86	natural	12
90	Source unknown	54.4

Figure 6-2

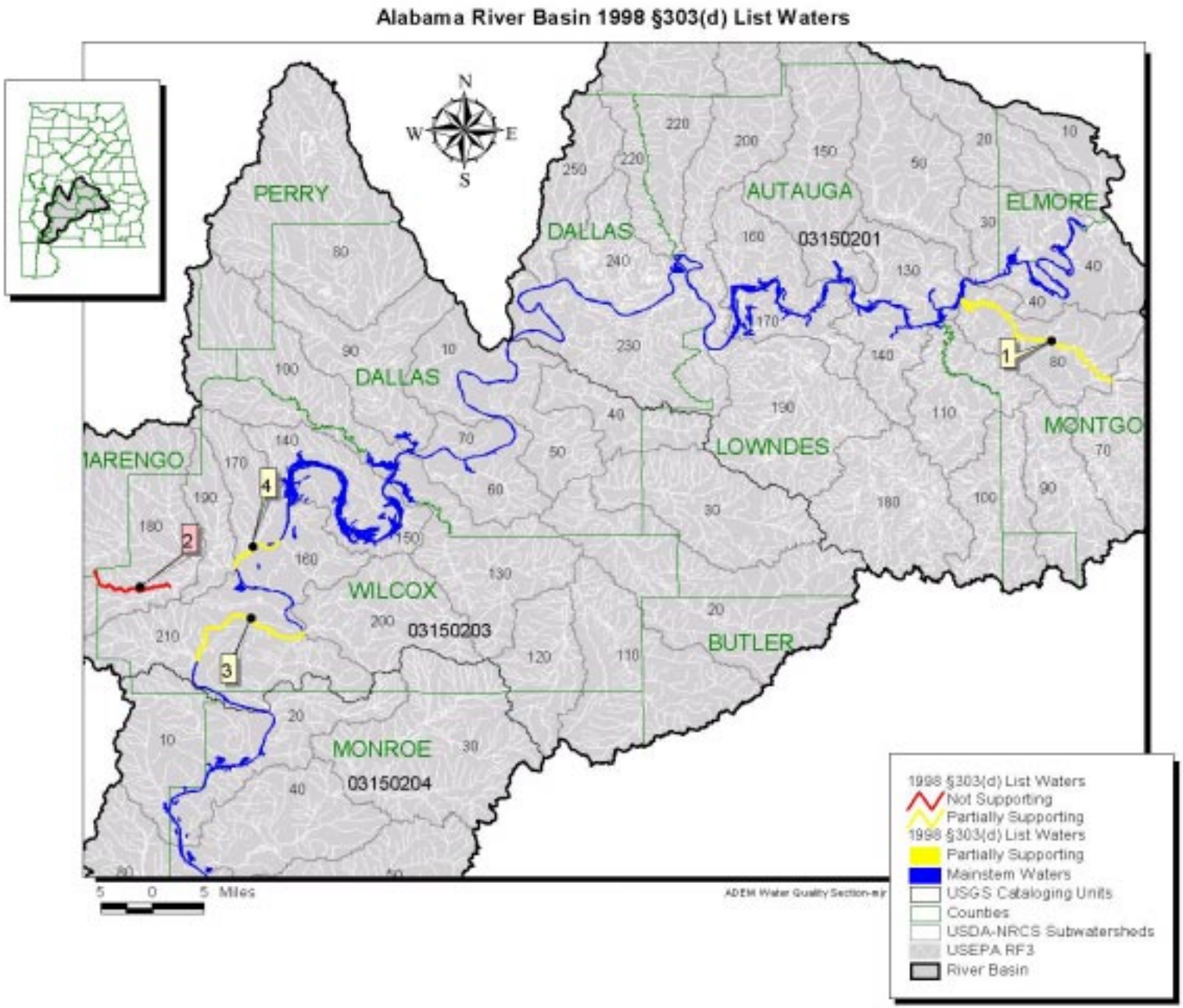

Alabama River Basin 1998 §303(d) List Waters
N
W
E
S
PERRY
DALLAS
AUTAUGA
03150201
ELMORE
DALLAS
MONTGO
LOWNDES
WILCOX
03150203
BUTLER
MONROE
03150204
1
2
3
4
5 0 5 Miles
ADEM Water Quality Section-eir
1998 §303(d) List Waters
Not Supporting
Partially Supporting
1998 §303(d) List Waters
Partially Supporting
Mainstem Waters
USGS Cataloging Units
Counties
USDA-NRCS Subwatersheds
USEPA RF3
River Basin

Table 6-5
Alabama River Basin 1998 §303(d) List Waters

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	River Basin	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
1	AL/03150201-080_01	P	Catoma Cr	R	M	Alabama	Montgomery	Fish & Wildlife	OE/DO	Urban runoff/Storm sewers Pasture Grazing	1990-91 1996-97	23.2 mi.	Alabama R / Ramer Cr
2	AL/03150203-180_01	N	Cub Cr	R	H	Alabama	Wilcox	Fish & Wildlife	Nutrients OE/DO	L source	1998	8.1 mi.	Beaver Cr / Its Source
3	AL/Alabama R_01	P	Alabama R	R	L	Alabama	Wilcox	Public Water Sup.	Nutrients OE/DO	Dam construc. Flow reg/mod	1991	5.0 mi.	Beaver Cr / Rockwest Cr
4	AL/Alabama R_02	P	Alabama R	R	L	Alabama	Wilcox	Public Water Sup.	Nutrients OE/DO	Industrial Nirrigated Crop prod. Pasture Grazing	1991	12.6 mi.	Bear Cr / Pursley Cr

SS =- Support Status with L = Less than Full Support, P = Partially Supporting, and N – Not Supporting; WBTYPE = Waterbody Type; R = Rank with L = Low, M = Medium, and H = High; OE/DO = Organic Enrichment/Dissolved. Oxygen

Figure 6-3

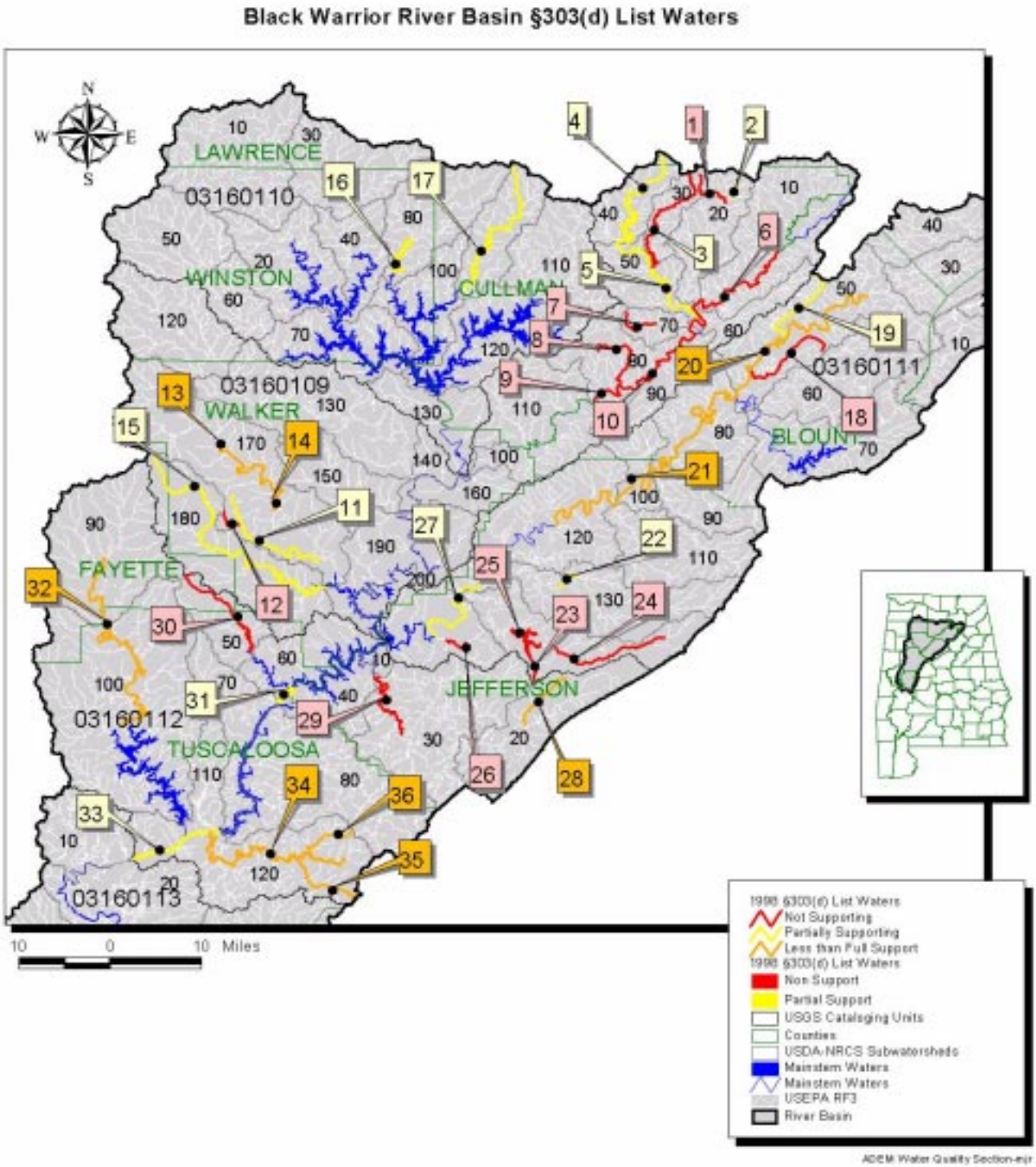

Black Warrior River Basin §303(d) List Waters
LAWRENCE
WINSTON
CULLMAN
WALKER
BLOUNT
FAYETTE
JEFFERSON
TUSCALOOSA
03160110
03160109
03160111
03160112
03160113
10 0 10 Miles
1998 §303(d) List Waters
Not Supporting
Partially Supporting
Less than Full Support
1998 §303(d) List Waters
Non Support
Partial Support
USGS Cataloging Units
Counties
USDA-NRCS Subwatersheds
Mainstem Waters
Mainstem Waters
USEPA RF3
River Basin
ADEM Water Quality Section-mjr

Table 6-6
Black Warrior River Basin 1998 §303(d) List Waters

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
1	AL/03160109-020_01	N	Duck Cr	R	H	Cullman	Fish & Wildlife	pH OE/DO	Pasture Grazing Int. animal feeding oper.	1991 1997	6.4 mi.	Duck R / Its Source
2	AL/03160109-020_02	P	Long Br	R	M	Cullman	Fish & Wildlife	Ammonia OE/DO Pathogens	Int. animal feeding oper. Pasture Grazing	1990 1997	2.0 mi.	Wolf Cr / Its Source
3	AL/03160109-030_01	N	Brindley Cr	R	H	Cullman	Public Water Sup.	Ammonia Siltation OE/DO Pathogens	Urban runoff/Storm sewers	1996	18.8 mi.	Broglen R / Its Source
4	AL/03160109-040_01	P	Eightmile Cr	R	L	Cullman	Fish & Wildlife	Pathogens	Urban runoff Pasture Grazing	1991 1996	23.0 mi.	Broglen R / Its Source
5	AL/03160109-050_01	P	Broglen R	R	M	Cullman	Fish & Wildlife	Pathogens	Urban runoff Pasture Grazing	1991 1996	12.0 mi.	Mulberry Fk / Its Source
6	AL/03160109-050_02	N	Mulberry Fk	R	H	Blount Cullman	Fish & Wildlife	Siltation Other habitat alter.	Unknown source	1974-83	18.4 mi.	Broglen R / Blount Co. Rd. 6
7	AL/03160109-070_01	N	Mud Cr	R	H	Cullman	Fish & Wildlife	OE/DO	Urban runoff/Storm sewers	1996	4.7 mi.	AL Hwy. 31 / Its Source
8	AL/03160109-080_01	N	Thacker Cr	R	H	Cullman	Fish & Wildlife	Ammonia OE/DO Pathogens	Pasture Grazing	1991 1997	9.5 mi.	Mulberry Fk / Its Source
9	AL/03160109-080_02	N	Mulberry Fk	R	H	Blount Cullman	Fish & Wildlife	Nutrients	Unknown source	1972-83 1988 1996	2.5 mi.	Marriott Cr / Mill Cr
10	AL/03160109-080_03	N	Mulberry Fk	R	H	Blount Cullman	Fish & Wildlife	Nutrients Siltation Other habitat alter.	Unknown source	1972-83 1988 1996	20 mi.	Mill Cr / Broglen R
11	AL/03160109-170_01	P	Cane Cr	R	M	Walker	Fish & Wildlife Agri. & Ind.	Metals Nutrients pH Siltation OE/DO	Unknown source	1988 1993 1997	14.7 mi.	Lost Cr / Its Source
12	AL/03160109-170_02	N	Black Br	R	H	Walker	Fish & Wildlife	Metals pH Siltation Other habitat alter.	Unknown source	1996-97	3.1 mi.	Cane Cr/ Its Source
13	AL/03160109-170_03	L	Lost Cr	R	H	Walker	Fish & Wildlife Agri. & Ind.	Siltation Other habitat alter.	Unknown source		1.2 mi.	US Hwy. 78 / Mill dam @ Cedrum
14	AL/03160109-170_04	L	Lost Cr	R	H	Walker	Fish & Wildlife	Siltation Other habitat alter.	Unknown source		17.3 mi.	Mill dam @ Cedrum / AL Hwy. 69 @ Oakman
15	AL/03160109-180_01	P	Wolf Cr	R	H	Walker	Fish & Wildlife	Metals pH Siltation Other habitat alter.	Unknown source	1996	37.2 mi.	Lost Cr / AL Hwy. 102

Table 6-6 (cont.)

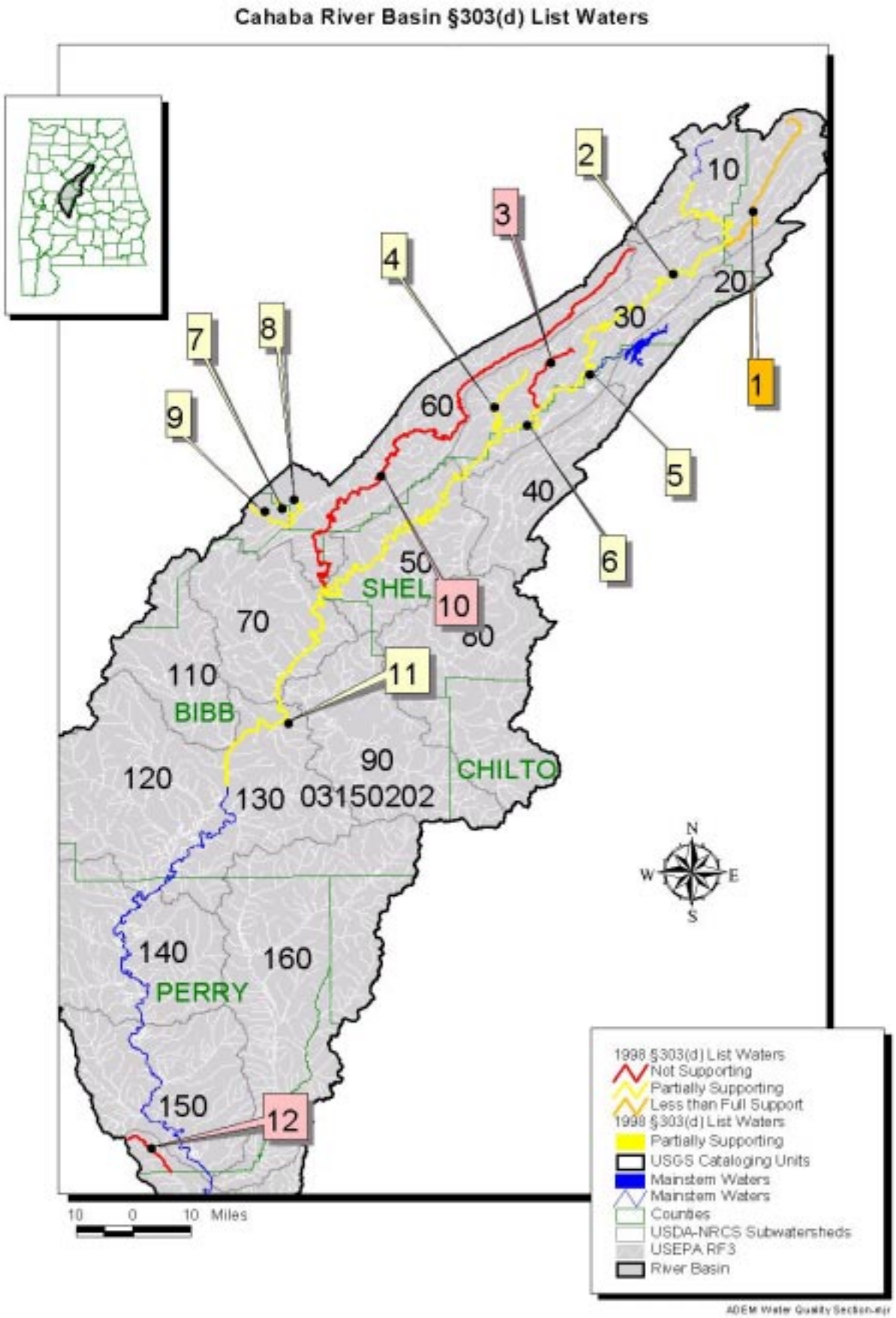
Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
16	AL/03160110-080_01	P	Rock Cr	R	M	Winston	Fish & Wildlife	OE/DO Pathogens	Pasture Grazing Int. animal feeding oper.	1990-91 1997	5.0 mi.	Smith L / Blevens Cr
17	AL/03160110-090_01	P	Crooked Cr	R	M	Cullman	Fish & Wildlife	Ammonia OE/DO Pathogens	Int. animal feeding oper. Pasture Grazing	1991 1997	28.0 mi.	Smith L / Its Source
18	AL/03160111-050_01	P	Dry Cr	R	M	Blount	Fish & Wildlife	Ammonia Nutrients OE/DO Pathogens	Unknown source	1988 1991	11.2 mi.	Locust Fk / Its Source
19	AL/03160111-050_02	N	Graves Cr	R	H	Blount	Fish & Wildlife	OE/DO	Pasture Grazing Industrial	1991	10.2 mi.	Locust Fk / Its Source
20	AL/03160111-050_03	L	Locust Fk	R	H	Blount	Fish & Wildlife	Siltation Other habitat alter.	Unknown source		21.8 mi.	Little Warrior R / Blount Co. Rd. 30
21	AL/03160111-120_01	L	Locust Fk	R	H	Blount Jefferson	Fish & Wildlife	Nutrients Siltation Other habitat alter.	Unknown source		47.3 mi.	Jefferson Co Rd 77 / Little Warrior R /
22	AL/03160111-130_01	P	Newfound Cr	R	M	Jefferson	Fish & Wildlife	Biology	Unknown source	1986	3.0 mi.	Fivemile Cr / Impoundment
23	AL/03160111-140_01	N	Camp Br	R	L	Jefferson	Fish & Wildlife	Metals pH Siltation Other habitat alter.	Surface mining-abandoned Subsurface mining-abandoned Mill tailings-abandoned Mine tailings-abandoned Landfills	1991	10.0 mi.	Bayview L / Its Source
24	AL/03160111-140_02	N	Village Cr	R	L	Jefferson	Agri. & Ind.	Npriority Organics Metals Ammonia pH Siltation OE/DO	Industrial Municipal Urban runoff/Storm sewers Surface mining-abandoned Subsurface mining-abandoned Mill tailings-abandoned Mine tailings-abandoned	1990-91 1997	12.6 mi.	Jefferson Co. Rd. 65 / Woodlawn Bridge
25	AL/03160111-140_03	N	Bayview L	L	L	Jefferson	Agri. & Ind.	Ammonia OE/DO Siltation Pesticides	Municipal Urban runoff/Storm sewers Industrial Spills Surface mining-abandoned	1991 1997	440 acr.	Bayview L Dam / Village Cr
26	AL/03160111-150_01	N	Short Cr	R	L	Jefferson	Fish & Wildlife	Metals pH OE/DO	Subsurface mining-abandoned Mine tailings-abandoned	1990-91 1997	3.0 mi.	Jefferson Co. Rd. 39 / 3 mi. upstream
27	AL/03160111-150_02	P	Locust Fk	R	L	Jefferson	Fish & Wildlife	OE/DO	Urban runoff/Storm sewers	1990-91 1997	16.3 mi.	Short Cr / Fivemile Cr
28	AL/03160112-020_01	L	Opossum Cr	R	H	Jefferson	Industrial Operations	OE/DO	Industrial Urban runoff/Storm sewers		7.1 mi.	Valley Cr / Its Source

Table 6-6 (cont.)

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
29	AL/03160112-030_01	N	Mud Cr	R	H	Jefferson	Fish & Wildlife	pH Siltation	Unknown source	1974-83	5.1 mi.	Valley Cr / Big Br
30	AL/03160112-050_01	N	Big Yellow Cr	R	H	Tuscaloosa	Swimming Fish & Wildlife	Metals pH	Unknown source	1979-85 1988	20.7 mi.	Bankhead L / Its Source
31	AL/Bankhead Res_01	P	Black Warrior R	R	L	Tuscaloosa	Public Water Sup. Swimming Fish & Wildlife	OE/DO	Dam construc.	1991	2.0 mi.	Bankhead Dam / Big Yellow Cr
32	AL/03160112-100_01	L	North R	R	H	Fayette Tuscaloosa	Fish & Wildlife	Nutrients Siltation Other habitat alter.	Unknown source		38 mi.	L Tuscaloosa / Ellis Cr
33	AL/Oliver Res_01	P	Black Warrior R	R	L	Tuscaloosa	Fish & Wildlife Swimming	OE/DO	Dam construc. Flow reg/mod	1991	6.0 mi.	Oliver Dam / Holt Lock and Dam
34	AL/03160112-120_01	L	Hurricane Cr	R	H	Tuscaloosa	Fish & Wildlife	Metals (Al, Fe) Pathogens Turbidity	Surface mining-abandoned Land development		31.4 mi.	Black Warrior R / Coal Cr
35	AL/03160112-120_02	L	Little Hurricane Cr	R	H	Tuscaloosa	Fish & Wildlife	Metals (Al, As, Cu, CrT, Fe) Pathogens	Surface mining-abandoned		10 mi.	Hurricane Cr / Its Source
36	AL/03160112-120_03	L	N. Fk. Hurricane Cr	R	H	Tuscaloosa	Fish & Wildlife	Metals (Al)	Surface mining-abandoned		6.4 mi.	Hurricane Cr / Its Source

SS =- Support Status with L = Less than Full Support, P = Partially Supporting, and N – Not Supporting; WBTYPE = Waterbody Type; R = Rank with L = Low, M = Medium, and H = High; OE/DO = Organic Enrichment/Dissolved. Oxygen

Figure 6-4


Cahaba River Basin §303(d) List Waters
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30
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70
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110
120
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SHEL
BIBB
CHILTO
PERRY
03150202
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10 0 10 Miles
1998 §303(d) List Waters
Not Supporting
Partially Supporting
Less than Full Support
1998 §303(d) List Waters
Partially Supporting
USGS Cataloging Units
Mainstem Waters
Mainstem Waters
Counties
USDA-NRCS Subwatersheds
USEPA RF3
River Basin
ADEM Water Quality Section.ejr

Table 6-7
Cahaba River Basin 1998 §303(d) List Waters

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
1	AL/03150202-010_01	L	Big Black Creek	R	H	St. Clair	Fish & Wildlife	Siltation Other habitat alter.	Surface mining-abandoned		15.6 mi.	Cahaba River / Its Source
2	AL/Cahaba R_01	P	Cahaba River	R	H	Jefferson Shelby	Fish & Wildlife	Nutrients Siltation	Urban runoff/Storm sewers Municipal		17.4 mi.	Buck Creek / US Hwy. 280
3	AL/03150202-030_02	N	Little Shades Creek	R	L	Jefferson	Fish & Wildlife	Priority Organics Nonpriority Organics OE/DO	Urban runoff/Storm sewers	1993	7.0 mi.	Cahaba River / Its Source
4	AL/03150202-030_03	P	Patton Creek	R	L	Jefferson	Fish & Wildlife	OE/DO	Urban runoff/Storm sewers	1995 1997	5.0 mi.	Cahaba River / Its Source
5	AL/Cahaba R_02	P	Cahaba River	R	H	Jefferson Shelby	Outstanding AL Water Public Water Supply Fish & Wildlife	Siltation Other habitat alter.	Urban runoff/Storm sewers		36.9 mi.	US Hwy. 280 / I-59
6	AL/Cahaba R_03	P	Cahaba River	R	H	Shelby	Outstanding AL Water Fish & Wildlife	Nutrients Siltation Pathogens Other habitat alter.	Municipal Urban runoff/Storm sewers Land development	1993-97	26.5 mi.	Shades Creek / Buck Creek
7	AL/03150202-060_01	P	Cooley Creek	R	M	Jefferson	Fish & Wildlife	Pathogens	Pasture Grazing Onsite wastewater systems	1996	3.8 mi.	Mill Creek / Its Source
8	AL/03150202-060_02	P	Mill Creek	R	M	Jefferson	Fish & Wildlife	Pathogens	Pasture Grazing	1996	5.4 mi.	Mud Creek / Its Source
9	AL/03150202-060_03	P	Mud Creek	R	M	Jefferson	Fish & Wildlife	Pathogens	Pasture Grazing	1996	3.7 mi.	Tannehill Iron Works / Its Source
10	AL/03150202-060_04	N	Shades Creek	R	L	Jefferson	Fish & Wildlife	Siltation OE/DO Other habitat alter. Pathogens Turbidity	Collection system failure Hwy/road/bridge construc. Land development Urban runoff/Storm sewers Removal of riparian veg. Bank/shoreline modification	1990-93 1997	55.0 mi.	Cahaba River / Its Source
11	AL/Cahaba R_04	P	Cahaba River	R	H	Bibb Shelby	Outstanding AL Water	Nutrients Other habitat alter.	Municipal Urban runoff/Storm sewers Land development		24 mi.	AL Hwy. 82 / Shades Creek
12	AL/03150202-170_01	N	Dry Creek	R	M	Dallas	Fish & Wildlife	Pathogens	Pasture Grazing	1996	4.5 mi.	Dallas Co. Rd. 201 / Its Source

SS =- Support Status with L = Less than Full Support, P = Partially Supporting, and N – Not Supporting; WBTYPE = Waterbody Type; R = Rank with L = Low, M = Medium, and H = High; OE/DO = Organic Enrichment/Dissolved. Oxygen

Figure 6-5

Chattahoochee River Basin §303(d) List Waters

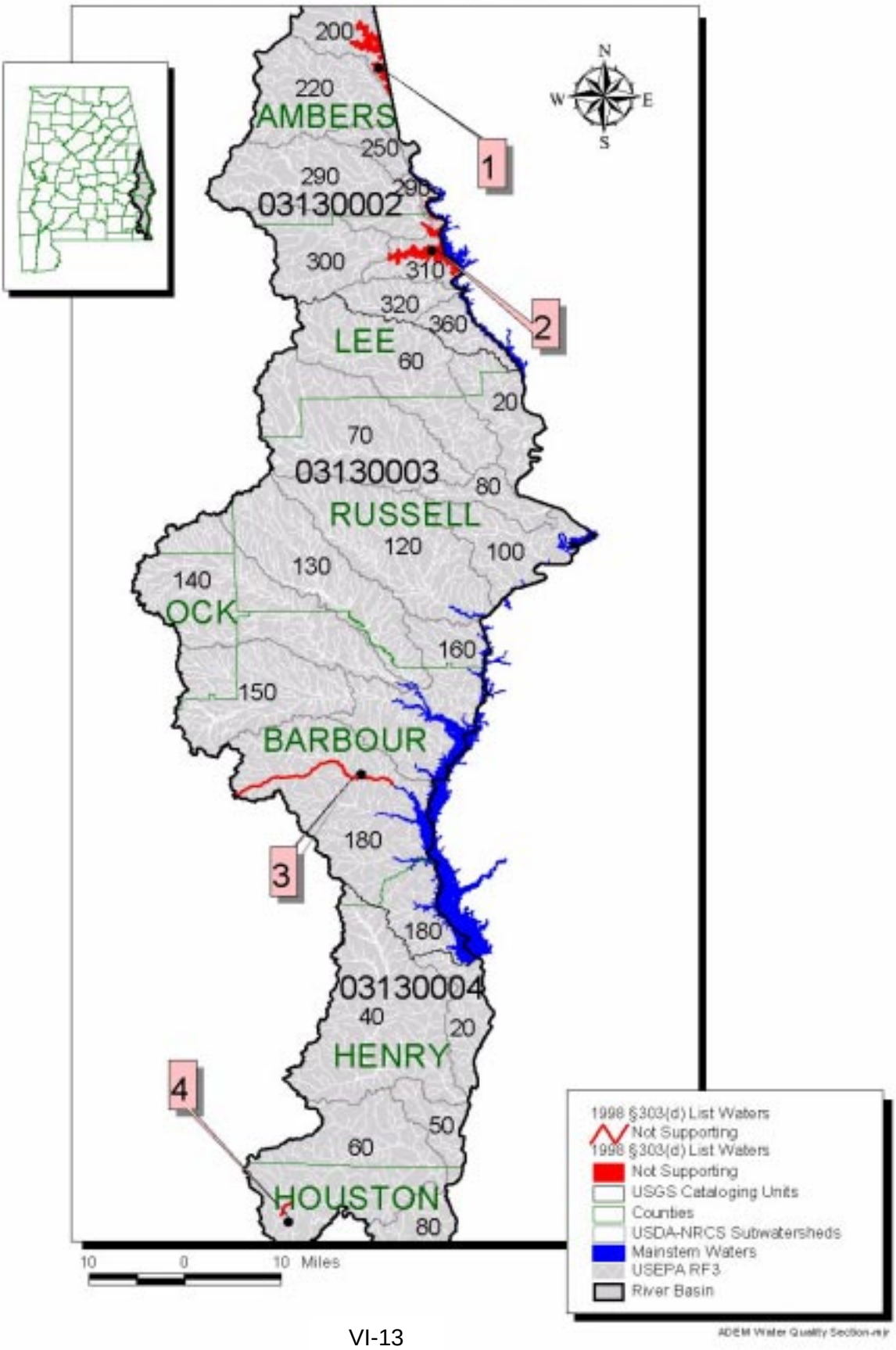


Table 6-8
Chattahoochee River Basin 1998 §303(d) List Waters

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
1	AL/West Point Res_01	N	West Point L	L	L	Chambers	Fish & Wildlife Swimming	Pesticides	Contaminated sediments	1993	2304 acr.	West Point Dam / Randolf Co. Line
2	AL/Harding Res_01	N	L Harding	L	L	Lee	Public Water Sup. Swimming Fish & Wildlife	Pesticides	Contaminated sediments	1993	2176 acr.	Bartlette Ferry Dam / West Point Dam
3	AL/03130003-180_01	N	Barbour Cr	R	H	Barbour	Fish & Wildlife	Siltation OE/DO	Unknown source	1987	21.9 mi.	Chattahoochee River / Its Source
4	AL/03130004-060_01	N	Poplar Spring Br	R	H	Houston	Fish & Wildlife	pH	Unknown source	1984	2.0 mi.s	Omussee Creek / Ross Clark Circle

SS =- Support Status with L = Less than Full Support, P = Partially Supporting, and N – Not Supporting; WBTYPE = Waterbody Type; R = Rank with L = Low, M = Medium, and H = High; OE/DO = Organic Enrichment/Dissolved. Oxygen

Figure 6-6

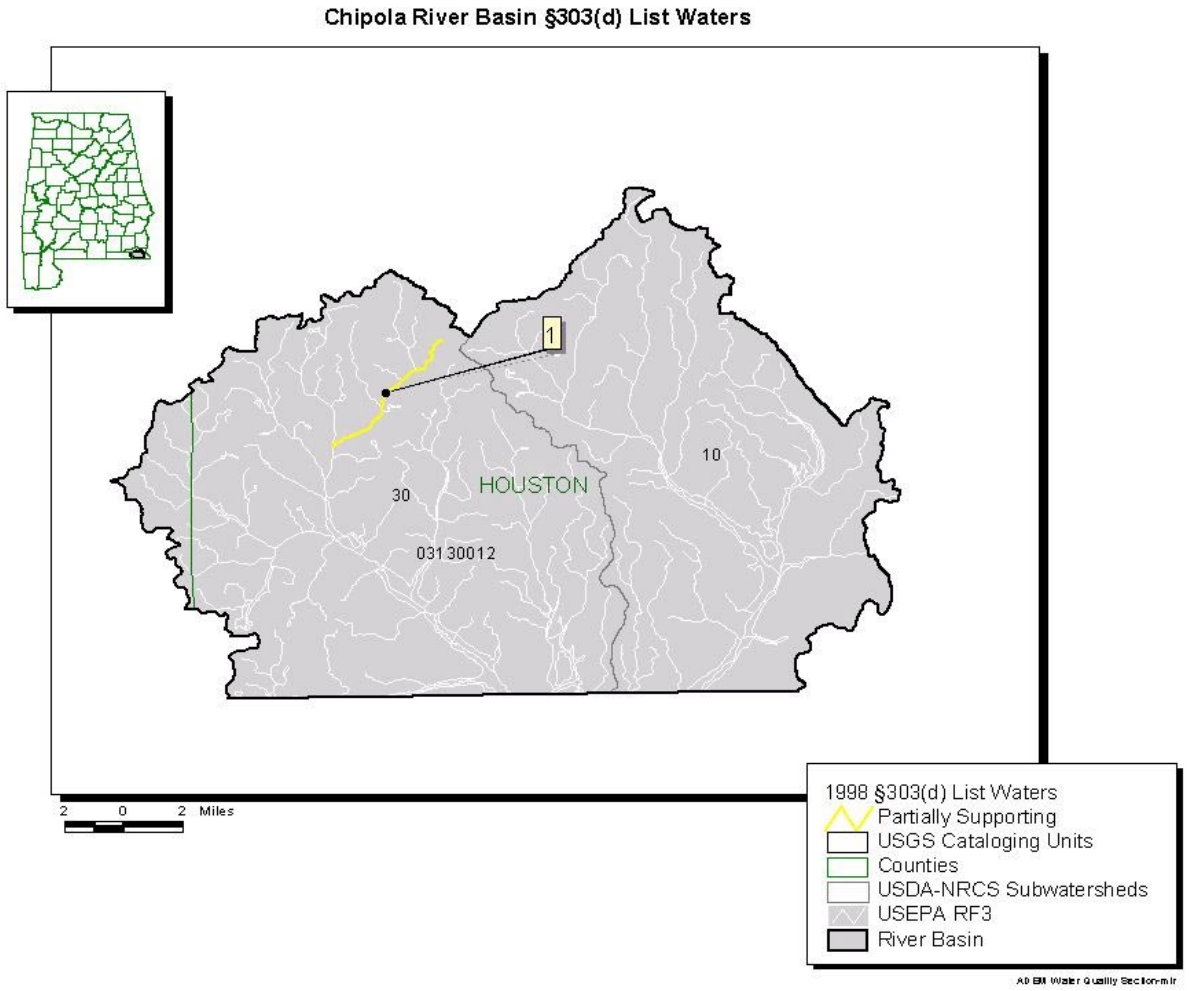
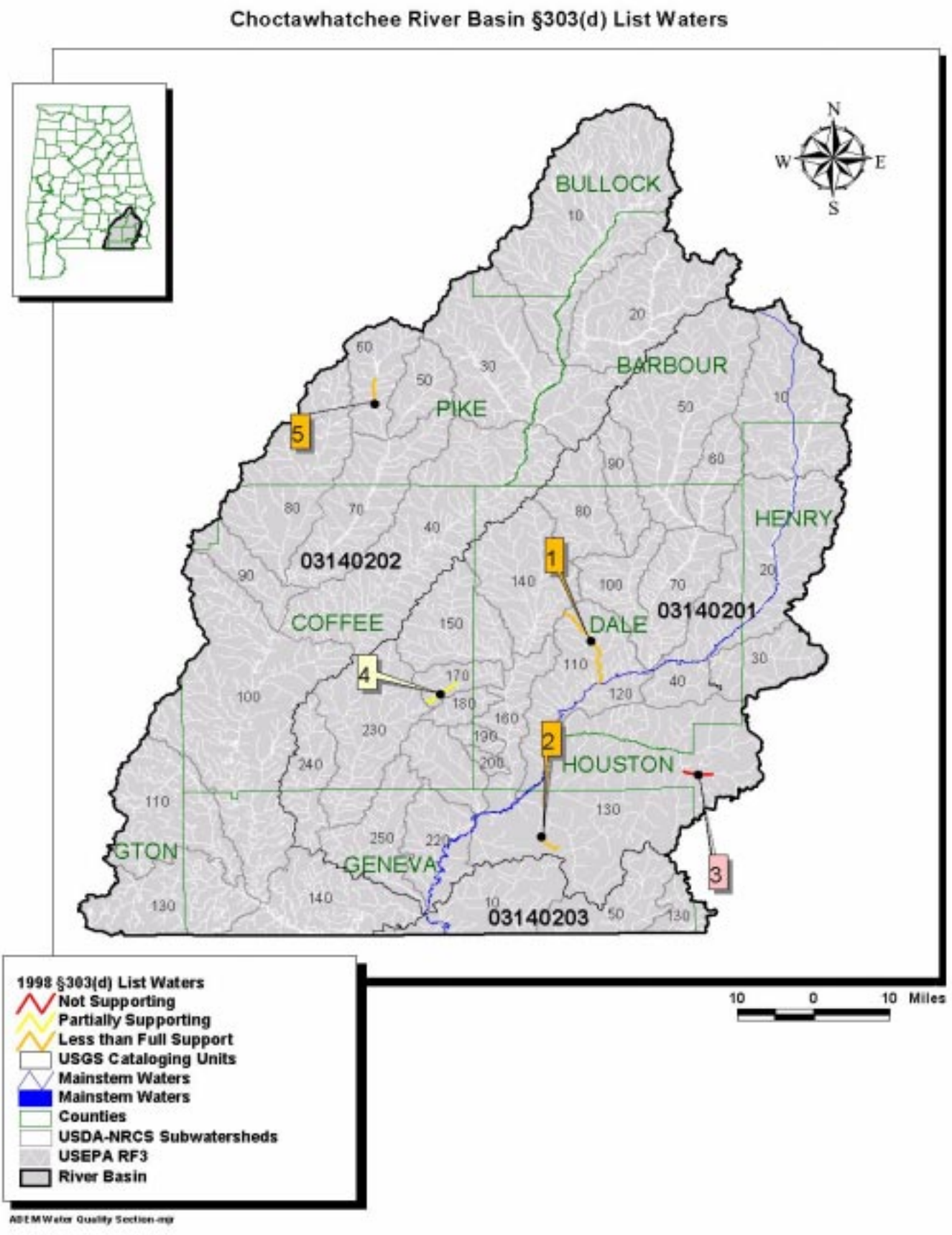


Table 6-9
Chipola River Basin 1998 §303(d) List Waters

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
1	AL/03130012-030_01	P	Cypress Cr	R	M	Houston	Fish & Wildlife	Nutrients OE/DO	Unknown source	1984 1986	5.3 miles	Limestone Creek / Its Source

SS =- Support Status with L = Less than Full Support, P = Partially Supporting, and N – Not Supporting; WBTYPE = Waterbody Type; R = Rank with L = Low, M = Medium, and H = High; OE/DO = Organic Enrichment/Dissolved. Oxygen

Figure 6-7


Choctawhatchee River Basin §303(d) List Waters
BULLOCK
PIKE
BARBOUR
HENRY
COFFEE
DALE
HOUSTON
GENEVA
GTON
03140202
03140201
03140203
1
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3
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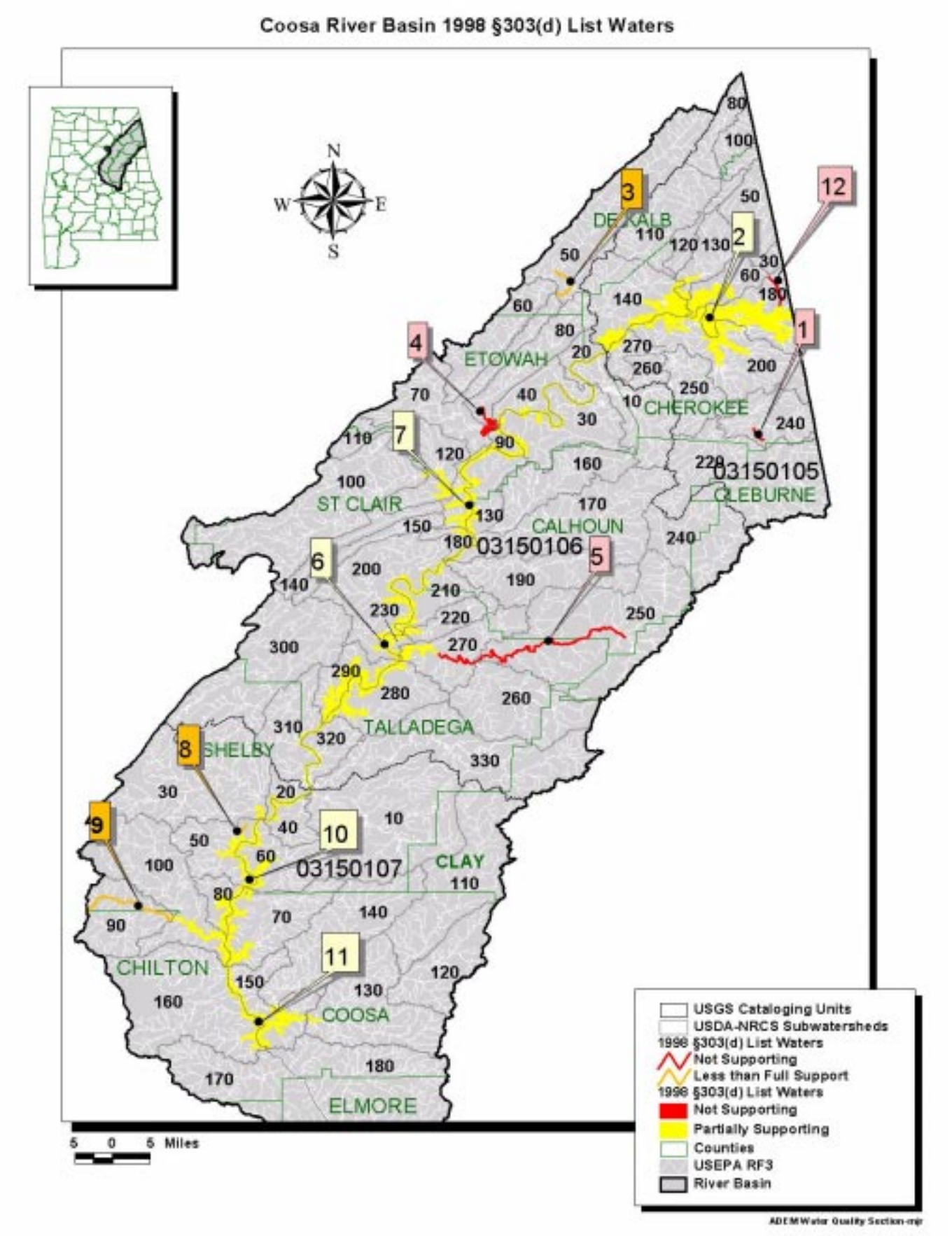
1998 §303(d) List Waters
Not Supporting
Partially Supporting
Less than Full Support
USGS Cataloging Units
Mainstem Waters
Mainstem Waters
Counties
USDA-NRCS Subwatersheds
USEPA RF3
River Basin

Table 6-10
Choctawhatchee River Basin 1998 §303(d) List Waters

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
1	AL/03140201-110_01	L	Hurricane Cr	R	H	Dale	Fish & Wildlife	Pathogens	Unknown source		8.5 mi.	Choctawhatchee River / Its Source
2	AL/03140201-130_01	L	Dowling Br	R	H	Geneva	Fish & Wildlife	OE/DO Pathogens	Unknown source		2.1 mi.	Cox Mill Creek / Its Source
3	AL/03140201-130_02	N	Beaver Cr	R	H	Houston	Fish & Wildlife	Nutrients OE/DO	Unknown source	1977-86	2.5 mi.	Newborn Creek / Dothan WWTP
4	AL/03140201-150_01	P	UT to Harrand Cr	R	M	Coffee	Fish & Wildlife	Nutrients OE/DO	Unknown source	1985 1986	4.0 mi.	Harrand Creek / Its Source
5	AL/03140202-060_01	L	Walnut Cr	R	M	Pike	Fish & Wildlife	Unknown toxicity	Municipal		3.0 mi.	Troy WWTP / DS of Pike Co. Rd. 59

SS =- Support Status with L = Less than Full Support, P = Partially Supporting, and N – Not Supporting; WBTYPE = Waterbody Type; R = Rank with L = Low, M = Medium, and H = High; OE/DO = Organic Enrichment/Dissolved. Oxygen

Figure 6-8


Coosa River Basin 1998 §303(d) List Waters
N
W
E
S
DEKALB
ETOWAH
CHEROKEE
CLEBURNE
ST CLAIR
CALHOUN
TALLADEGA
SHELBY
CLAY
CHILTON
COOSA
ELMORE
03150105
03150106
03150107
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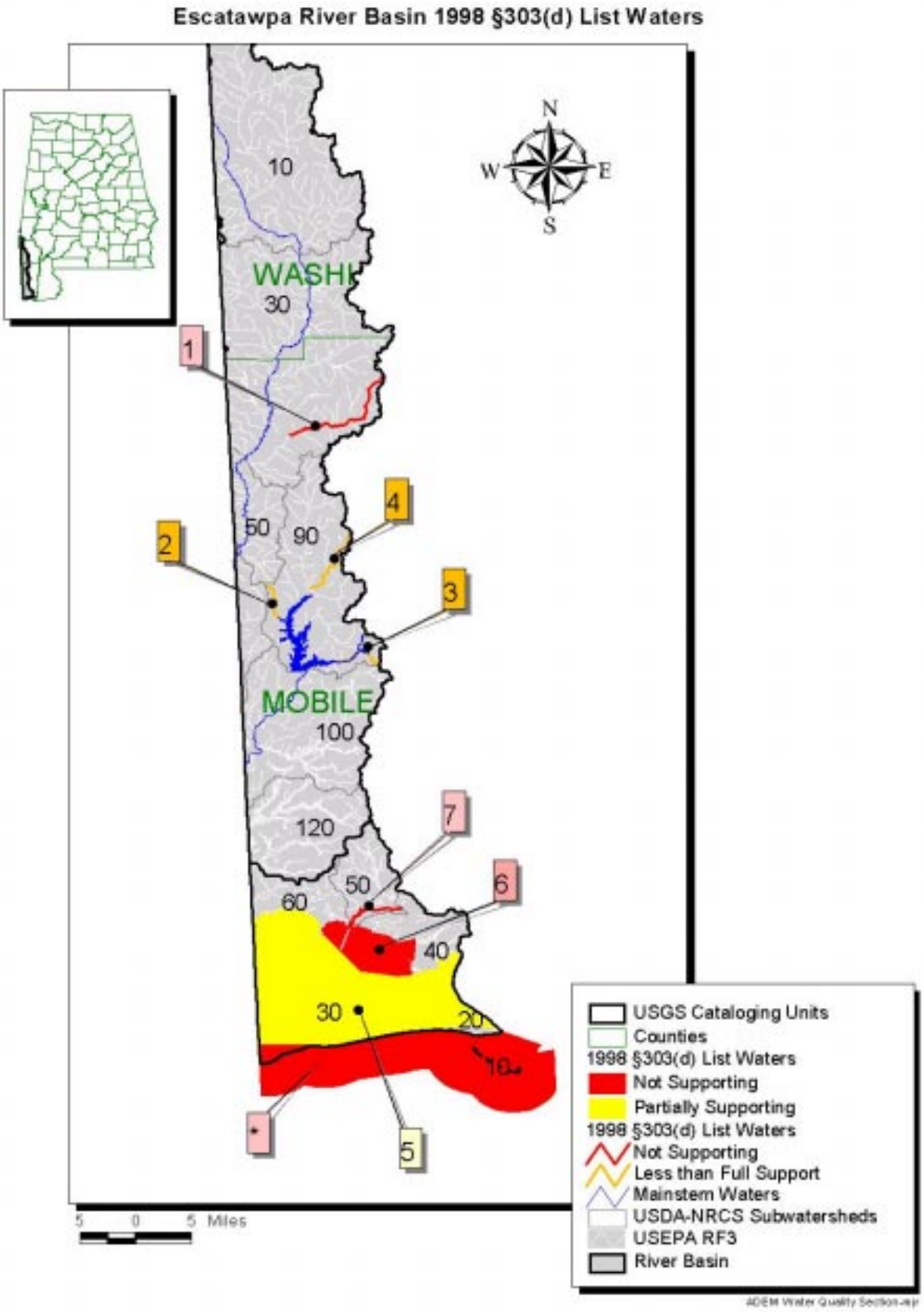
5 0 5 Miles
USGS Cataloging Units
USDA-NRCS Subwatersheds
1998 §303(d) List Waters
Not Supporting
Less than Full Support
1998 §303(d) List Waters
Not Supporting
Partially Supporting
Counties
USEPA RF3
River Basin

Table 6-11
Coosa River Basin 1998 §303(d) List Waters

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
1	AL/03150105-240_01	N	Wolf Br (UT to Hurricane Cr.)	R	H	Cherokee	Fish & Wildlife	Ammonia OE/DO	Int. animal feeding oper.	1994	2.0 mi.	Hurricane Creek / Its Source
2	AL/Weiss Res_01	P	Weiss L	L	M	Cherokee	Public Water Sup. Swimming Fish & Wildlife	Priority Organics Nutrients pH OE/DO	Sources outside state Flow reg/mod	1992-94	30200 acr.	Weiss Dam / AL-GA State Line
3	AL/03150106-050_01	L	Little Wills Cr	R	H	DeKalb	Fish & Wildlife	Nutrients	Unknown source		5.5 mi.	Big Wills Creek / Its Source
4	AL/03150106-080_01	N	Black Cr	R	L	Etowah	Agri. & Ind.	Priority Organics Ammonia OE/DO	Industrial Urban runoff/Storm sewers Contaminated sediments	1994 1997	3.0 mi.	Big Wills Creek / Forest Avenue
5	AL/03150106-270_01	N	Choccolocco Cr	R	L	Talladega	Fish & Wildlife	Priority Organics	Contaminated sediments	1993-97	34.2 mi.	Lake Logan Martin / Hillabee Creek
6	AL/Logan Martin Res_01	P	L Logan Martin	L	L	St. Clair	Fish & Wildlife Swimming	Nutrients OE/DO Priority Organics	Urban runoff/Storm sewers Flow reg/mod Contaminated sediments	1991-93 1994-97 1995-97	15263 acr.	Logan Martin Dam / Neely Henry Dam
7	AL/Neely Henry Res_01	P	L Neely Henry	L	M	Etowah	Public Water Sup. Swimming Fish & Wildlife	Priority Organics Nutrients pH OE/DO	Industrial Municipal Flow reg/mod Upstream sources	1992-95 1994-97	11235 acr.	Neely Henry Dam / Weiss Dam
8	AL/03150107-050_01	L	UT to Dry Br	R	H	Shelby	Fish & Wildlife	Nutrients	Unknown source		1.5 mi.	Dry Branch / Its Source
9	AL/03150107-090_01	L	Buxahatchee Cr	R	H	Chilton Shelby	Fish & Wildlife	Nutrients	Unknown source		13 mi.	Waxahatchee Creek / Its Source
10	AL/Lay Res_01	P	Lay L	L	L	Talladega	Public Water Sup. Swimming Fish & Wildlife	Priority Organics Nutrients OE/DO Flow alter.	Flow reg/mod Contaminated sediments Upstream sources	1990-91 1992-97	12000 acr.	Lay Dam / Logan Martin Dam
11	AL/Mitchell Res_01	P	L Mitchell	L	L	Coosa	Public Water Sup. Swimming Fish & Wildlife	Nutrients OE/DO	Urban runoff/Storm sewers Flow reg/mod	1991-93 1994-97	5850 acr.	Mitchell Dam / Lay Dam
12	AL/03150105-180_01	N	UT to Weiss L	R	H	Cherokee	Fish & Wildlife	Ammonia Nutrients OE/DO Pathogens	Unknown source		4.4 mi.	Blayplay Creek / Its Source

SS =- Support Status with L = Less than Full Support, P = Partially Supporting, and N – Not Supporting; WBTYPE = Waterbody Type; R = Rank with L = Low, M = Medium, and H = High; OE/DO = Organic Enrichment/Dissolved. Oxygen

Figure 6-9


Escatawpa River Basin 1998 §303(d) List Waters
N
W
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S
10
WASHI
30
1
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50
90
2
3
MOBILE
100
7
120
50
6
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USGS Cataloging Units
Counties
1998 §303(d) List Waters
Not Supporting
Partially Supporting
1998 §303(d) List Waters
Not Supporting
Less than Full Support
Mainstem Waters
USDA-NRCS Subwatersheds
USEPA RF3
River Basin

Table 6-12
Escatawpa River Basin 1998 §303(d) List Waters

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	River Basin	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
1	AL/03170008-030_01	N	Puppy Cr	R	L	Escatawpa	Mobile	Fish & Wildlife	Pathogens	Urban runoff/Storm sewers	1991	10.0 mi.	AL Hwy. 217 / Its Source
2	AL/03170008-090_01	L	Boggy Br	R	M	Escatawpa	Mobile	Fish & Wildlife	Metals (Fe) Pathogens	Unknown source		3.6 mi.	Big Creek Lake / Its Source
3	AL/03170008-090_02	L	Hamilton Cr	R	H	Escatawpa	Mobile	Fish & Wildlife	OE/DO	Unknown source		4.6 mi.	Big Creek Lake / Its Source
4	AL/03170008-090_03	L	Juniper Cr	R	H	Escatawpa	Mobile	Fish & Wildlife	Pathogens	Unknown source		6.6 mi.	Big Creek / Its Source
5	AL/03170009-030_01	P	Mississippi Sound	E	M	Escatawpa	Mobile	Shellfish Harvesting Fish & Wildlife Swimming	Pathogens	Urban runoff/Storm sewers	1994-97	146.5 mi2	Segment classified for shellfish harvsting
6	AL/03170009-030_02	N	Portersville Bay	E	L	Escatawpa	Mobile	Shellfish Harvesting Fish & Wildlife Swimming	Pathogens	Municipal Industrial	1996	23.2 mi2	1000 ft. W. of outfall / Bayou La Batre Utilities Outfall
7	AL/03170009-050_01	N	Bayou La Batre	R	L	Escatawpa	Mobile	Fish & Wildlife	pH OE/DO	Urban runoff/Storm sewers	1990-91	4.0 mi.	Portersville Bay / Its Source

* The Gulf of Mexico is listed for mercury fish tissue concentrations in King Mackerell. Further information is contained in Table 6-10, #19 as well as Part V Table 5-1.

SS =- Support Status with L = Less than Full Support, P = Partially Supporting, and N – Not Supporting; WBTYPE = Waterbody Type; R = Rank with L = Low, M = Medium, and H = High; OE/DO = Organic Enrichment/Dissolved. Oxygen

Figure 6-10

Lower Tombigbee River Basin §303(d) List Waters

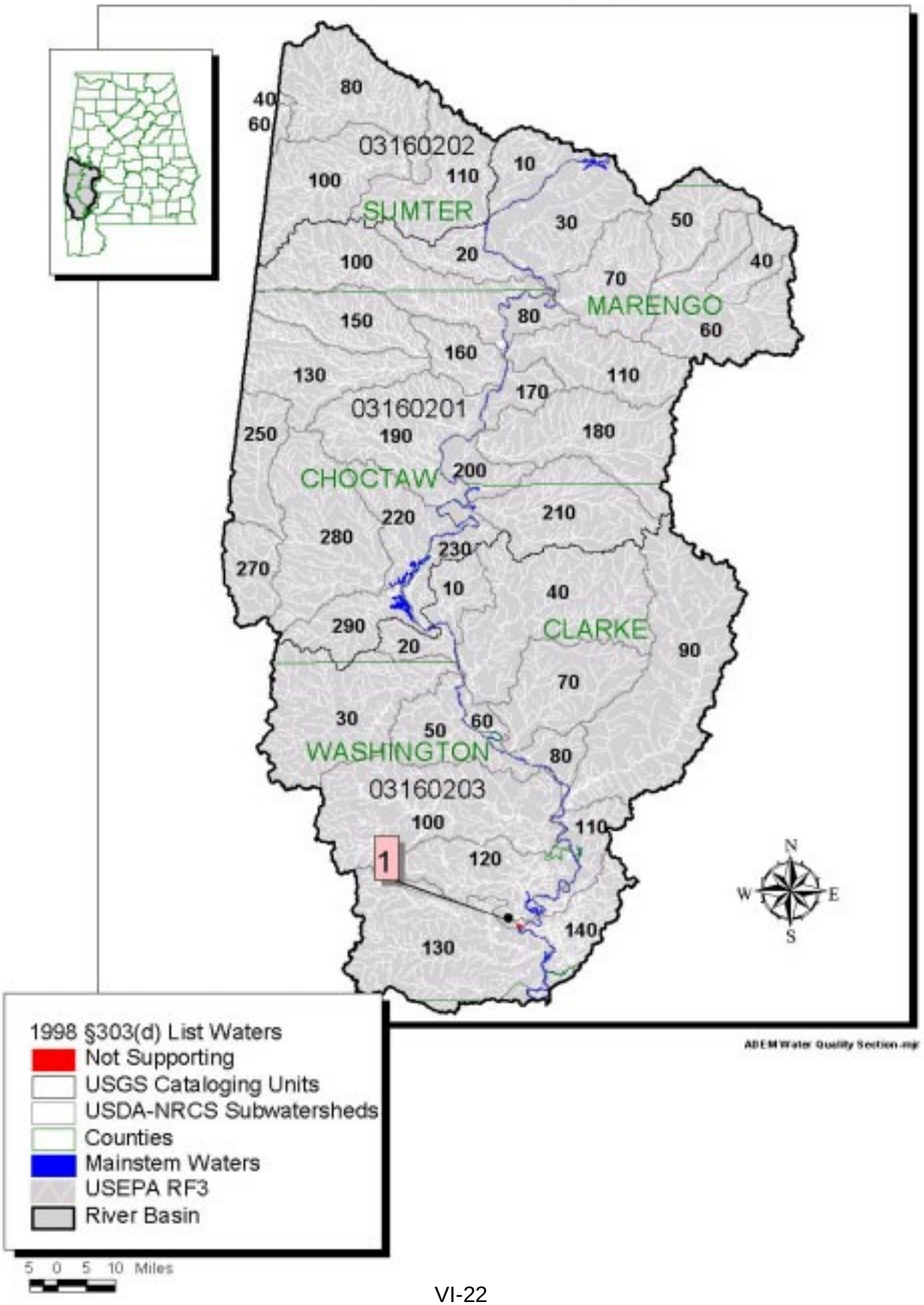


Table 6-13
Lower Tombigbee River Basin 1998 §303(d) List Waters

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	River Basin	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
1	AL/03160203-130_01	N	Olin Basin	L	L	L. Tombigbee	Washington	Fish & Wildlife	Pesticides Metals	Contaminated sediments	1993	65 acr.	All of Olin Basin

SS =- Support Status with L = Less than Full Support, P = Partially Supporting, and N – Not Supporting; WBTYPE = Waterbody Type; R = Rank with L = Low, M = Medium, and H = High; OE/DO = Organic Enrichment/Dissolved. Oxygen

Figure 6-11

Mobile River Basin 1998 §303(d) List Waterbodies

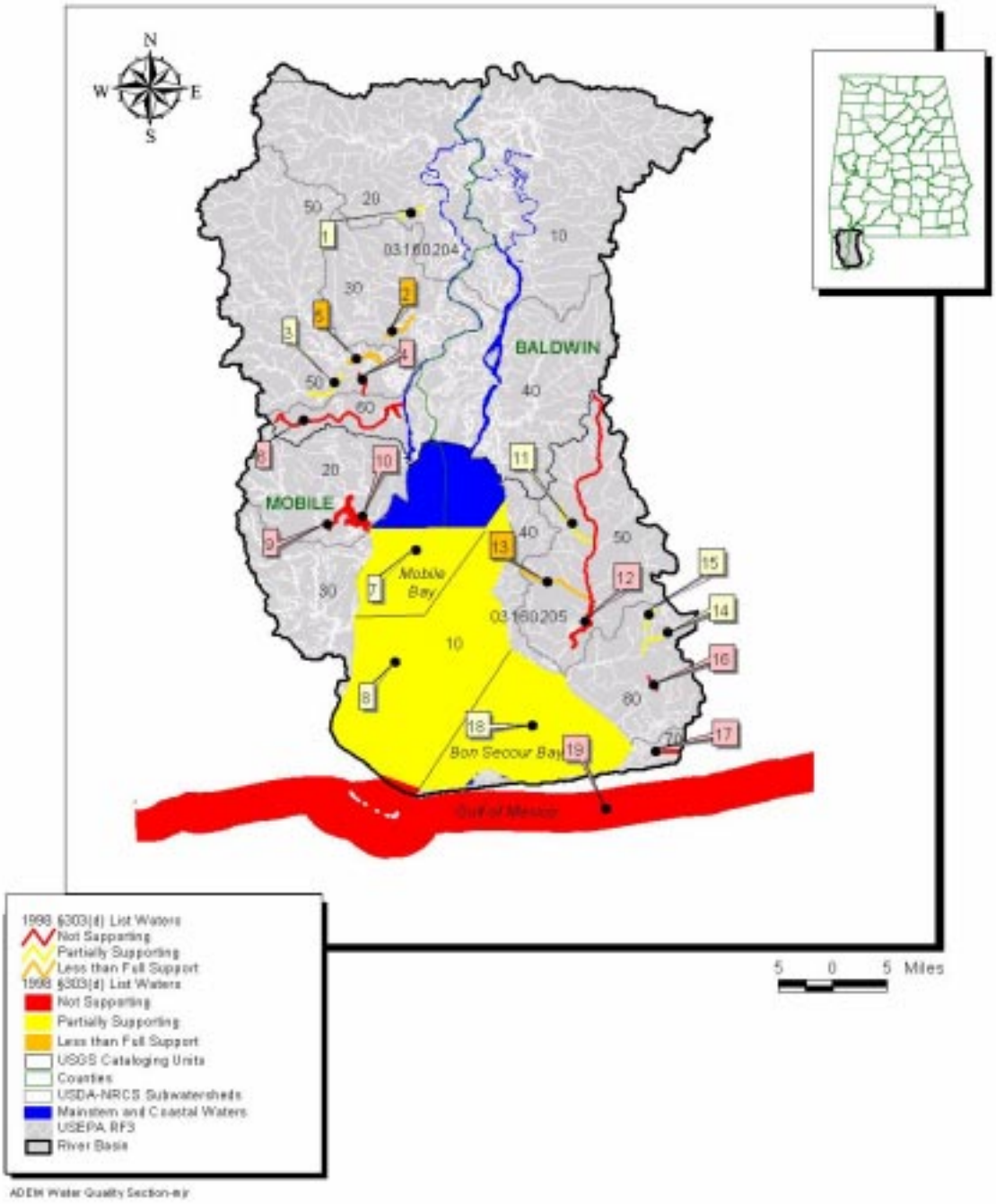


Table 6-14
Mobile River Basin 1998 §303(d) List Waters

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
1	AL/03160204-020_01	P	Cold Cr Swamp	E	L	Mobile	Fish & Wildlife	Metals	Contaminated sediments Flow reg/mod	1993	1.0 mi2	
2	AL/03160204-030_01	L	Bayou Sara/ Norton Cr	R	H	Mobile	Swimming Fish & Wildlife	Nutrients	Unknown source		3.7 mi.	Saraland WWTP / Gunnison Creek
3	AL/03160204-050_01	P	Eightmile Cr	R	M	Mobile	Public Water Sup. Fish & Wildlife	Pathogens	Urban runoff/Storm sewers Collection system failure	1996-97	3.2 mi.	AL Hwy. 45 / Highpoint Blvd.
4	AL/03160204-050_02	N	Gum Tree Br	R	H	Mobile	Fish & Wildlife	Pathogens	Collection system failure Urban runoff/Storm sewers	1998	2.2 mi.	Eightmile Creek / Its Source
5	AL/03160204-050_03	L	Chickasaw Cr	R		Mobile	Swimming Fish & Wildlife Agri. & Ind.	pH	Unknown source		4.0 mi.	AL Hwy. 43 / AL Hwy. 213
6	AL/03160204-060_01	N	Threemile Cr	R	L	Mobile	Agri. & Ind.	pH OE/DO	Municipal Collection system failure Hwy/road/bridge construc. Land development	1990-95 1997	17.4 mi.	Mobile River / Its Source
7	AL/03160205-010_01	P	Mobile Bay	E	L	Mobile	Shellfish Harvesting Fish & Wildlife Swimming	OE/DO	Urban runoff/Storm sewers	1990-91	50.0 mi2	Southwest bay
8	AL/03160205-010_02	P	Mobile Bay	E	M	Mobile	Shellfish Harvesting Fish & Wildlife	Pathogens	Urban runoff/Storm sewers	1994-97	198.5 mi2	Segment classified for shellfish harvsting
9	AL/03160205-020_01	N	Rabbit Cr	R	L	Mobile	Fish & Wildlife	OE/DO Pathogens	Urban runoff/Storm sewers Onsite wastewater systems	1991	3.0 mi.	Dog River / AL Hwy. 163
10	AL/03160205-020_02	N	Dog R	R	L	Mobile	Fish & Wildlife Swimming	pH OE/DO Pathogens	Land development Urban runoff/Storm sewers Onsite wastewater systems	1990-91 1993-95	4.0 mi.	Mobile River / 4 miles upstream
11	AL/03160205-050_01	P	Caney Br	R	M	Baldwin	Fish & Wildlife	Pathogens	Pasture grazing - riparian	1995-97	5.0 mi.	Fish River / Its Source
12	AL/03160205-050_02	N	Fish R	R	L	Baldwin	Fish & Wildlife Swimming	Mercury	Unknown source	1996	31.5 mi.	Weeks Bay / Its Source
13	AL/03160205-050_03	L	Cowpen Cr	R	M	Baldwin	Fish & Wildlife	pH	Unknown source	1991 1996	6.8 mi.	Fish River / Its Source
14	AL/03160205-060_01	P	Magnolia R	R	M	Baldwin	Fish & Wildlife Swimming	OE/DO	Land development Onsite wastewater systems	1994-97	6.3 mi.	Baldwin Co. Rd. 49 / Baldwin Co. Rd. 24
15	AL/03160205-060_02	P	UT to Magnolia R	R	M	Baldwin	Fish & Wildlife	Pathogens	Agriculture	1994-97	3.0 mi.	Baldwin Co. Rd. 24 / Its Source
16	AL/03160205-060_03	N	UT to Bon Secour R.	R	H	Baldwin	Fish & Wildlife	Pathogens	Urban runoff/Storm sewers Pasture grazing	1995	2.3 mi.	Baldwin Co. Rd. 65 / Its Source
17	AL/03160205-070_01	N	Intracoastal Waterway	R	L	Baldwin	Fish & Wildlife	OE/DO	Urban runoff/Storm sewers Natural sources	1990-91	2.2 mi.	Oyster Bay / Alabama Hwy. 59
18	AL/03160205-070_02	P	Bon Secour Bay	E	M	Baldwin	Shellfish Harvesting Swimming Fish & Wildlife	Pathogens	Urban runoff/Storm sewers Onsite wastewater systems	1994-97	121.3 mi2	Segment classified for shellfish harvsting
19	AL/Gulf of Mexico_01	N	Gulf of Mexico	E	L	Mobile	Shellfish Harvesting Swimming Fish & Wildlife	Mercury	Unknown source	1996-97	238 mi2	Mississippi / Florida

SS =- Support Status with L = Less than Full Support, P = Partially Supporting, and N – Not Supporting; WBTYPE = Waterbody Type; R = Rank with L = Low, M = Medium, and H = High; OE/DO = Organic Enrichment/Dissolved. Oxygen

Figure 6-12

Perdido-Escambia River Basin §303(d) List Waters

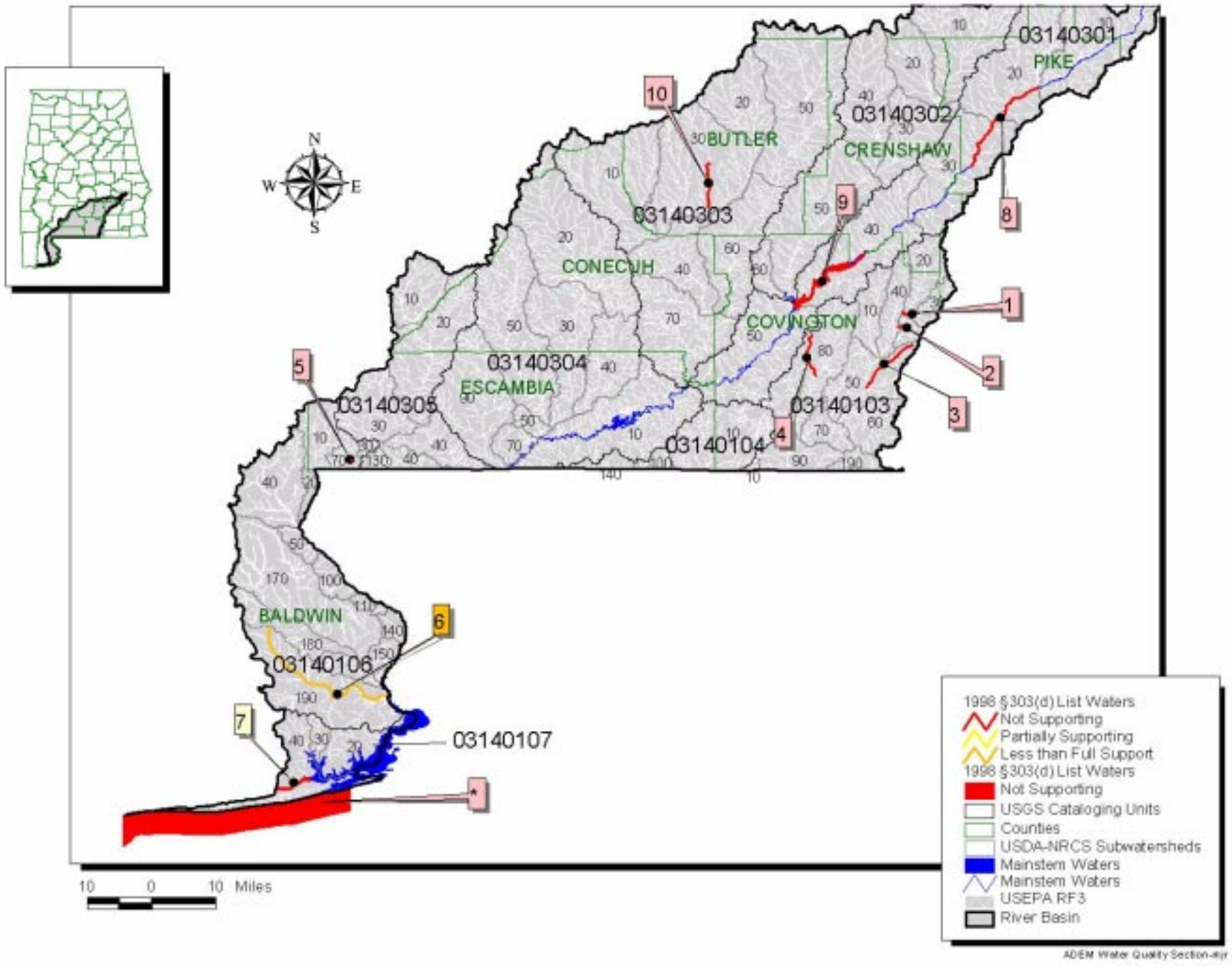


Table 6-15
Perdido-Escambia River Basin 1998 §303(d) List Waters

Map Index	WaterbodyID	SS	Waterbody Name	WBTYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
1	AL/03140103-020_01	N	UT to Jackson L 2-S	R	H	Covington	Fish & Wildlife	OE/DO Pathogens	Int. animal feeding oper. Pasture grazing	1996-97	1.3 mi.	W.F. Jackson Lake / Its Source
2	AL/03140103-020_02	N	UT to Jackson L 3-C	R	H	Covington	Fish & Wildlife	OE/DO Pathogens	Int. animal feeding oper. Pasture grazing	1996-97	0.2 mi.	W.F. Jackson Lake / Its Source
3	AL/03140103-050_01	N	Indian Cr	R	H	Covington	Fish & Wildlife	Nutrients OE/DO	Unknown source	1985	9.0 mi.	Yellow River / Its Source
4	AL/03140103-080_01	N	Bay Br	R	H	Covington	Fish & Wildlife	Nutrients OE/DO	Unknown source		7.2 mi.	Five Runs Creek / Its Source
5	AL/03140106-070_01	P	Boggy Br	R	L	Escambia	Fish & Wildlife	OE/DO Zinc Chlorides	Industrial	1996,97	0.2 mi.	Atmore WWTP / Masland Carpets WWTP
6	AL/03140106-190_01	L	Blackwater R	R	H	Baldwin	Fish & Wildlife	Metals	Unknown source		30.4 mi.	Perdido River / Its Source
7	AL/03140107-040_01	N	Intracoastal Waterway	E	L	Baldwin	Fish & Wildlife	OE/DO Temperature	Unknown source		5 mi.	AL Hwy. 59 / Wolf Bay
8	AL/03140301-030_01	N	Conecuh R	R	L	Pike	Fish & Wildlife	Siltation OE/DO	Nonirrigated crop prod. Pasture grazing	1991	24.7 mi.	Broadhead Creek / Mannings Creek
9	AL/03140301-040_01	N	Conecuh R	R	L	Covington	Fish & Wildlife Swimming	Siltation OE/DO Pathogens	Nonirrigated crop prod. Flow reg/mod Pasture grazing	1991	18.0 mi.	Point A Dam / Hornet Creek
10	AL/03140303-030_01	N	Rocky Cr	R	H	Butler	Fish & Wildlife	Unknown toxicity	Unknown source	1986 1990	8.0 mi.	Persimmon Creek / Co. Rd. N of Chapman

* The Gulf of Mexico is listed for mercury fish tissue concentrations in King Mackerell. Further information is contained in Table 6-10, #19 as well as Part V Table 5-1.

SS =- Support Status with L = Less than Full Support, P = Partially Supporting, and N – Not Supporting; WBTYPE = Waterbody Type; R = Rank with L = Low, M = Medium, and H = High; OE/DO = Organic Enrichment/Dissolved. Oxygen

Figure 6-13

Tallapoosa River Basin §303(d) List Waters

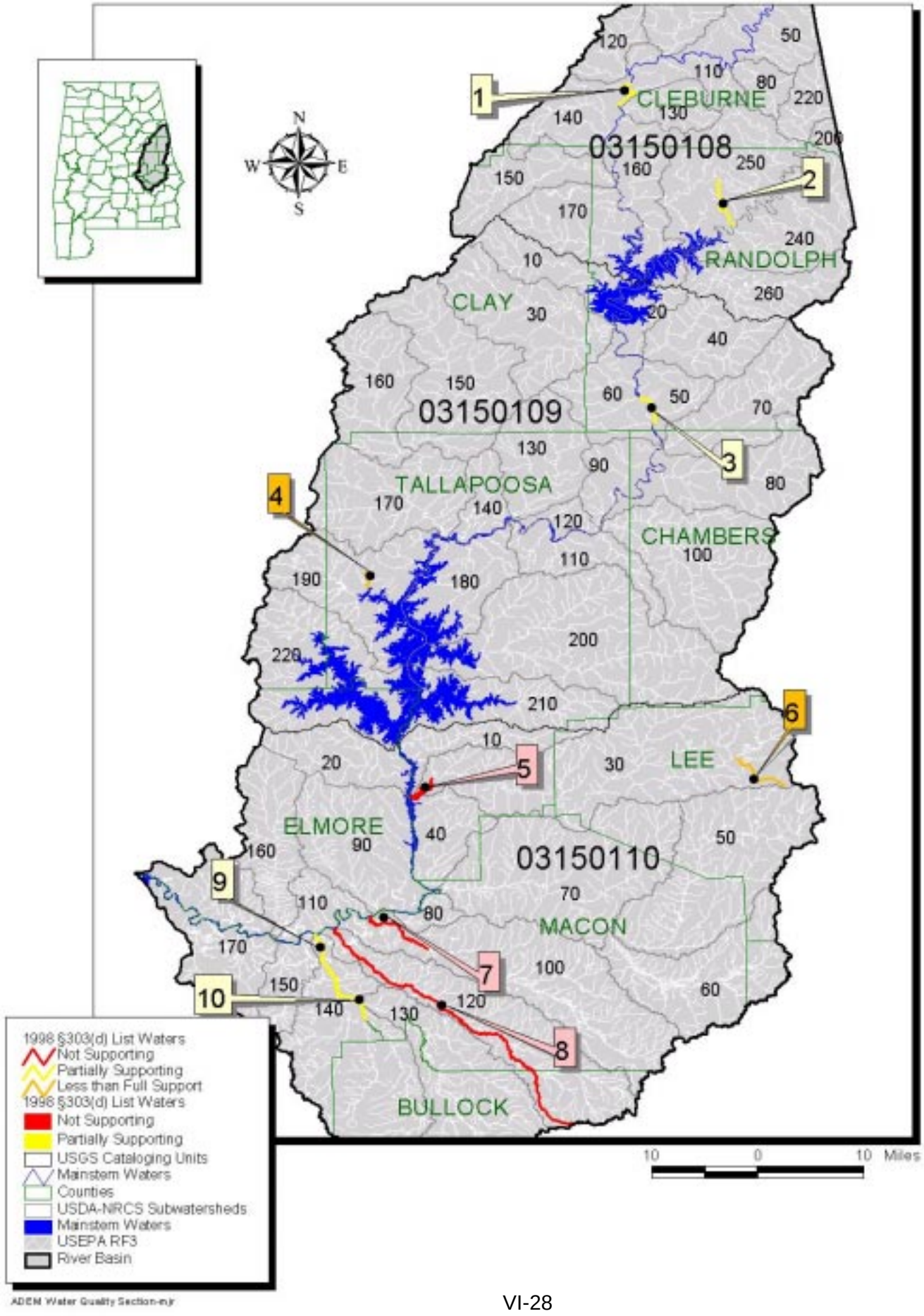


Table 6-16
Tallapoosa River Basin 1998 §303(d) List Waters

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
1	AL/Tallapoosa R_01	P	Tallapoosa R	R	M	Cleburne	Fish & Wildlife	OE/DO	Industrial Municipal Nonirrigated crop prod. Pasture grazing Flow reg/mod	1992	4.3 mi.	Dam-Cleb. Co. Rd. 36 / Cleburne Co. Rd. 19
2	AL/03150108-250_01	P	Wolf Cr	R	M	Randolph	Fish & Wildlife	Ammonia OE/DO Pathogens	Int. animal feeding oper.	1990	4.0 mi.	L. Tallapoosa River / Its Source
3	AL/Tallapoosa R_02	P	Tallapoosa R	R	L	Randolph	Fish & Wildlife	Flow alter.	Dam construc. Flow reg/mod	1991	3.0 mi.	AL Hwy. 77 / Cedar Creek
4	AL/03150109-190_01	L	Sugar Cr	R	H	Tallapoosa	Fish & Wildlife	Metals (Cu) Chlorides Nutrients Color	Municipal		4.8 mi.	Elkahatchee Creek / Sugar Cr Alex City
5	AL/Yates Res_01	N	Yates Reservoir	L	H	Tallapoosa	Public Water Sup. Swimming Fish & Wildlife	Nutrients OE/DO	Industrial Municipal Nonirrigated crop prod. Pasture grazing	1994-97	224 acr.	Soug. Cr. Embayment / NW1/4, S 21, T19N, R22E
6	AL/03150110-030_01	L	Pepperell Br	R	H	Lee	Agri. & Ind.	Nutrients	Industrial		6.5 mi.	Sougahatchee Creek / Its Source
7	AL/03150110-100_01	N	Calebee Cr	R	H	Macon	Fish & Wildlife	Siltation Other habitat alter.	Unknown source	1996	10 mi.	Tallapoosa River / Macon Co. Rd. 9
8	AL/03150110-120_01	N	Cubahatchee Cr	R	H	Macon	Swimming Fish & Wildlife	Siltation Other habitat alter.	Unknown source	1996	41 mi.	Tallapoosa River / Its Source
9	AL/03150110-140_01	P	Line Cr	R	M	Macon	Fish & Wildlife	Siltation Flow alter. Other habitat alter.	Unknown source	1996	10.0 mi.	Tallapoosa River / Johnsons Creek
10	AL/03150110-140_02	P	Line Cr	R	M	Macon	Fish & Wildlife	Siltation	Unknown source	1996	5.1 mi.	Johnsons Creek / Panther Creek

SS =- Support Status with L = Less than Full Support, P = Partially Supporting, and N – Not Supporting; WBTYPE = Waterbody Type; R = Rank with L = Low, M = Medium, and H = High; OE/DO = Organic Enrichment/Dissolved. Oxygen

Figure 6-14

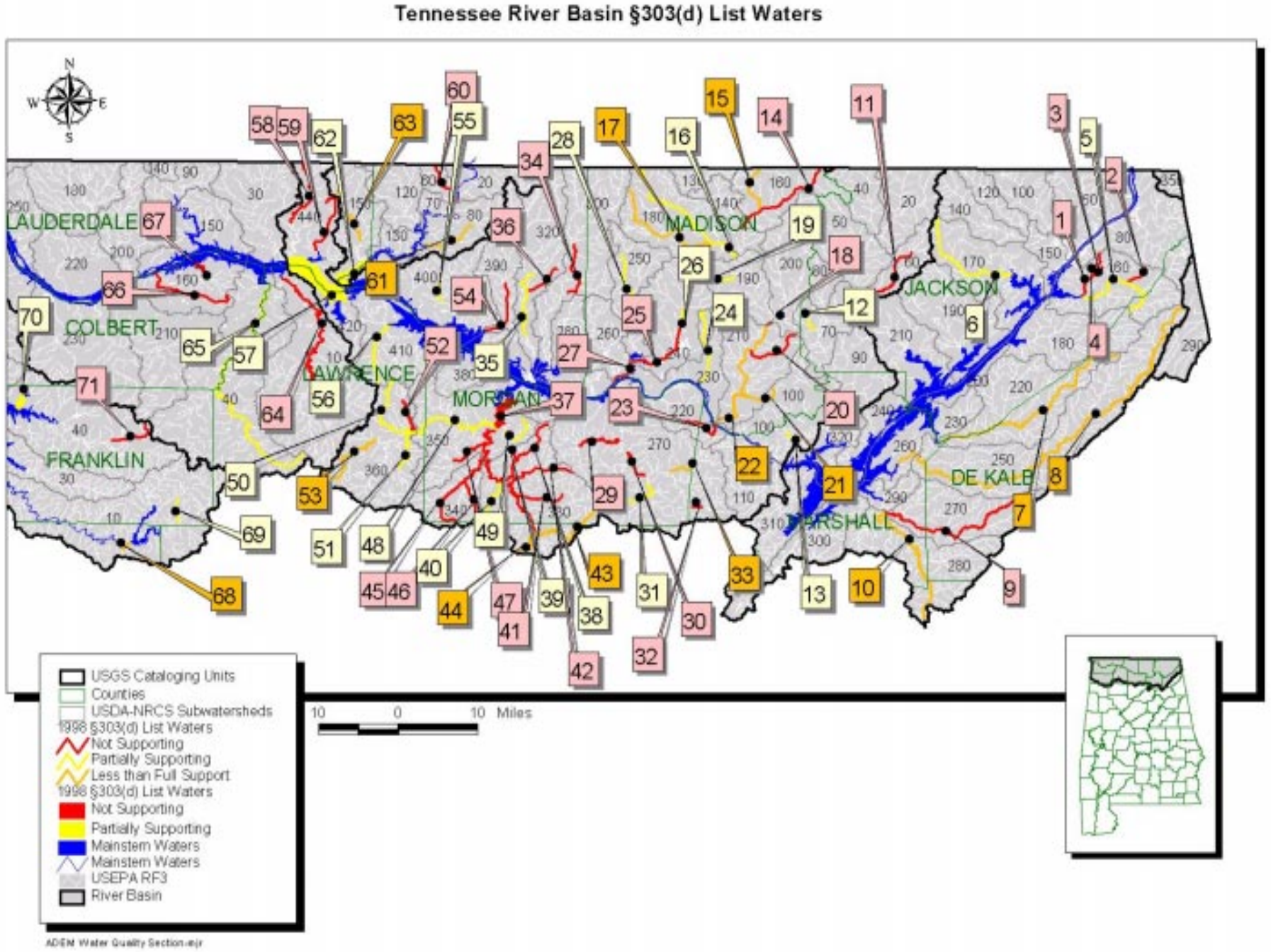

Tennessee River Basin §303(d) List Waters
N
W
E
S
LAUDERDALE
COLBERT
LAWRENCE
MORGAN
MADISON
JACKSON
DE KALB
MARSHALL
FRANKLIN
USGS Cataloging Units
Counties
USDA-NRCS Subwatersheds
1998 §303(d) List Waters
Not Supporting
Partially Supporting
Less than Full Support
1998 §303(d) List Waters
Not Supporting
Partially Supporting
Mainstem Waters
Mainstem Waters
USEPA RF3
River Basin
10 0 10 Miles
ADEM Water Quality Section.mjr

Table 6-17
Tennessee River Basin 1998 §303(d) List Waters

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
1	AL/06030001-160_01	N	Dry Cr	R	H	Jackson	Fish & Wildlife	Pesticides pH Siltation	Unknown source	1980 1985-88 1991	8.0 mi.	Coon Creek / Its Source
2	AL/06030001-160_02	N	Hogue Cr	R	H	Jackson	Fish & Wildlife	Nutrients Siltation OE/DO	Unknown source	1986 1987	2.4 mi.	Flat Rock Creek / Its Source
3	AL/06030001-160_03	N	Warren Smith Cr	R	H	Jackson	Fish & Wildlife	pH Siltation	Unknown source	1986 1987	3.0 mi.	Dry Creek / Ross Branch
4	AL/06030001-160_04	N	Rocky Br	R	L	Jackson	Fish & Wildlife	pH Siltation	Unknown source		3.6 mi.	Dry Creek / Its Source
5	AL/06030001-160_05	P	Coon/Flat Rock Cr	R	L	Jackson	Fish & Wildlife	Metals pH Siltation	Surface mining-abandoned Mine tailings-abandoned	1991	20.0 mi.	Tennessee River / Its Source
6	AL/06030001-170_01	P	Mud Cr	R	L	Jackson	Fish & Wildlife	OE/DO	Nonirrigated crop prod. Pasture grazing	1991	18 mi.	Tennessee River / Its Source
7	AL/06030001-220_01	L	South Sauty Cr	R	M	DeKalb	Swimming Fish & Wildlife	pH	Unknown source		32 mi.	Lake Guntersville / Its Source
8	AL/06030001-250_01	L	Town Cr	R	M	DeKalb	Fish & Wildlife	pH	Unknown source		63.3 mi.	Lake Guntersville / Its Source
9	AL/06030001-270_01	N	Scarham Cr	R	H	Marshall	Fish & Wildlife	Pesticides Ammonia Siltation OE/DO Pathogens	Nonirrigated crop prod. Specialty crop prod. Int. animal feeding oper. Pasture grazing	1991 1993-95	24 mi.	Short Creek / Its Source
10	AL/06030001-280_01	L	Short Cr	R	M	Marshall	Public Water Sup. Fish & Wildlife	Pathogens	Unknown source		23.5 mi.	Lake Guntersville / Its Source
11	AL/06030002-060_01	N	Guess Cr	R		Jackson	Fish & Wildlife	Unknown toxicity	Unknown source	1997	10.8 mi.	Paint Rock River / Bee Branch
12	AL/06030002-070_01	P	Cole Spring Br	R	L	Jackson	Fish & Wildlife	Siltation OE/DO	Pasture grazing	1994-95	2.1 mi.	Bridge at Jones Farm / Jeep Trail Crossing
13	AL/06030002-100_01	P	L. Paint Rock Cr	R	L	Marshall	Fish & Wildlife	Siltation OE/DO	Pasture grazing	1994-95	2.0 mi.	Merrill Road Bridge / Jeep Trail Crossing
14	AL/06030002-160_01	N	Mountain Fk	R	H	Madison	Fish & Wildlife	Siltation Pathogens OE/DO	Pasture grazing	1994-95 1997	14.5 mi.	Flint River / Its Source
15	AL/06030002-160_02	L	Hester Cr	R	M	Madison	Fish & Wildlife	Nutrients Siltation OE/DO	Unknown source		7.2 mi.	Mountain Fork / AL/TN stateline
16	AL/06030002-180_01	P	Brier Fk	R	L	Madison	Fish & Wildlife	Unknown toxicity Siltation	Nonirrigated crop prod.	1994-95	3.9 mi.	Flint River / AL/TN stateline
17	AL/06030002-180_02	L	Beaverdam Cr	R	M	Madison	Fish & Wildlife	Siltation	Unknown source		19 mi.	Brier Fork Its Source
18	AL/06030002-200_01	N	Hurricane Cr	R		Madison	Fish & Wildlife	OE/DO	Unknown source		0.8 mi.	Flint River / Gurley Pike Road
19	AL/06030002-190_01	P	Chase Cr	R	L	Madison	Fish & Wildlife	Siltation OE/DO	Agriculture Urban runoff/Storm sewers	1994-95	2.2 mi.	Acuff Spring / Hwy. 72

Table 6-17 (cont.)

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
20	AL/06030002-210_01	N	Goose Cr	R	H	Madison	Fish & Wildlife	Unknown toxicity OE/DO	Agriculture	1997	8.5 mi.	Flint River / Its Source
21	AL/06030002-210_02	L	Yellow Bank Cr	R	M	Madison	Fish & Wildlife	OE/DO	Unknown source		5.6 mi.	Flint River / Its Source
22	AL/06030002-210_03	L	Flint R	R	M	Madison	Public Water Sup. Fish & Wildlife	OE/DO	Unknown source		21.5 mi.	Tennessee River / Hurricane Creek
23	AL/06030002-220_01	N	Cane Cr	R	L	Madison	Fish & Wildlife	Siltation OE/DO	Agriculture	1994-95	5.1 mi.	Tennessee River / Gooch Creek
24	AL/06030002-230_01	P	Aldridge Cr	R	L	Madison	Fish & Wildlife	Siltation OE/DO	Urban runoff/Storm sewers Pasture grazing	1994-95	11 mi.	Tennessee River / Its Source
25	AL/06030002-240_01	N	Huntsville Spring Br.	R	L	Madison	Fish & Wildlife	Priority Organics	Contaminated sediments	1993	5.0 mi.	Indian Creek / Huntsville Field
26	AL/06030002-240_02	P	Huntsville Spring Br.	R	L	Madison	Fish & Wildlife	Metals	Urban runoff/Storm sewers	1994-95	4.4 mi.	Huntsville Field / Hwy. 431
27	AL/06030002-250_01	N	Indian Cr	R	L	Madison	Fish & Wildlife	Priority Organics	Contaminated sediments	1991-91 1993	3.6 mi.	Tennessee River / Huntsville Spring Br.
28	AL/06030002-250_02	P	Indian Cr	R	L	Madison	Fish & Wildlife	Siltation OE/DO	Nonirrigated crop prod. Land development Urban runoff/Storm sewers	1994-95	6.9 mi.	AL Hwy. 72 / Its Source
29	AL/06030002-270_01	N	Town Cr	R	H	Morgan	Fish & Wildlife	OE/DO	Agriculture	1997	8.4 mi.	Cotaco Creek / Its Source
30	AL/06030002-270_02	N	Cotaco Cr	R	H	Morgan	Fish & Wildlife	Pathogens	Agriculture	1997	5.1 mi.	Guyer Branch / W. Fork Cotaco Cr.
31	AL/06030002-270_03	P	West Fk Cotaco Cr.	R	M	Morgan	Fish & Wildlife	Pathogens	Agriculture	1997	7.5 mi.	AL Hwy.67 / Frost Creek
32	AL/06030002-270_04	N	Mill Pond Cr	R	H	Marshall	Fish & Wildlife	Siltation	Unknown source			Hog Jaw Creek / Perkins Creek
33	AL/06030002-270_05	L	Hughes Cr	R	M	Morgan	Fish & Wildlife	Siltation	Unknown source		2.9 mi.	Cotaco Creek / Its Source
34	AL/06030002-300_01	N	Limestone Cr	R	L	Limestone	Fish & Wildlife	Siltation OE/DO	Nonirrigated crop prod. Pasture grazing	1994-95	9.3 mi.	AL Hwy.72 / Leslie Creek
35	AL/06030002-320_01	P	Piney Cr	R	L	Limestone	Fish & Wildlife	Pesticides Siltation OE/DO	Nonirrigated crop prod. Pasture grazing	1994-95	11.2 mi.	Church Site / Pepper Road Bridge
36	AL/06030002-320_02	N	French Mill Cr	R	H	Limestone	Fish & Wildlife	Pathogens	Unknown source	1997	4.9 mi.	Piney Creek / UT in Pine Swamp
37	AL/06030002-330_01	N	Flint Cr	R	H	Morgan	Public Water Sup. Fish & Wildlife Agri. & Ind.	Siltation OE/DO Pathogens	Municipal Nonirrigated crop prod. Pasture grazing Int. animal feeding oper. Urban runoff/Storm sewers	1992-95 1997	40.0 mi.	Alabama Hwy. 67 / Its Source
38	AL/06030002-330_02	N	Shoal Cr	R	L	Morgan	Fish & Wildlife	OE/DO Pathogens	Urban runoff/Storm sewers Agriculture	1994-95 1997	10.9 mi.	Flint Creek / Its Source
39	AL/06030002-330_03	N	Town Br	R	L	Morgan	Fish & Wildlife	OE/DO	Urban runoff/Storm sewers	1994-95	1.9 mi.	Shoal Creek / Its Source

Table 6-17 (cont.)

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
40	AL/06030002-330_04	P	Mack Cr	R	L	Morgan	Fish & Wildlife	Siltation OE/DO	Pasture grazing	1994-95	5.4 mi.	Flint Creek / Its Source
41	AL/06030002-330_05	N	Robinson Cr	R	L	Morgan	Fish & Wildlife	Siltation OE/DO	Agriculture	1994-95 1997	6.3 mi.	Flint Creek / Its Source
42	AL/06030002-330_06	N	Cedar Cr	R	H	Morgan	Fish & Wildlife	OE/DO Pathogens	Agriculture	1997	8.7 mi.	Flint Creek / Its Source
43	AL/06030002-330_07	L	East Fk Flint Cr	R	M	Cullman	Fish & Wildlife	OE/DO Pathogens	Unknown source		14.9 mi.	Flint Creek / Its Source
44	AL/06030002-330_08	L	Rock Cr	R	M	Cullman	Fish & Wildlife	OE/DO	Unknown source		5 mi.	East Fork Flint Cr. Its Source
45	AL/06030002-340_01	N	Crowdabout Cr	R	H	Morgan	Fish & Wildlife	Siltation Pathogens OE/DO	Nonirrigated crop prod. Pasture grazing Int. animal feeding oper.	1992-95 1997	15.0 mi.	Flint Creek / Its Source
46	AL/06030002-340_02	N	Herrin Cr	R	M	Morgan	Fish & Wildlife	Ammonia Nutrients Siltation OE/DO	Pasture grazing		6.3 mi.	Crowdabout Creek / Its Source
47	AL/06030002-350_01	N	No Business Cr	R	L	Morgan	Fish & Wildlife	OE/DO Pathogens	Nonirrigated crop prod. Pasture grazing	1994-95 1997	6.3 mi.	Flint Creek / Johnson Chapel Creek
48	AL/06030002-350_02	P	West Flint Cr	R	M	Morgan	Fish & Wildlife	Siltation Pathogens OE/DO	Nonirrigated crop prod. Pasture grazing Int. animal feeding oper.	1993-95 1997	19.4 mi.	Flint Creek / McDaniel Creek
49	AL/06030002-350_03	P	Village Br	R	L	Morgan	Fish & Wildlife	Siltation OE/DO	Agriculture	1994-95	5.7 mi.	Moss Spring Branch / Its Source
50	AL/06030002-360_01	P	Big Shoal Cr	R	M	Lawrence	Fish & Wildlife	OE/DO	Pasture grazing	1996-97	13.3 mi.	West Flint Creek / Its Source
51	AL/06030002-360_02	P	McDaniel Cr	R	L	Lawrence	Fish & Wildlife	Siltation OE/DO	Agriculture	1994-95	3.9 mi.	West Flint Creek / AL Hwy. 36 bridge
52	AL/06030002-360_03	N	Flat Cr	R	H	Lawrence	Fish & Wildlife	Ammonia Nutrients Siltation OE/DO	Unknown source	1997	7.3 mi.	West Flint Creek / Its Source
53	AL/06030002-360_04	L	Elam Cr	R	M	Lawrence	Fish & Wildlife	OE/DO	Unknown source		11.9 mi.	Rocky Branch / Its Source
54	AL/06030002-390_01	N	Swan Cr	R	L	Limestone	Agri. & Ind. Fish & Wildlife	Siltation OE/DO	Nonirrigated crop prod. Urban runoff/Storm sewers Pasture grazing	1994-95	7.9 mi.	Tennessee River / Town Creek
55	AL/06030002-400_01	P	Round Island Cr	R	L	Limestone	Fish & Wildlife	Siltation OE/DO	Agriculture	1994-95	3.6 mi.	Browns Ferry Road / Beauchamp Branch
56	AL/06030002-410_01	P	Mallard Cr	R	L	Lawrence	Fish & Wildlife	Siltation OE/DO	Agriculture	1994-95	10.2 mi.	Wheeler Reservoir / Its Source
57	AL/Wheeler Res_01	P	Tennessee R	R	L	Lawrence	Public Water Sup. Swimming Fish & Wildlife	pH Temp./thermal mod.	Industrial Flow reg/mod Dam construc. Unknown source	1990-91 1993-97	10.0 mi.	Wheeler Dam / Elk River

Table 6-17 (cont.)

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
58	AL/06030002-440_02	N	Second Cr	R	H	Lauderdale	Fish & Wildlife	Pathogens OE/DO	Agriculture	1997	11.6 mi.	Lauderdale Co. Rd. 76 / AL/TN State Line
59	AL/06030002-440_03	N	First Cr	R	H	Lauderdale	Swimming Fish & Wildlife	Unknown toxicity	Unknown source	1997	10.0 mi.	AL Hwy. 72 / Its Source
60	AL/06030004-060_01	N	Shoal Cr	R	H	Limestone	Fish & Wildlife	Unknown toxicity	Unknown source	1997	7.0 mi.	Elk River / AL/TN State Line
61	AL/06030004-080_01	L	Big Cr	R	M	Limestone	Fish & Wildlife	OE/DO	Unknown source		7.7 mi.	Elk River / Its Source
62	AL/Wheeler Res_02	P	Elk R	R	L	Limestone	Swimming Fish & Wildlife	pH OE/DO	Pasture grazing Nonirrigated crop prod.	1990-91	6.0 mi.	Wheeler Reservoir / Anderson Creek
63	AL/06030004-150_02	L	Anderson Cr	R	M	Lauderdale	Fish & Wildlife	Siltation	Unknown source		9.0 mi.	Snake Road bridge / Its Source
64	AL/06030005-010_01	N	Big Nance Cr	R	H	Lawrence	Fish & Wildlife	Pesticides Ammonia Siltation OE/DO Pathogens	Nonirrigated crop prod. Int. animal feeding oper. Landfills Pasture grazing	1991 1995	24.0 mi.	Wilson Lake / Its Source
65	AL/06030005-040_01	P	Town Cr	R	L	Lawrence	Fish & Wildlife	pH OE/DO	Nonirrigated crop prod. Pasture grazing	1991	46.0 mi.	Wheeler Reservoir / Its Source
66	AL/06030005-160_01	N	Pond Cr	R	L	Colbert	Agri. & Ind.	Metals OE/DO	Nonirrigated crop prod. Urban runoff/Storm sewers Natural sources	1991	12.0 mi.	Tennessee River / Its Source
67	AL/06030005-160_02	N	McKiernan Cr	R	H	Colbert	Fish & Wildlife	Ammonia Nutrients Siltation OE/DO	Unknown source	1988	2.2 mi.	Tennessee River / Shegog Creek
68	AL/06030006-010_01	L	Bear Cr	R	H	Marion	Swimming Fish & Wildlife	Metals (Al)	Unknown source		3.0 mi.	Mill Creek / U. Bear Creek Dam
69	AL/06030006-010_02	P	Little Dice Br	R	M	Franklin	Fish & Wildlife	Siltation	Unknown source	1982 1996	3.6 mi.	Bear Creek / Its Source
70	AL/06030006-040_01	P	Lost Cr	R	L	Franklin	Fish & Wildlife	pH	Unknown source	1991	2.0 mi.	Cedar Creek / Its Source
71	AL/06030006-040_02	N	Harris Cr	R	H	Franklin	Fish & Wildlife	Siltation OE/DO	Pasture grazing	1995	5.9 mi.	Mud Creek / Its Source

SS =- Support Status with L = Less than Full Support, P = Partially Supporting, and N – Not Supporting; WBTYPE = Waterbody Type; R = Rank with L = Low, M = Medium, and H = High; OE/DO = Organic Enrichment/Dissolved. Oxygen

Figure 6-15

Upper Tombigbee River Basin §303(d) List Waters

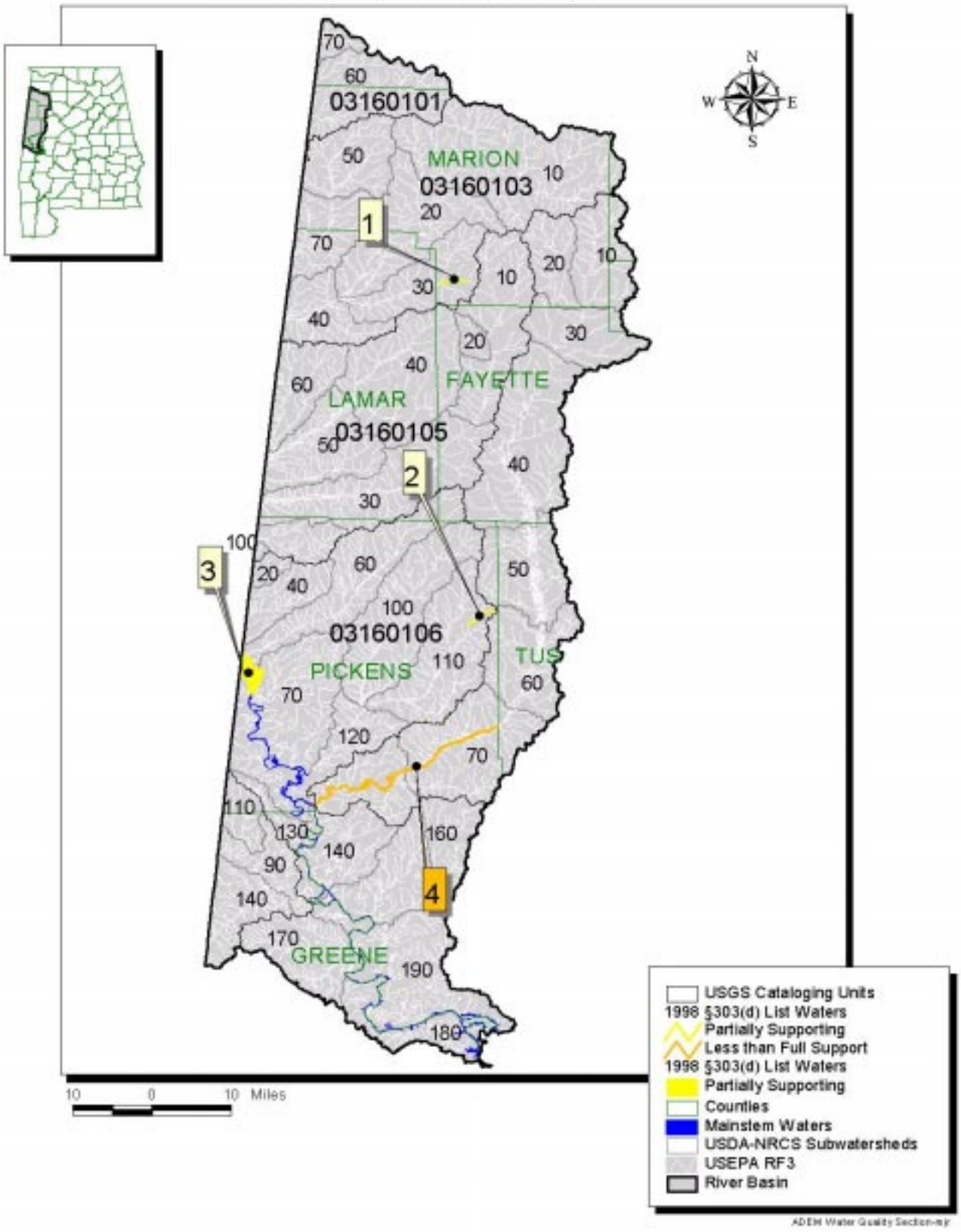


Table 6-18
Upper Tombigbee River Basin 1998 §303(d) List Waters

Map Index	WaterbodyID	SS	Waterbody Name	WB TYPE	R	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
1	AL/03160103-030_01	P	Purgatory Cr	R	H	Marion	Public Water Sup. Fish & Wildlife	pH	Unknown source	1988	3.0 mi.	Wickett Creek / Hughes/Reedy Branches
2	AL/03160106-110_01	P	Little Bear Cr	R	L	Pickens	Fish & Wildlife	OE/DO	Unknown source	1996	3.9 mi.	Pickens Co. Rd. 4 / Its Source
3	AL/Aliceville Res_01	P	Tombigbee R	R	L	Pickens	Fish & Wildlife Swimming	OE/DO Flow alter.	Dam construc. Flow reg/mod	1991	5.0 mi.	Beville Dam / AL-MS State Line
4	AL/03160107-080_01	L	Sispey R	R	M	Pickens	Fish & Wildlife	Metals (Fe)	Unknown source		4.4 mi.	Tombigbee River / Tuscaloosa Co. line

SS =- Support Status with L = Less than Full Support, P = Partially Supporting, and N – Not Supporting; WBTYPE = Waterbody Type; R = Rank with L = Low, M = Medium, and H = High; OE/DO = Organic Enrichment/Dissolved. Oxygen

Table 6-19
Fiscal Year 1999 Water Quality Section Modeling

1st Quarter FY99			
Stream	**Discharger**	**No. of WLAs/ Comments**	**Miles Assessed**
Cribbs Mill Creek	Tuscaloosa WWTP	4	7.5
Tennessee River	Cherokee WWTP	2	12
Bear Creek	Phillips Elem. School	2	3.2
Chattahoochee River	Phenix City	2	52.2
UT to Weaver Mill Creek	Dunbar Elem. School	2 Seasonal	8.6
UT to Catoma Creek	Green Lantern Restaurant	2 Seasonal	13.1
Halawakee Creek	Proposed Industrial Site	2 Seasonal	7.7
UT to Halawakee Creek	Opelika Eastside WWTP	2 Seasonal	11.5
Cypress Creek	Dothan WWTP	2 Seasonal	6.1
Ohatchee Creek	Ohatchee School	2 Seasonal	4.1
UT to Pintlala Creek	Swan Lake Trailer Park	2 Seasonal	13.5
UT to Butler Creek	Mt. Meigs Campus Complex	2 Seasonal	3.9

2nd Quarter FY99			
Stream	**Discharger**	**No. of WLAs/ Comments**	**Miles Assessed**
Turkey Creek	Pinson WWTP	16/Desktop-wetweath.	16.2
Fivemile Creek	numerous dischargers	28-wetweath.	25.1
Valley Creek	numerous dischargers	24	25.7
Frog Level Branch	Wedowee	2 Seasonal	9.3
Tarver Creek	Hidden Acres MHP	2 Seasonal	8.6
Cane Creek	Proposed Indian Oaks Apts.	2 Seasonal	9.9
UT to Shoal Creek	Shoal Creek Country Club	2 Seasonal	17.3
UT to Childers Creek	Cahaba West Park	2 Seasonal	4
Short Creek	Proposed Longview Subdivision	1	1.9
UT to Archie Creek	Goose Pond Colony	2 Seasonal	0.9
UT to Little Paint Creek	Proposed Cathedral Caverns	2 Seasonal	6.1
Tennessee River	Proposed Madison WWTP	1	72
Tennessee River	Huntsville West Area WWTP	1	74.1
Flint River	Huntsville Big Cove WWTP	1	22.1
Town/Swan Creeks	Athens WWTP	2 Seasonal	8.3
Pond Creek	Muscle Shoals WWTP	2 Seasonal	4.8
Flint River	Central School		10.9

Table 6-19 (cont.)

3rd Quarter FY99			
Stream	**Discharger**	**No. of WLAs/ Comments**	**Miles Assessed**
Limestone Creek	Proposed East Limestone Elem. School	2 Seasonal	5.6
Copperun Creek	Proposed Magnolia Spring WWTP	2 Seasonal	3.5
Red River Branch	I-59 Rest Area	2 Seasonal/1-Desktop	1.6
Piney Creek	Ardmore WWTP	1	5
Short Creek	Proposed Longview Subdivision	1	1.9
L. Choctawhatchee River	L. Choctawhatchee WWTP	2	12.4
Conecuh River	Jefferson Smurfitt	2	52
Spring Creek	Houston Co. Dist. Center	2	3.5
Little Canoe Creek	Proposed City of Steele Lagoon	0.5	5.3
Cane Creek	UAB Cool Springs Farm Lagoon	1	11
Cane Creek	St. Clair Health Care Lagoon	1	10.9
Whitewater Creek	City of Troy	2	19.6
Little Mulberry Creek	Proposed Power Plant	2	10.4
Tennessee River	TVA-Bellefonte Nuclear Plant	1-Diffuser	0.3
Mobile River	APCO-Barry Steam Plant	1-Diffuser	0.3
Buttahatchee River	Hamilton WWTP	2-Seasonal/1-Desktop	21.8

4th Quarter FY99			
Stream	**Discharger**	**No. of WLAs/ Comments**	**Miles Assessed**
Big Branch	Donaldson Correctional Facility	2 seasonal	5.7
UT to Ward Creek	Tyson	2 seasonal	4.6
Turkey Creek	Jefferson Co.	7-wetweath.	16.2
Locust Fork	Sayre Land Company	4	4.4
Fivemile Creek	Jefferson Co.	7	25.1
Town / Swan Creek	Athens WWTP	1 winter	8.3
Coxey Creek	Clements School	2 seasonal	1.3
Whitewater Creek	Troy WWTP	2 seasonal	19.6
Mannings Creek	Lockheed Martin	2 seasonal	6.5
Little Hillabee Creek	Bibb Graves High School	2 seasonal	9.3
Waxahatchee Creek	Columbiana WWTP	2 seasonal	7.9
Cane Creek	Indian Oaks Apartments	2 seasonal	9.9
Conecuh / Escambia River	Jefferson Smurfit	2 seasonal	52
Cane Creek	Weaver WWTP	2 seasonal	19.1
Swift Creek	Autaugaville WWTP	2 seasonal	0.5
Wolf Creek	Foley	6	3.1

Table 6-20
Recent ADEM River and Stream Monitoring Projects

Project	Monitored	Evaluated	Total
1999 §303(d) Sampling	644.8	80.6	725.4
1997 Black Warrior River Basin NPS Screening	297.1	406.5	703.6
1998 Tennessee River Basin NPS Screening	107.6		107.6
1999 Southeast River Basins NPS Screening	196.5	228.2	424.7
1999 Nutrients in Tributaries Study	556.1		556.1
1998 §303(d) Sampling	161.8		161.8
Industrial Ambient Monitoring	117.0		117.0
Total	2080.8	715.3	2796.1

Due to the §305(b) 2 year reporting cycle constraint combined with staffing and information systems limitations within ADEM, the projects listed in Table 6-20 were not analyzed and mapped in time for inclusion in Alabama's 2000 §305(b) Report. These projects are presently being assessed for the 2000 §303(d) List. ADEM will provide a special update to the 2000 §305(b) Report based upon these projects by April 1, 2001.

Part VII Watershed Projects within Alabama

A The Watershed Approach

Alabama has continued or initiated a number of watershed protection projects throughout the State. Some of these Section 319 funded projects include the Flint Creek Watershed Project, the Weeks Bay Watershed Project, Sand Mountain/Lake Guntersville Watershed Project, Paint Rock River Watershed Project, Choccolocco Creek Watershed Project, the Lower Cahaba and Black Warrior River Basin Project.

In addition, the Bear Creek Watershed and Flint River Watershed Projects will be initiated with FY2000 Section 319 grant funding.

Table 7-1
Alabama Watershed Projects Since 1986

Cataloguing Unit	Watershed Project	Initiation Date
Tri-State Region	ACT/ACF Study	1994
06030006	Bear Creek	1986
03160111	Bayview Lake	1988
03150202	Buck Creek	1995
03150201	Catoma Creek	1995
03150106	Choccolocco Creek	1996
03140202 03140203	Choctawhatchee-Pea Rivers	1991
03160205	Dog River	1993
03160205	Fish River/Weeks Bay	1993
06030002	Flint Creek	1992
03140103	Lightwood Knot Creek	1995*
03150105	Little River	1996
03150202	Lower Cahaba River	1995
06030002	Paint Rock River	1996
03160110	Ryan-Crooked-Rock Creek	1991
06030001	Sand Mountain/Lake Guntersville	1986
03140303	Sepulga River Watershed Project	1998

* Lightwood Knot Creek

This National Monitoring Project is coordinated by the Geological Survey of Alabama (GSA) to document the effectiveness of NPS best management practices. Monitoring data is being collected and BMPs have been installed in this paired watershed study to illustrate water quality improvements. Agricultural BMPs and implementation of educational programs are important components of project.

Coastal Watershed Studies

In 1993, ADEM published a document entitled "Water Quality and Natural Resource Monitoring Strategy for Coastal Alabama" in which ADEM proposed a three part strategy to

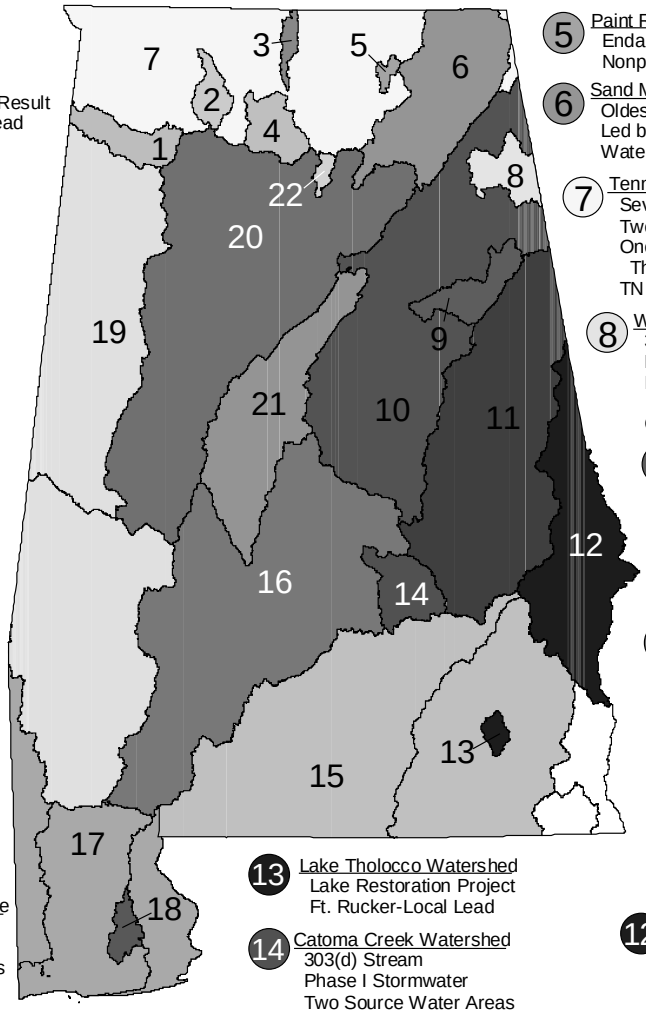
monitor its coastal resources. One component was a survey of watersheds in the coastal counties. Dog River was the pilot watershed and surveys were conducted and published in 1994 and 1995. Bon Secour watershed was studied and published in 1996 and the Chickasaw Creek watershed was published in 1997. Little Lagoon was studied in 1998 and 1999 and publication of this report is pending.

Other Watershed Projects

This tri-state (AL/GA/FL) project originated in the early 1990's and is called the Alabama-Coosa-Tallapoosa/Apalachicola-Chattahoochee-Flint (ACT/ACF) Rivers Study. It will hopefully result in a compact between the three states which will allow mutual use of the shared river systems for the benefit of water quality and the local economies. The Flint Creek Watershed Project is an ongoing project, one of the first of its kind initiated in Alabama involving multi-agency support from the local, state and federal levels of government, in addition to citizen involvement. In addition, watershed projects involving Bear Creek, Bayview Lake, Choccolocco Creek, Fish River/Weeks Bay, Lower Cahaba River, Paint Rock River, Ryan-Crooked-Rock Creek, Sand Mountain/Lake Guntersville are discussed in Part IV The Nonpoint Source Assessment Program of the ***1996 Water Quality Report to Congress*.**

Figure 7-1

Alabama Clean Water Action Plan Locally - Led Watershed Projects



1 Bear Creek Watershed
TVA Recreational Floatway
Growing Poultry Industry
Fisheries Concern
Abandoned Coal Mines

2 Big Nance Creek Watershed
303 (d) Stream
National Demonstration Project
Priority under UWA
Totally NPS-affected

3 Piney Creek Watershed
303 (d) Stream
UWA Priority Watershed
Organic Enrichment
Prime Farmland

4 Flint Creek Watershed
Highly Concentrated 303 (d) Streams
Strong Education Component
Holistic Project
Decentralized wastewater treatment

22 Duck River Watershed
303 (d) Stream
Priority Stream under UWA
Totally NPS affected
Water Supply Reservoir Desired Result
Cullman Water Authority Local Lead

5 Paint Rock River
Endangered Species
Nonprofit/Governmental Partnership

6 Sand Mountain
Oldest Continuous Project in State
Led by Local Agriculture
Water Quality Improvements Documented

21 Cahaba River Watershed
Twelve 303 (d) Streams
Endangered Species
Population/Growth Pressures
Phase I Stormwater, SSOs,
Point/Nonpoint, Source Water
Local Lead

7 Tennessee River Basin
Seventy-0ne 303 (d) Streams
Twenty-five SWAs
One Phase I &
Three Phase II Stormwater Areas
TN Valley RC&D Local Lead, TVA Co-Lead

20 Black Warrior Watershed
Thirty-seven 303 (d) Streams
Fourteen Source Water Areas
One Phase I Stormwater Area
Three Phase II Stormwater Areas

8 Weiss Lake Watershed
303 (d) Lake-Nutrient Concerns
National fishery implications
Interstate Flow/Water Quality Implications
Development pressures
Cherokee Co.- Local Lead

19 Tombigbee River Watershed
Five 303(d) Streams

9 Choccolocco Creek
303 (d) Stream
Interagency Biological Evaluation
Team
Streambank Stabilization &
Flood Control
Watershed Remediation Project
Phase II Stormwater

18 Weeks Bay
Outstanding National
Resource Water
National Estuarine
Research Reserve
Population/Growth Pressures
Three 303 (d) stream segments

10 Coosa River Watershed
Twelve 303 (d) Streams
Sixteen Source Water Areas
Enrichment Problems
Honda Auto Assembly Plant
& FERC Re-licensing (5 Projects)
Twelve Phase II Stormwater Projects
Gadsden Water Board Local Lead
AL Power Co. Co-Lead

17 Mobile Bay
National Estuary Project
Twenty-six 303 (d) Streams
Point/Nonpoint/Toxicity
Shellfish Threats
Phase I Stormwater

11 Tallapoosa River Watershed
Ten 303 (d) streams
Eleven Source Water Areas
Mtgy Water Board-Local Lead

16 Alabama River Watershed
Four 303(d) Streams
One Phase I Stormwater Area
Three Phase II Stormwater Areas

13 Lake Tholocco Watershed
Lake Restoration Project
Ft. Rucker-Local Lead

15 Perdido-Escambia/Choctawhatchee
Chipola Rivers Watershed
Fourteen 303(d) Streams
Seven Phase II Stormwater Areas

14 Catoma Creek Watershed
303(d) Stream
Phase I Stormwater
Two Source Water Areas
Outer Loop Development
Mtgy Water Board-Local Lead

12 Middle Chattahoochee Watershed
CSO/SSO Management
Interstate Watershed Project
Five Source Water Areas
Poultry Complex Development
Columbus Water Works-Local Lead
Five Phase II Stormwater Areas

ADEM-Water Quality Section-mjr-08/00

Part VIII Wetlands Assessment
A. Coastal Wetlands

Alabama's coastal wetlands are managed primarily through the regulatory authorities provided by ADEM Administrative Code R.335-8 (Coastal Program) promulgated pursuant to the Environmental Management Act and the Alabama Coastal Management Act, and through its authority to issue Section 401 certification under the Clean Water Act. Within the Coastal Program regulations, wetlands and submersed grassbeds are identified as coastal resources for which impacts from any regulated uses must be considered, and for which impacts from unregulated uses may be considered. This involves review of all State and federal permitting activities in the coastal zone. Section 404 dredge and fill permits and Section 10 navigable water permits are issued through the Mobile District of the US Army Corps of Engineers (USACE).

Information on the quality and extent of coastal wetlands for Alabama is generally nonexistent. Historical conditions (pre-1970) are poorly documented, and comparisons of recent inventories are often difficult, due to variations in classification schemes, survey methodology, and/or geographical coverage. EPA's Gulf of Mexico Program funded a wetland demonstration project to be completed by the USGS that will compare acreage of wetlands in 1955, 1979, and 1988. ADEM and others still await the results of this demonstration project. The project is using National Wetland Inventory (NWI) methodology.

There is currently no coastal wetlands monitoring strategy in place and the Department is largely dependent on the work of the EPA, the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Fish and Wildlife Service.

Table 8-1
Extent of Coastal Wetlands

Wetland Type	Historical Extent (acres)	1992 Reported Acreage	Most Recent Acreage	% Change From 1992 to Most Recent
Tidal Wetlands	N/A	27,600	N/A	N/A

Source: **Coastal Wetlands of the United States** (NOAA, 1991)

During 1993 the ADEM proposed to the EPA the Alabama Coastal Wetlands Initiative (ACWI). A grant application was submitted for this project and approved by the EPA. The main objective of the ACWI is to develop and implement a coastal wetlands functional assessment methodology for use in program management decisions. This methodology will provide greater predictability and consistency in permit decisions for property owners or applicants. It will also provide justification for preservation of highly functional coastal wetlands as well as a rational wetland impact analysis which will complement existing management activities in the coastal area.

The main goals of the three (3) year ACWI are to develop and implement a wetlands functional assessment methodology and to incorporate a functional assessment database. This database will be used with other databases in a geographical information system (GIS) environment. With a wetlands layer within a GIS, ADEM personnel will be able to provide consistent and environmentally sound

determinations regarding impacts to wetlands in the coastal area. The GIS, combined with the functional assessment methodology, will enhance ADEM Mobile Branch staff capability by streamlining staff permit request review, providing ranking of wetlands by functional value, improving consistency of permit conditions, improving consistency of assessment of mitigation requirements, and identifying potential sites for restoration-type mitigation (altered wetlands of "low" functional value).

The project will also provide greater predictability and consistency in permit decisions for property owners or applicants through the potential for "advanced identification" of wetland areas, increased justification for preservation of highly functional wetlands, a rational wetlands analysis process which will complement existing management activities in the coastal zone, and a model methodology for other coastal areas.

The wetland inventory/mapping digitization of NWI and other related maps using GIS is integral to the success of this project. The wetland resource database must be fully defined and characterized for the functional assessment methodology to be developed. When this database is complete involved agencies will fully utilize the methodology. GIS is the most effective and comprehensive method for mapping. Several agencies are currently using GIS technology to manage the resource on a limited basis. GIS capability in conjunction with an accepted functional assessment methodology will directly improve wetland management efforts and enhance wetland conservation efforts on a regional scale.

B. Freshwater Wetland Protection and Management Program

Dredge and fill activities in wetlands that are not regulated by the Alabama Coastal Area Management Program in the Mobile and Baldwin County coastal zone are regulated solely through the ADEM's authority to issue 401 Water Quality Certification under the Clean Water Act. Other activities that might impact wetlands (such as draining or logging operations) which do not result in significant wetland fill are not currently regulated by the State for their potential impacts to wetlands. Waters within wetlands are, by definition, waters of the State in the Alabama Water Pollution Control Act (AWPCA), but wetlands are not defined for their inherent values such as function, rareness, type, habitat, or value.

Applications for USACE CWA Section 404 Individual permits which affect wetlands are reviewed for water quality consistency. The permitting process is initiated through a joint public notice with the USACE. During this time, on-site inspections may be performed. The project is reviewed to ensure protection of State waters through enforcement of applicable water quality standards pursuant to Division VI of the Department's Administrative Code and the AWPCA. Certain Section 404 activities which affect wetlands meet the criteria for issuance of Nationwide or General USACE permits. Following a comprehensive review of the proposed project and related materials including public comments and interagency coordination, a determination relative to water quality certification is issued. During this process many proposed projects are altered significantly and impacts to wetlands are minimized.

Wetland dredge and fill projects typically involve activities related to commercial developments, highway construction, marinas, dams, resource transmission right-of-ways, resource extraction, and stream alteration. The number of projects which impact

wetlands increases substantially with growing populations and expanding resource extraction operations.

The National Wetlands Policy Forum has recommended that all states prepare wetland conservation plans (SWCPs). The EPA has established a goal to assist the states, on a voluntary basis, in developing SWCPs by the year 2000. The purpose of the conservation plan is to improve the efficiency of government and private efforts to protect, restore, and create wetlands. The plan should incorporate both regulatory and nonregulatory approaches to wetlands protection.

As a result of interest by many groups in developing a SWCP for Alabama, ADEM has been facilitating a Wetlands Conservation and Wetlands Management Initiative (WCAMI). A technical advisory committee has been formed to help guide the initiative. Participating in the committee are ADEM staff, environmental groups, wetland research scientists, and representatives of State and federal agriculture, forestry, mining, construction, and development agencies. Prior to this effort wetlands conservation and management in Alabama was uncoordinated and fragmented. Compounding this confusion has been the disagreement at the federal level as to what constitutes a wetland. Alabama has been hampered along with other states by a lack of incentives and funding to manage wetlands, as well as restraints, definitions, and conditions under which wetlands must currently be managed.

An effort to reach a consensus regarding wetlands is essential if Alabama is to avoid the legacy of other states where less than half of historical wetlands still exist. As a result, very conservative regulations have been enacted to preserve those that remain. The primary goal of the advisory committee is to provide informational and technical development of the management initiative. To accomplish this, the Advisory Committee has:

1. initiated discussions with public and private organizations to seek their involvement and support;
2. assessed wetland issues, such as categorization, delineation, role of mitigation banking, etc. as they affect Alabama;
3. identified and described Alabama's wetland resources based on available or easily obtainable information;
4. summarized wetland definitions currently in use as well as those for potential use in a future plan;
5. summarized information on wetland location, types, functions, abundance, and condition, etc.;
6. summarized available information on status and trends, including gains and losses of wetland types and functions, causes of alteration, extent to which wetlands are now protected, and the effects of losses;
7. identified and described major governmental and private efforts that affect Alabama wetlands;
8. identified existing public and private laws, programs, institutions, and mechanisms available to conserve and manage wetland resources;
9. assessed the various wetland classification systems and methodologies to determine their suitability for use in Alabama; and
10. assessed the efforts of states that have completed or are in the process of completing, aesthetic and/or biological narrative criteria for wetlands and their suitability for use in Alabama.

These efforts are now substantially complete. Final reports have been prepared, reviewed, and edited and are awaiting final review and approval

Most recently, Alabama has secured funding for the development of digitized land cover data sets and land use maps for a region of the state. The data sets and maps will provide information essential for sound decision making and long-term planning as part of the State's Wetlands Program. Although Alabama had received preliminary approval for implementation of the project on a statewide basis, an EPA mandated reduction in the grant award resulted in a significant reduction in the geographic scope of the project.

Despite an increasing concern regarding the future of Alabama's wetlands, recent cuts in state and federal funding threaten to undermine the development of a more comprehensive wetlands program. The recent reduction in funding for the FY95 wetlands grant and uncertainty of funding for future program development and implementation makes growth unlikely and limits the possibility of developing a State Wetland Conservation Plan in the foreseeable future.

Appendix V of the ***1998 Alabama Water Quality Report to Congress*** contains the Executive Summary from ***Wetlands Conservation and Management Initiative Volume I*** and can be downloaded from ADEM's website at www.adem.state.al.us.

Part IX Concerns and Recommendations

Protection of water resources must be based on credible science and coordinated management of available resources. In addition, all stakeholders must work toward a consensus and share a common vision for protecting and managing for environmental benefits. Continued cooperation and collaboration of all partners, education, and promotion and implementation of voluntary and regulatory based compliance with best management practices (BMPs) remains a priority.

Lack of erosion controls, voluntary nonpoint source compliance, as well as lack of voluntary compliance with streamside management zones (SMZs) in Alabama remains an area of special concern. The Department has placed emphasis on these challenges by decentralizing certain aspects of the State water pollution control program to the regional field offices. This has resulted in increased inspection and enforcement efficiencies. As a result inspections of construction sites, mining operations and nonpoint sources of water pollution have significantly increased. Likewise, the number of compliance actions in this arena has increased.

Animal waste runoff is another special problem. Toward a solution, a proactive approach has been initiated with agricultural stakeholders through Confined Animal Feeding Operation (CAFO) Registration by Rule.

Erosion and sedimentation continues to be a long-term concern. Sediment is generally one of the leading stream pollutants. This problem is difficult to address in a comprehensive manner since many land-disturbance activities can and do produce water quality degradation. An Alabama Erosion Control Task Force is currently providing education and seeking solutions to this problem. Decentralization of inspection and compliance functions is serving to enhance the Department's efforts to reduce erosion and sedimentation from regulated activities.

Present funding levels will continue to challenge ADEM's Water Quality Program with limited personnel and resources. Likewise, the Water Quality Program has been maintained with limited personnel, yet has worked in support of new federal requirements (e.g., Clean Water Action Plan, 303(d) listing, TMDLs, antidegradation, water quality standards promulgation, wet weather issues, GIS, etc). ADEM's Water and Field Operations Divisions continue to operate an adequate NPDES permit program with these additional programs, requirements, and initiatives.

Water Programs are moving from a point source permitting emphasis to one with an emphasis on watershed management. Water quality monitoring and assessment activities shifted to the watershed approach in 1996. This approach requires improved data acquisition/management systems. In addition to universities and other local agencies, a multitude of State (Table 9-1) and federal agencies, are involved with water quality/quantity/natural resource issues in Alabama. Sharing data linked with geographical information in digital format is becoming essential. Efforts are continuing within ADEM towards implementation of the Surface Water Quality Database, which will serve as a repository for the State's surface water quality data.

Though ADEM is designated as the repository for environmental data, some of this information is not utilized for management/reporting purposes due to personnel/information system constraints. To this end and through Section 319 and 104(b)(3) grant monies, the Department has funded the development of GIS capabilities or opportunities for cooperation within some of the organizations in Table 9-1. It is hoped that these efforts will facilitate the use of incoming data with an accompanying geographical data layer. Continued efforts towards the implementation of ESRI's ARC/INFO™ GIS software is an integral part of these efforts. The development of a statewide data clearinghouse for GIS environmental information will be vital to

the multi-agency cooperative programs being initiated to study and protect Alabama's watersheds. Many states coordinate such efforts under a state "Office of GIS."

EPA-Region 4 believes that Alabama needs additional resources to enable its monitoring program to meet the programmatic and court-ordered commitments in the TMDL program. Based on EPA's comparison with other Region 4 states and an evaluation of Alabama's current surface water monitoring program it appears that a 30-65% increase in resources may be needed for surface water monitoring. Unfortunately increases in funding from State and federal sources are uncertain at this time.

The Department suggests the passage by the State Legislature of legislation to create local county authority to manage and plan growth and development outside of incorporated areas, as a few counties already have, along with conservation of resources. With proper local authority and current environmental information, management of Alabama's resources could continue on the local level while meeting the needs of economic development statewide.

A final concern is related to a future Alabama-Coosa-Tallapoosa/Apalachicola-Chattahoochee-Flint (ACT/ACF) water quantity allocation formula and its possible effects on water quality in Alabama through flow reductions.

Table 9-1
Alabama State Agencies Involved with Water Quality/Quantity/Natural Resources

ACES	Alabama Cooperative Extension Service
ADAI	Alabama Department of Agriculture and Industries
ADCNR	Alabama Department of Conservation and Natural Resources
ADCNR-MRD	ADCNR-Marine Resources Division
ADECA-OWR	Alabama Department of Economic and Community Affairs-Office of Water Resources
ADEM	Alabama Department of Environmental Management
ADIR	Alabama Department of Industrial Relations
ADPH	Alabama Department of Public Health
AEMA	Alabama Emergency Management Agency
AEMC	Alabama Environmental Management Commission
AFC	Alabama Forestry Commission
ASWCC	Alabama Soil and Water Conservation Commission
ASMC	Alabama Surface Mining Commission
FSA	Farm Service Agency
GSA	Geological Survey of Alabama
MESC	Marine Environmental Sciences Consortium

Appendix A
Geological Formations by River Basin

The following maps of Alabama's geology represent data that were originally presented in Geological Survey of Alabama Special Map 220, "Geologic Map of Alabama," by M.W. Szabo, W.E. Osborne, C.W. Copeland, Jr., and T.L. Neathery, published in 1988.
These data were compiled into GIS format by D.R. Taylor, under the direction of B.H. Tew of the Geological Survey of Alabama.

Figure A-1

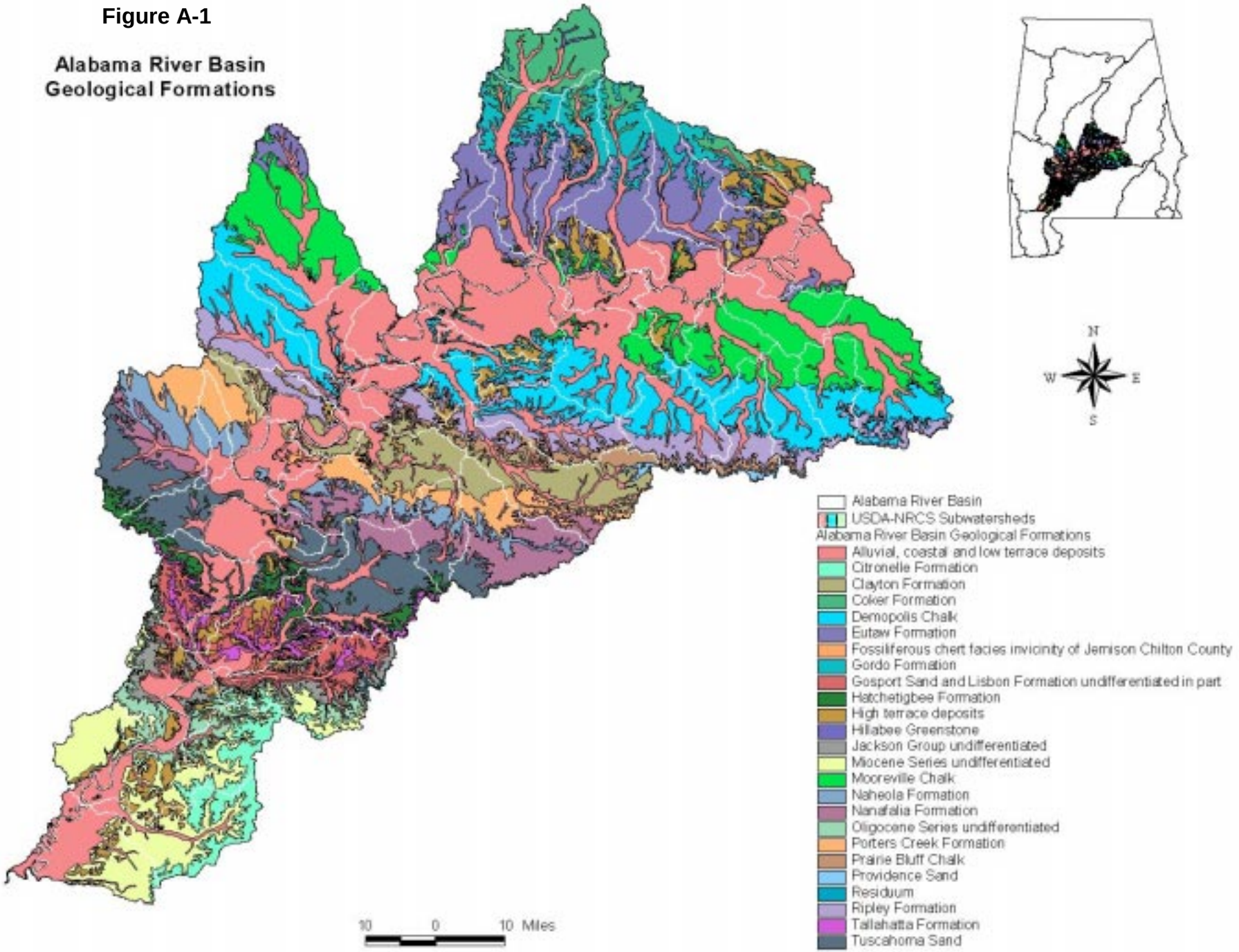

Alabama River Basin
Geological Formations
N
W
E
S
Alabama River Basin
USDA-NRCS Subwatersheds
Alabama River Basin Geological Formations
Alluvial, coastal and low terrace deposits
Citronelle Formation
Clayton Formation
Coker Formation
Demopolis Chalk
Eutaw Formation
Fossiliferous chert facies invicinity of Jemison Chilton County
Gordo Formation
Gosport Sand and Lisbon Formation undifferentiated in part
Hatchetigbee Formation
High terrace deposits
Hillabee Greenstone
Jackson Group undifferentiated
Miocene Series undifferentiated
Mooreville Chalk
Naheola Formation
Nanafalia Formation
Oligocene Series undifferentiated
Porters Creek Formation
Prairie Bluff Chalk
Providence Sand
Residuum
Ripley Formation
Tallahatta Formation
Tuscahoma Sand
10 0 10 Miles

Figure A-2

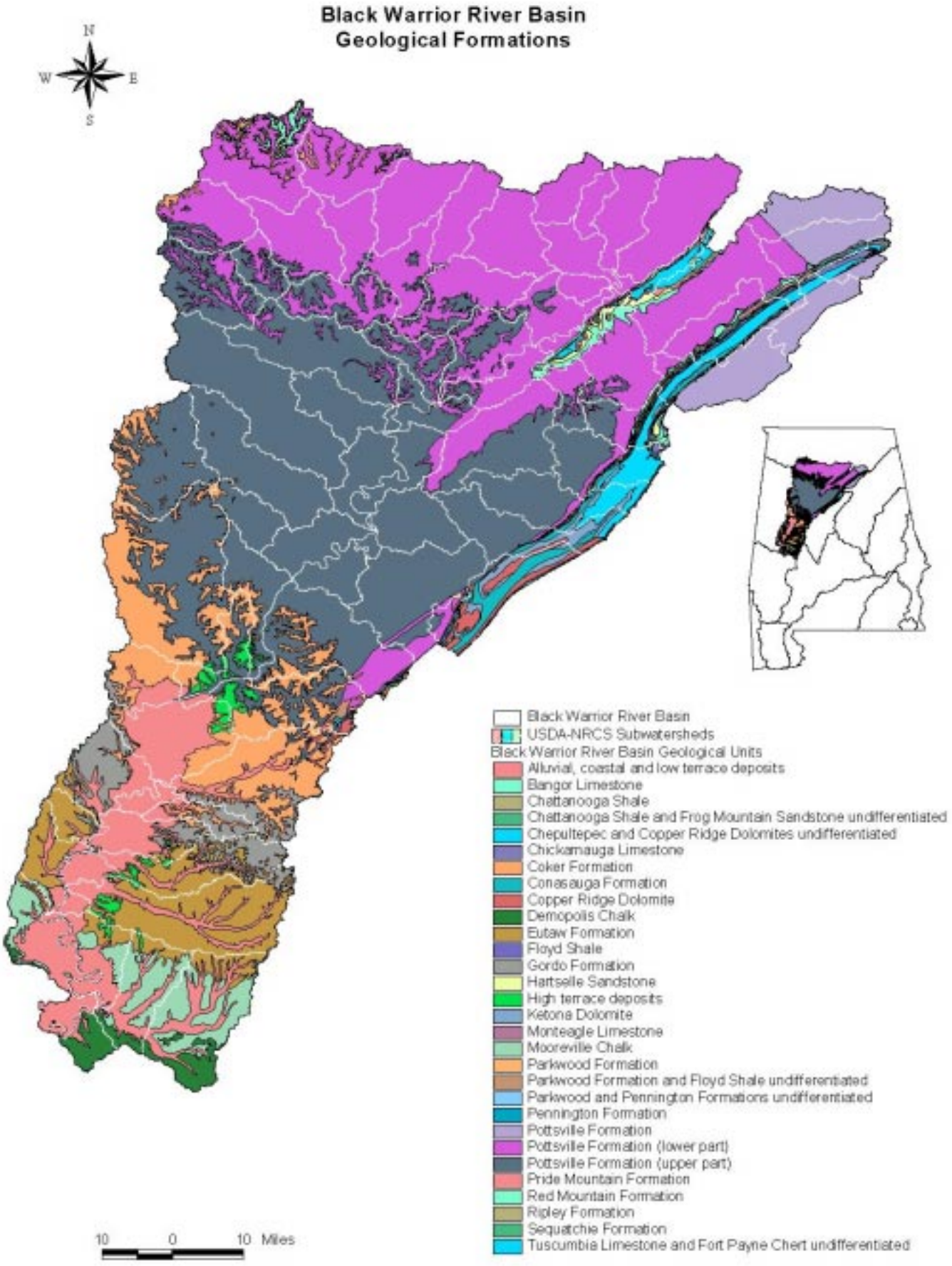
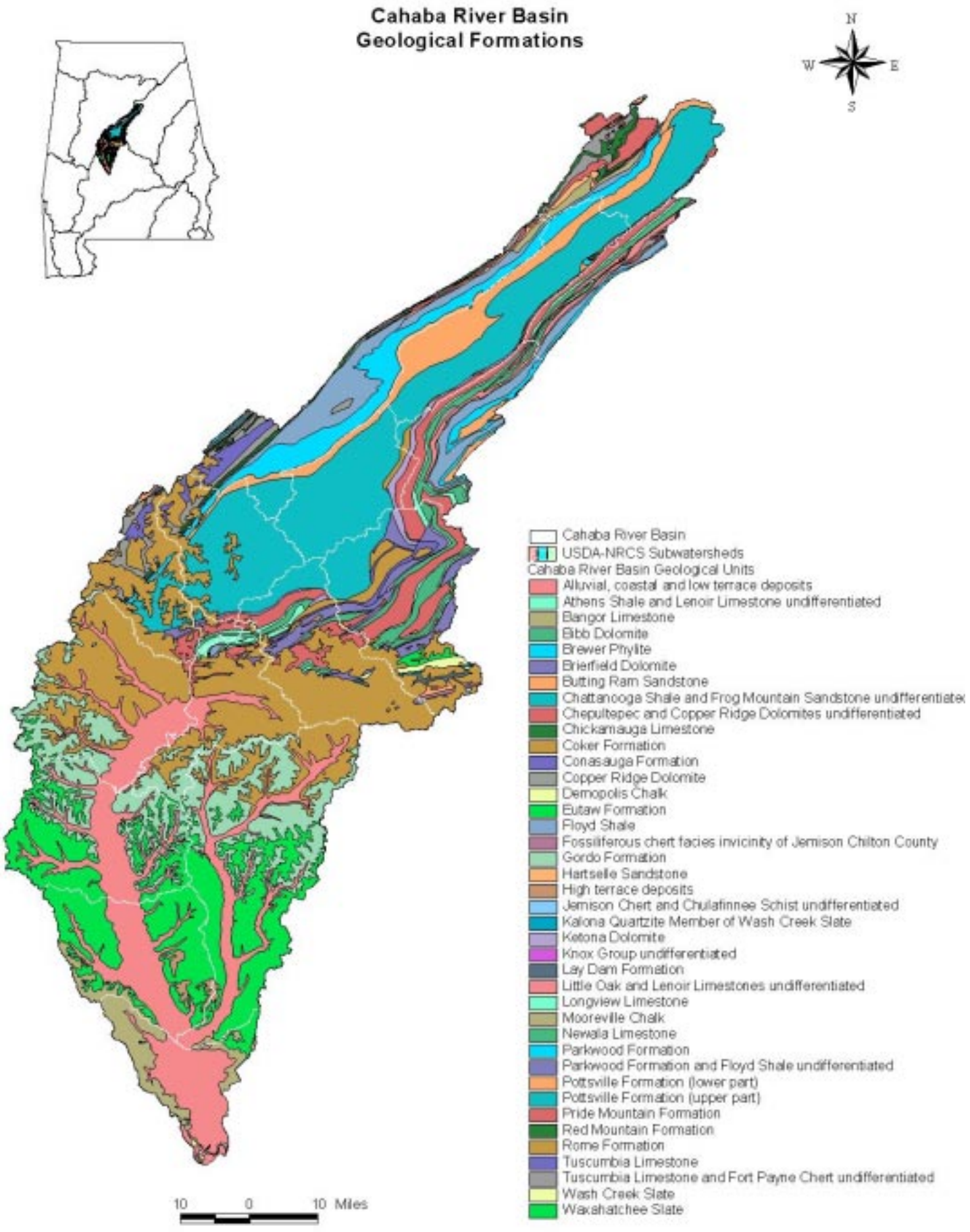

Black Warrior River Basin
Geological Formations
N
W
E
S
Black Warrior River Basin
USDA-NRCS Subwatersheds
Black Warrior River Basin Geological Units
Alluvial, coastal and low terrace deposits
Bangor Limestone
Chattanooga Shale
Chattanooga Shale and Frog Mountain Sandstone undifferentiated
Chepultepec and Copper Ridge Dolomites undifferentiated
Chickamauga Limestone
Coker Formation
Conasauga Formation
Copper Ridge Dolomite
Demopolis Chalk
Eutaw Formation
Floyd Shale
Gordo Formation
Hartselle Sandstone
High terrace deposits
Ketona Dolomite
Monteagle Limestone
Mooreville Chalk
Parkwood Formation
Parkwood Formation and Floyd Shale undifferentiated
Parkwood and Pennington Formations undifferentiated
Pennington Formation
Pottsville Formation
Pottsville Formation (lower part)
Pottsville Formation (upper part)
Pride Mountain Formation
Red Mountain Formation
Ripley Formation
Sequatchie Formation
Tuscumbia Limestone and Fort Payne Chert undifferentiated
10 0 10 Miles

Figure A-3


Cahaba River Basin
Geological Formations
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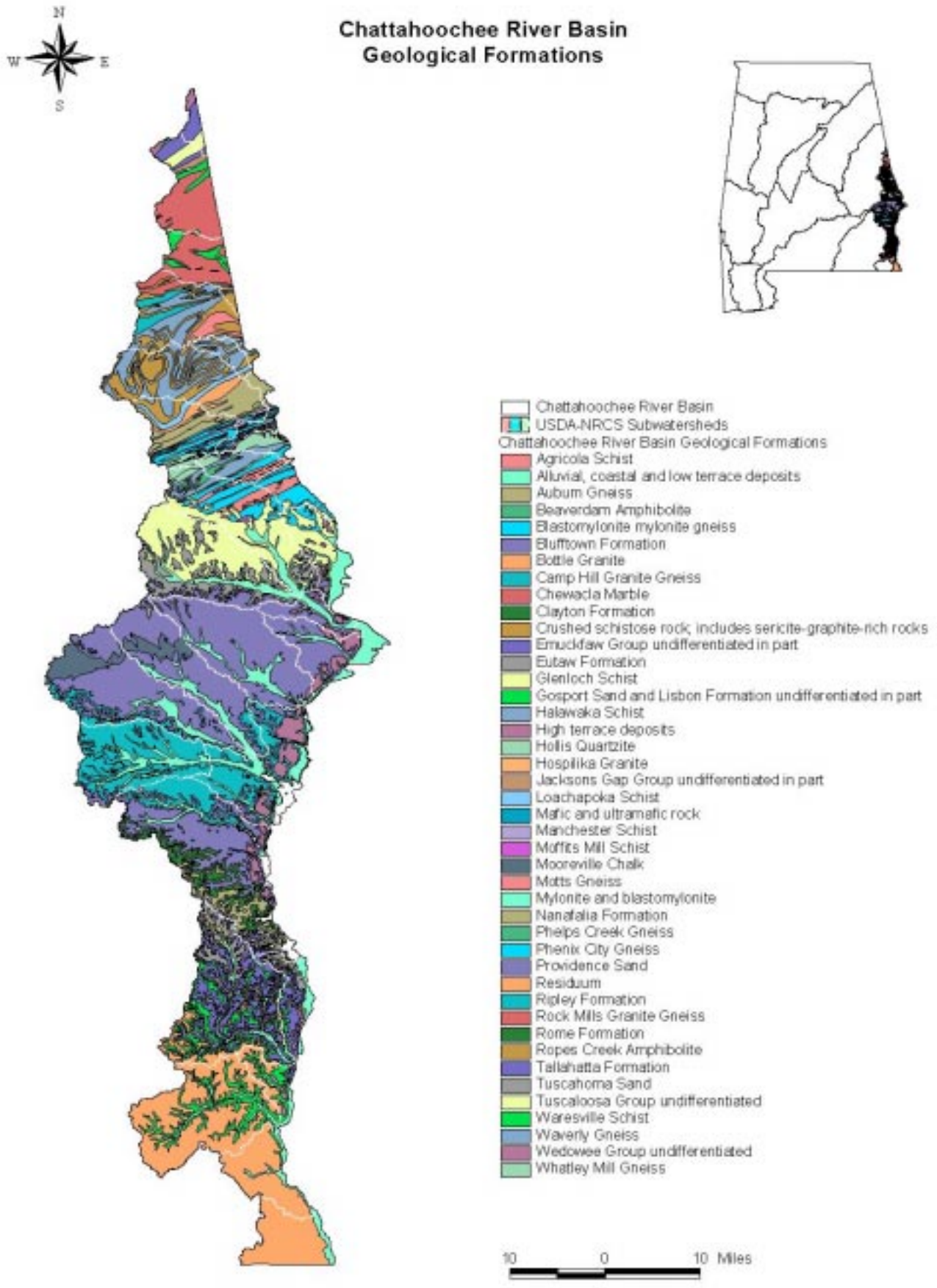
Cahaba River Basin
USDA-NRCS Subwatersheds
Cahaba River Basin Geological Units
Alluvial, coastal and low terrace deposits
Athens Shale and Lenoir Limestone undifferentiated
Bangor Limestone
Bibb Dolomite
Brewer Phyllite
Brierfield Dolomite
Butting Ram Sandstone
Chattanooga Shale and Frog Mountain Sandstone undifferentiated
Chepultepec and Copper Ridge Dolomites undifferentiated
Chickamauga Limestone
Coker Formation
Conasauga Formation
Copper Ridge Dolomite
Demopolis Chalk
Eutaw Formation
Floyd Shale
Fossiliferous chert facies invicinity of Jemison Chilton County
Gordo Formation
Hartselle Sandstone
High terrace deposits
Jemison Chert and Chulafinnee Schist undifferentiated
Kalona Quartzite Member of Wash Creek Slate
Ketona Dolomite
Knox Group undifferentiated
Lay Dam Formation
Little Oak and Lenoir Limestones undifferentiated
Longview Limestone
Mooreville Chalk
Newala Limestone
Parkwood Formation
Parkwood Formation and Floyd Shale undifferentiated
Pottsville Formation (lower part)
Pottsville Formation (upper part)
Pride Mountain Formation
Red Mountain Formation
Rome Formation
Tuscumbia Limestone
Tuscumbia Limestone and Fort Payne Chert undifferentiated
Wash Creek Slate
Wakahatchee Slate
10 0 10 Miles

Figure A-4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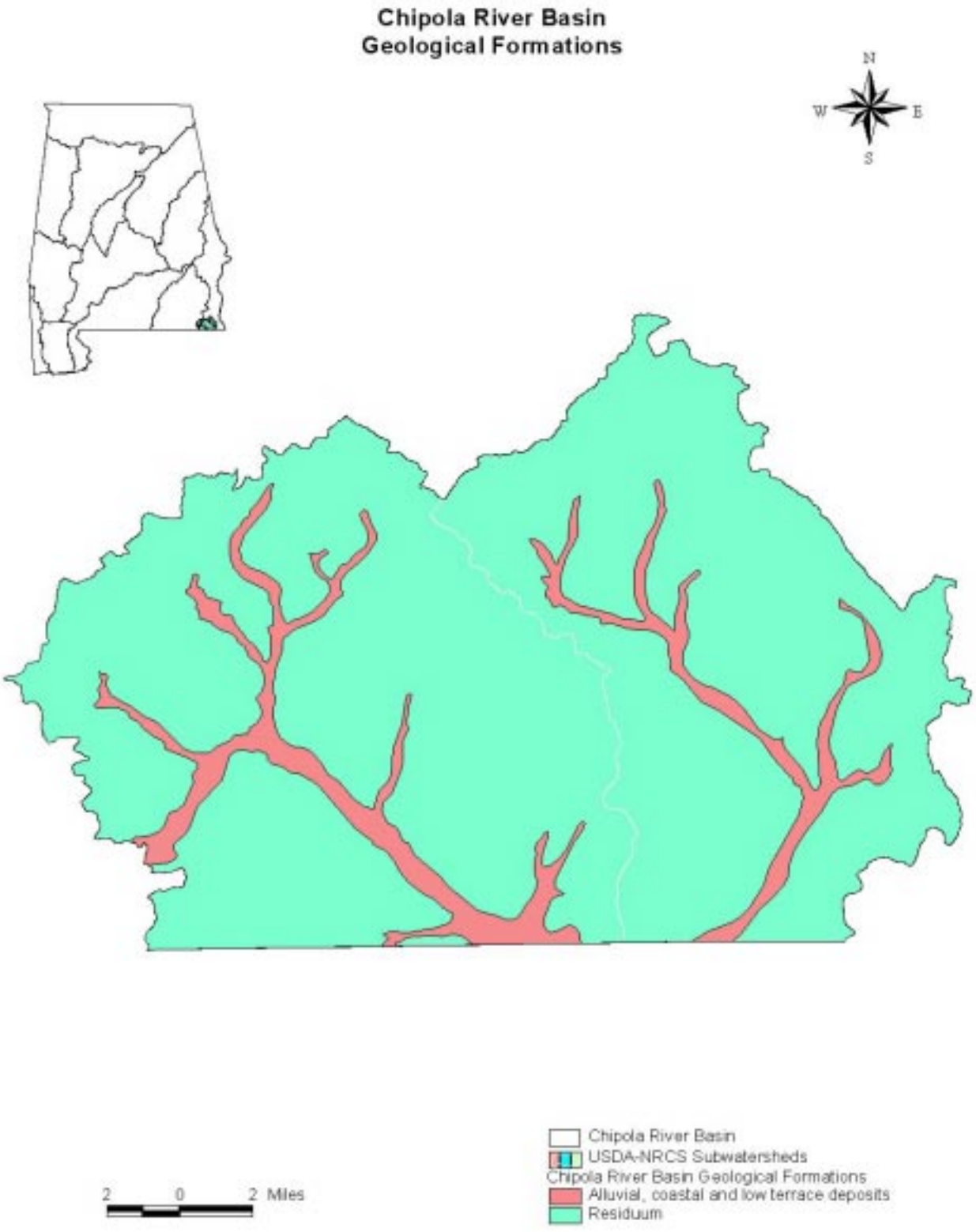
Chattahoochee River Basin
Geological Formations
Chattahoochee River Basin
USDA-NRCS Subwatersheds
Chattahoochee River Basin Geological Formations
Agricola Schist
Alluvial, coastal and low terrace deposits
Auburn Gneiss
Beaverdam Amphibolite
Blastomylonite mylonite gneiss
Blufftown Formation
Bottle Granite
Camp Hill Granite Gneiss
Chewacla Marble
Clayton Formation
Crushed schistose rock; includes sericite-graphite-rich rocks
Emuckfaw Group undifferentiated in part
Eutaw Formation
Glenloch Schist
Gosport Sand and Lisbon Formation undifferentiated in part
Halawaka Schist
High terrace deposits
Hollis Quartzite
Hospilika Granite
Jacksons Gap Group undifferentiated in part
Loachapoka Schist
Mafic and ultramafic rock
Manchester Schist
Moffits Mill Schist
Mooreville Chalk
Motts Gneiss
Mylonite and blastomylonite
Nanafalia Formation
Phelps Creek Gneiss
Phenix City Gneiss
Providence Sand
Residuum
Ripley Formation
Rock Mills Granite Gneiss
Rome Formation
Ropes Creek Amphibolite
Tallahatta Formation
Tuscahoma Sand
Tuscaloosa Group undifferentiated
Waresville Schist
Waverly Gneiss
Wedowee Group undifferentiated
Whatley Mill Gneiss
10 0 10 Miles

Figure A-5


Chipola River Basin
Geological Formations
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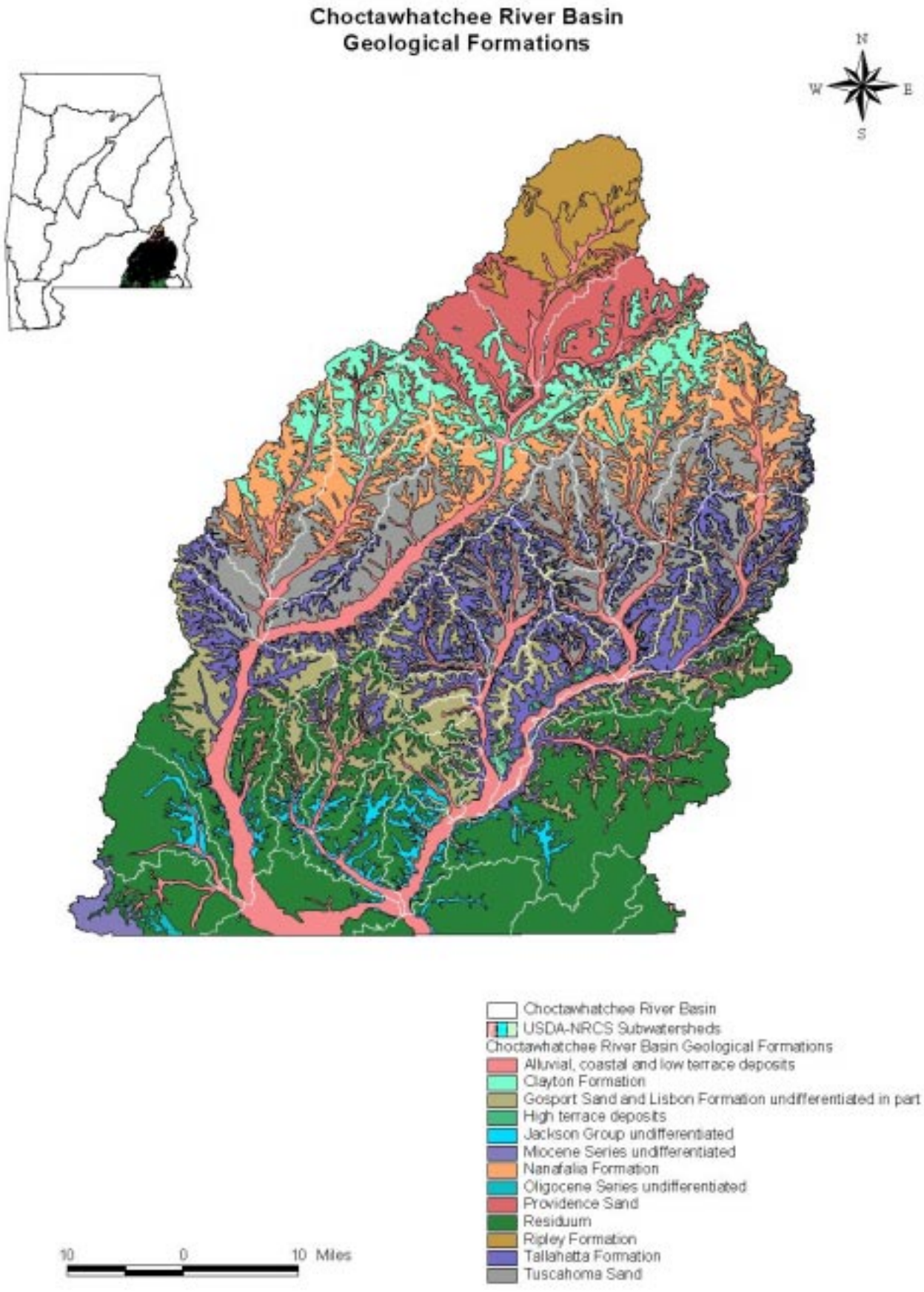
Chipola River Basin
USDA-NRCS Subwatersheds
Chipola River Basin Geological Formations
Alluvial, coastal and low terrace deposits
Residuum

Figure A-6


Choctawhatchee River Basin
Geological Formations
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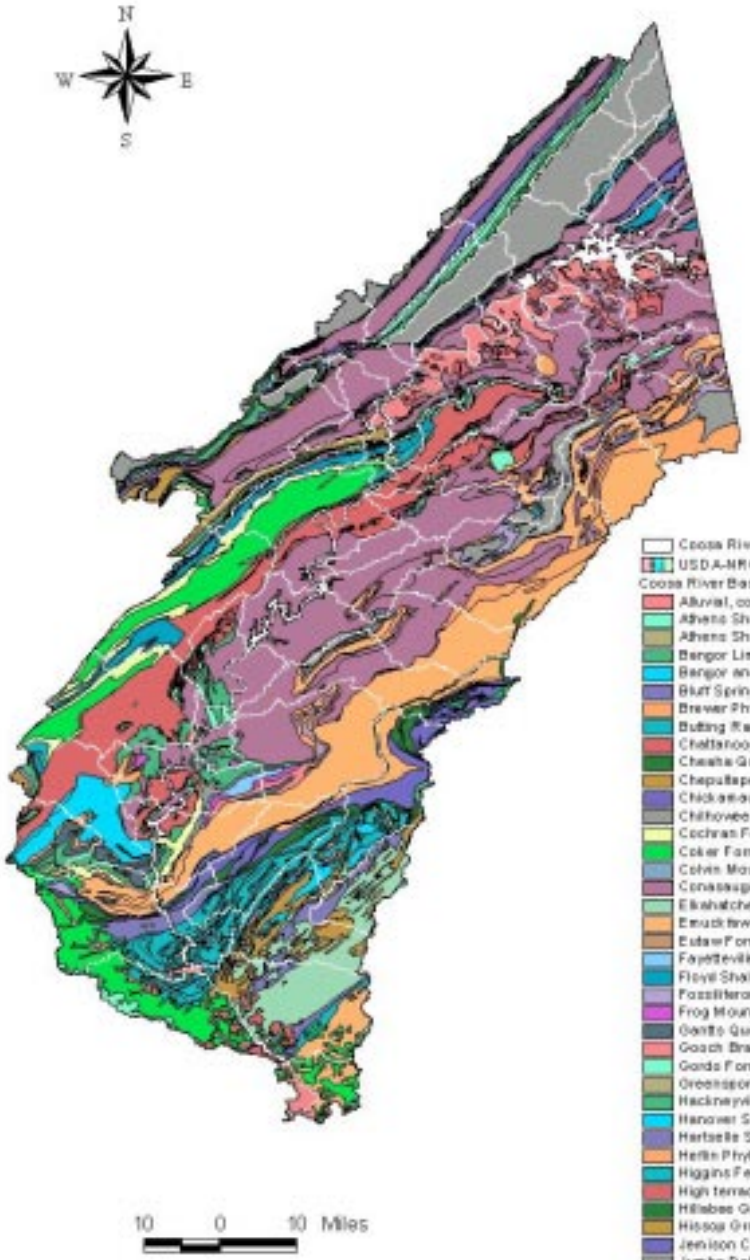
Choctawhatchee River Basin
USDA-NRCS Subwatersheds
Choctawhatchee River Basin Geological Formations
Alluvial, coastal and low terrace deposits
Clayton Formation
Gosport Sand and Lisbon Formation undifferentiated in part
High terrace deposits
Jackson Group undifferentiated
Miocene Series undifferentiated
Nanafalia Formation
Oligocene Series undifferentiated
Providence Sand
Residuum
Ripley Formation
Tallahatta Formation
Tuscahoma Sand
10 0 10 Miles

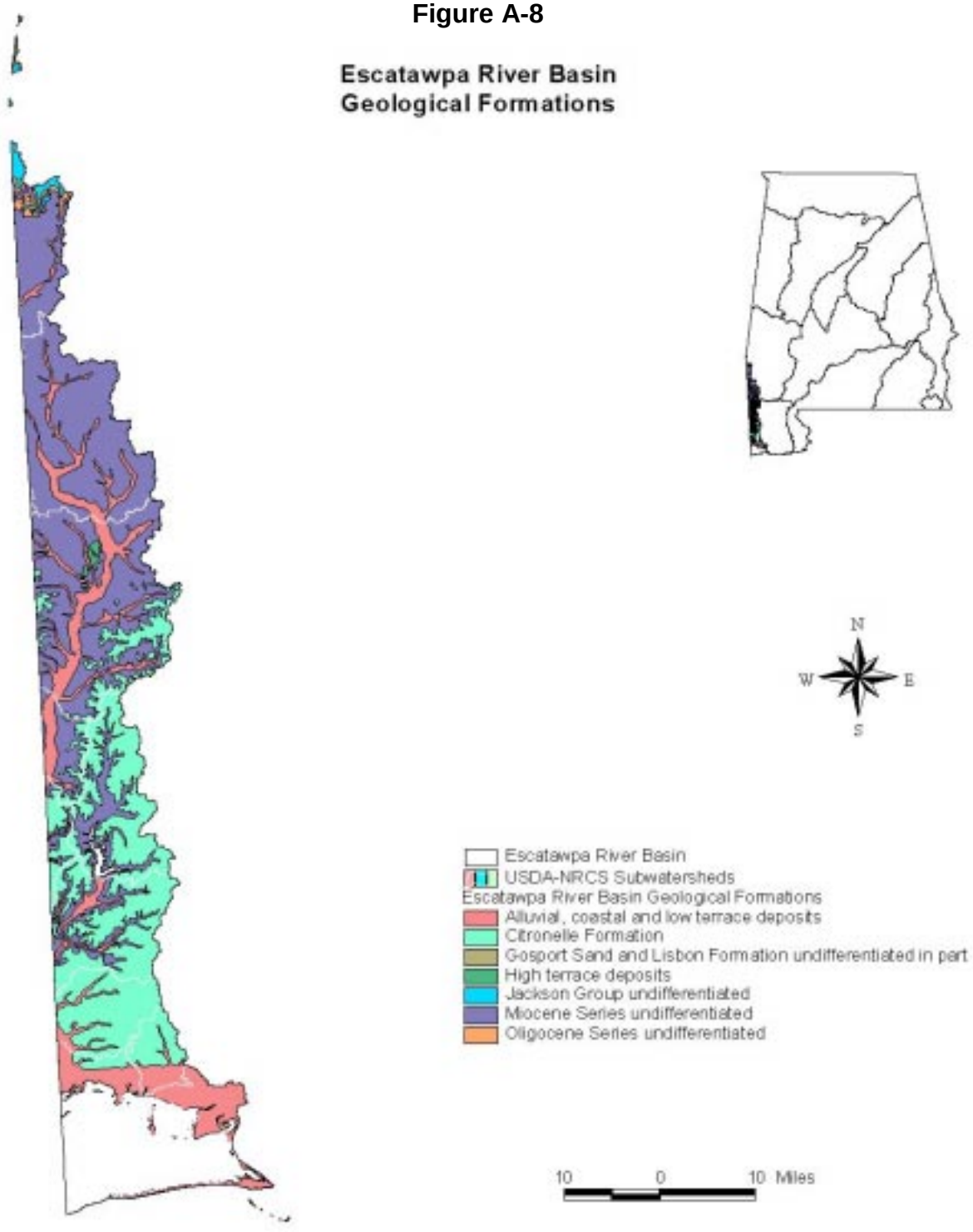
Figure A-7

Coosa River Basin Geological Formations



Coosa River Basin
USDA-NRCS Subwatersheds
Coosa River Basin Geological Formations
Alluvial, coastal and low terrace deposits
Athens Shale
Athens Shale and Lenoir Limestone undifferentiated
Bangor Limestone
Bangor and Monteagle Limestones undifferentiated
Bluff Springs Granite
Brewer Phyllite
Bulting Ram Sandstone
Chattanooga Shale and Frog Mountain Sandstone undifferentiated
Cheaha Quartzite Member of Lay Dam Formation
Chepultepec and Copper Ridge Dolomites undifferentiated
Chickamauga Limestone
Chilhowee Group undifferentiated
Cochran Formation
Coker Formation
Colvin Mountain Sandstone
Conasauga Formation
Elsahatchee Quartz Diorite Gneiss
Ettowah Group undifferentiated in part
Eutaw Formation
Fayetteville Phyllite
Floyd Shale
Fossiliferous chert facies invicinity of Jamison Chilton County
Frog Mountain Sandstone
Gantts Quarry Formation
Gooch Branch Chert
Gordo Formation
Greensport Formation
Hackneyville Schist
Hanover Schist
Hartselle Sandstone
Heflin Phyllite
Higgins Ferry Group undifferentiated
High terrace deposits
Hillabee Greenstone
Hissop Granite
Jamison Chert and Chulafinnee Schist undifferentiated
Jumbo Dolomite
Kahona Quartzite Member of Wash Creek Slate
Ketchepedrakee Amphibolite
Ketona Dolomite
Knox Group undifferentiated
Kowaliga Gneiss
Lay Dam Formation
Little Oak Limestone
Little Oak and Lenoir Limestones undifferentiated
Little Oak and Newala Limestones
Longview Limestone
Metaclastic rocks of unkown affinity
Miller Mill Quartzite Member of Lay Dam Formation
Mitchell Dam Amphibolite
Monteagle Limestone
Mooreville Chalk
Newala Limestone
Newala and Longview Limestones undifferentiated
Nichols Formation
Paleozoic shale undifferentiated
Parkwood Formation
Parkwood Formation and Floyd Shale undifferentiated
Parkwood and Pennington Formations undifferentiated
Pinchaulee Gneiss
Poe Bridge Mountain Group undifferentiated
Pottsville Formation
Pottsville Formation (lower part)
Pottsville Formation (upper part)
Pride Mountain Formation
Red Mountain Formation
Rockford Granite
Rome Formation
Sawyer Limestone Member of Brewer Phyllite
Sequatchie Formation
Sequatchie Formation Colvin Mountain Sandstone Greensport Formation undifferentiated
Shady Dolomite
Shelvin Rock Church Formation
Stumps Creek Formation
Tuscumbia Limestone
Tuscumbia Limestone and Fort Payne Chert undifferentiated
Ultramafic rock
Wash Creek Slate
Wavahatchee Slate
Wedowee Group undifferentiated
Weisner and Wilson Ridge Formations undifferentiated
Zarie Granite

Figure A-8


Escatawpa River Basin
Geological Formations
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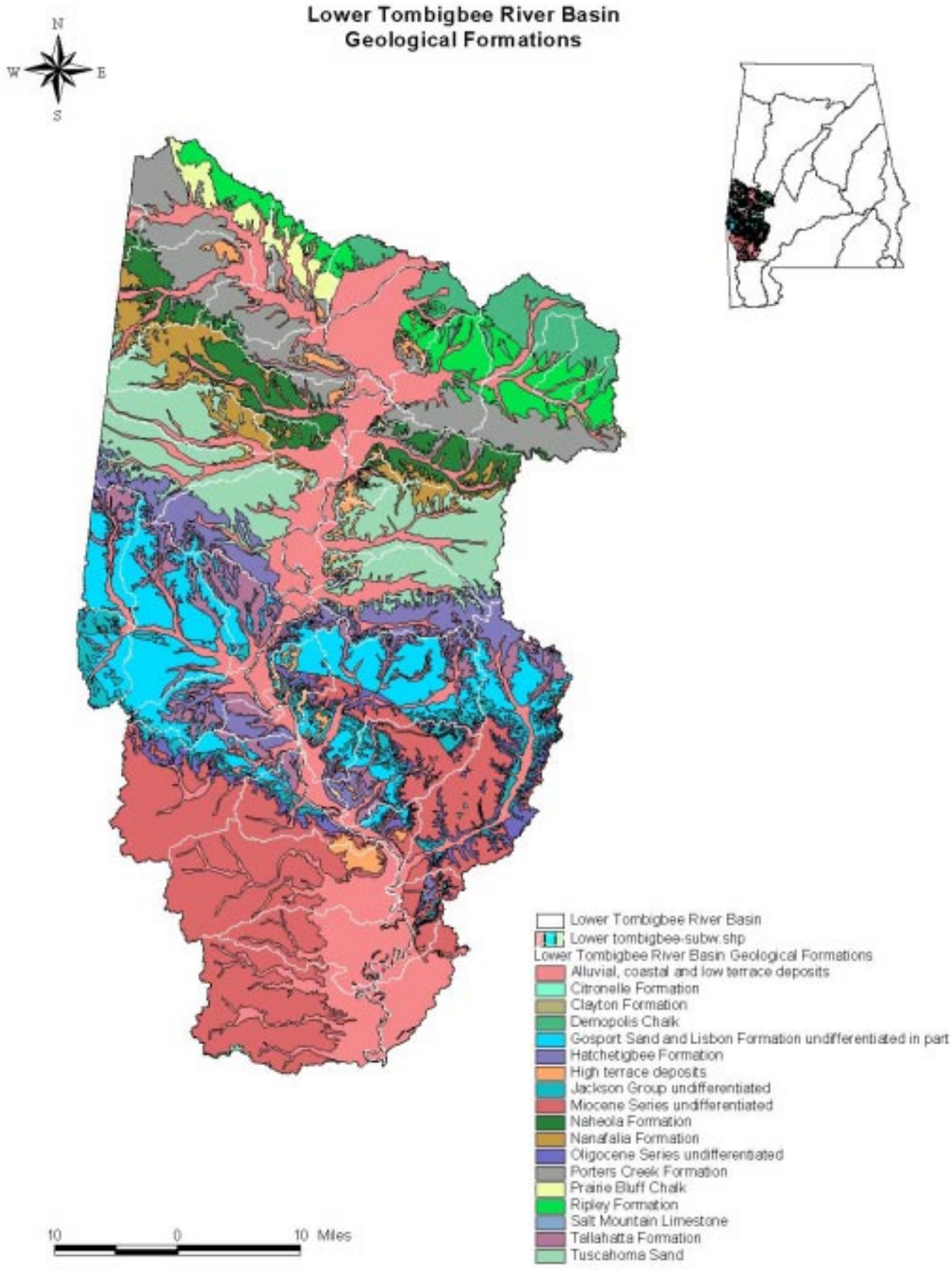
Escatawpa River Basin
USDA-NRCS Subwatersheds
Escatawpa River Basin Geological Formations
Alluvial, coastal and low terrace deposits
Citronelle Formation
Gosport Sand and Lisbon Formation undifferentiated in part
High terrace deposits
Jackson Group undifferentiated
Miocene Series undifferentiated
Oligocene Series undifferentiated
10 0 10 Miles

Figure A-9


Lower Tombigbee River Basin
Geological Formations
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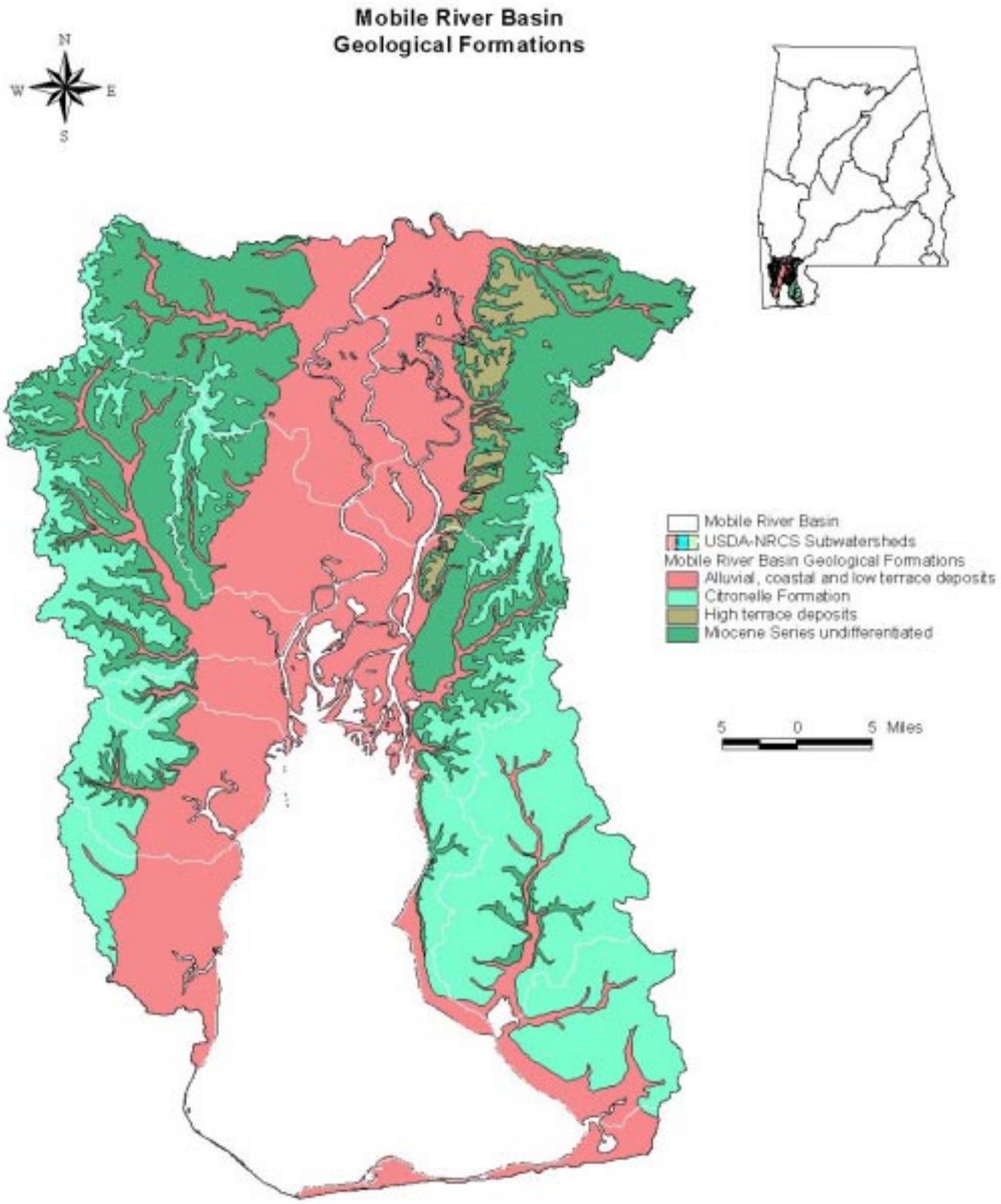
Lower Tombigbee River Basin
Lower tombigbee-subw.shp
Lower Tombigbee River Basin Geological Formations
Alluvial, coastal and low terrace deposits
Citronelle Formation
Clayton Formation
Demopolis Chalk
Gosport Sand and Lisbon Formation undifferentiated in part
Hatchetigbee Formation
High terrace deposits
Jackson Group undifferentiated
Miocene Series undifferentiated
Naheola Formation
Nanafalia Formation
Oligocene Series undifferentiated
Porters Creek Formation
Prairie Bluff Chalk
Ripley Formation
Salt Mountain Limestone
Tallahatta Formation
Tuscahoma Sand

Figure A-10


Mobile River Basin
Geological Formations
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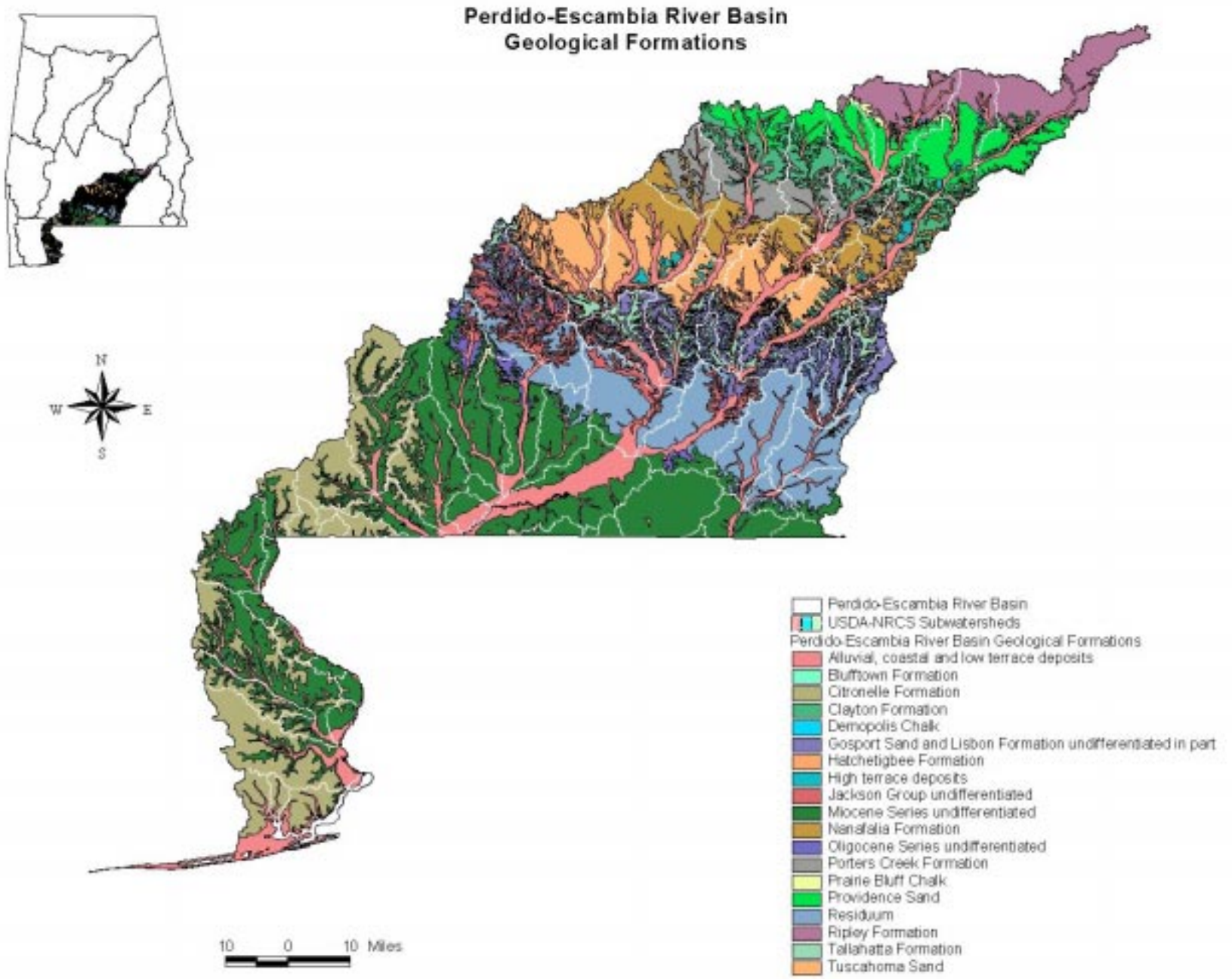
Mobile River Basin
USDA-NRCS Subwatersheds
Mobile River Basin Geological Formations
Alluvial, coastal and low terrace deposits
Citronelle Formation
High terrace deposits
Miocene Series undifferentiated
5 0 5 Miles

Figure A-11


Perdido-Escambia River Basin
Geological Formations
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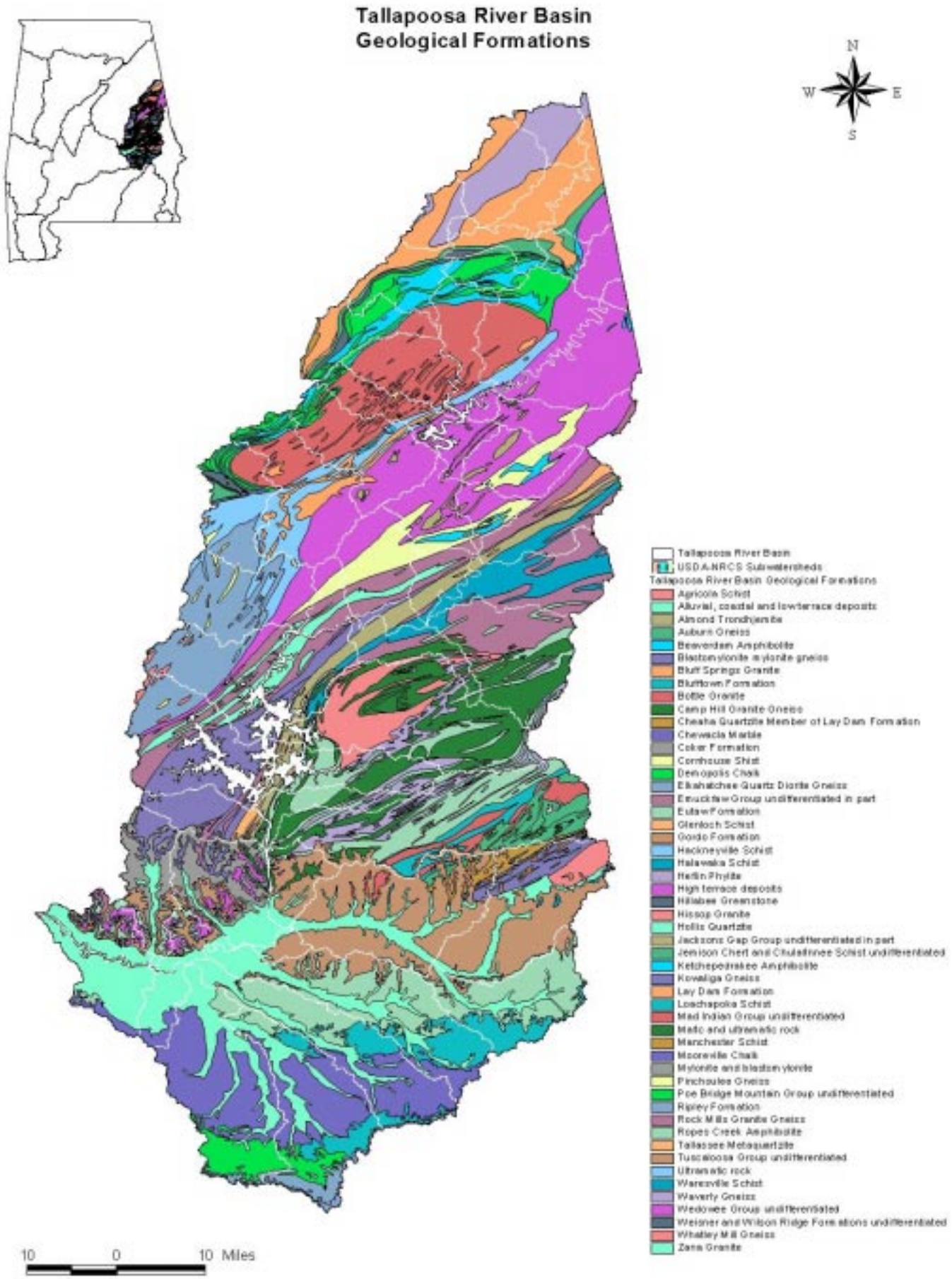
10 0 10 Miles
Perdido-Escambia River Basin
USDA-NRCS Subwatersheds
Perdido-Escambia River Basin Geological Formations
Alluvial, coastal and low terrace deposits
Bluffstown Formation
Citronelle Formation
Clayton Formation
Demopolis Chalk
Gosport Sand and Lisbon Formation undifferentiated in part
Hatchetigbee Formation
High terrace deposits
Jackson Group undifferentiated
Miocene Series undifferentiated
Nanafalia Formation
Oligocene Series undifferentiated
Porters Creek Formation
Prairie Bluff Chalk
Providence Sand
Residuum
Ripley Formation
Tallahatta Formation
Tuscahoma Sand

Figure A-12


Tallapoosa River Basin
Geological Formations
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Tallapoosa River Basin
USDA-NRCS Subwatersheds
Tallapoosa River Basin Geological Formations
Agricola Schist
Alluvial, coastal and low terrace deposits
Almond Trondhjemite
Auburn Gneiss
Beaverdam Amphibolite
Blastomylonite mylonite gneiss
Bluff Springs Granite
Bluffdown Formation
Bottle Granite
Camp Hill Granite Gneiss
Cheaha Quartzite Member of Lay Dam Formation
Cherwacla Marble
Coker Formation
Cornhouse Schist
Demopolis Chalk
Elkahatchee Quartz Diorite Gneiss
Emuckfaw Group undifferentiated in part
Eulaw Formation
Glenloch Schist
Gordo Formation
Hackneyville Schist
Halawaka Schist
Heflin Phyllite
High terrace deposits
Hillabee Greenstone
Hissop Granite
Hollis Quartzite
Jacksons Gap Group undifferentiated in part
Jemison Chert and Chulafinnee Schist undifferentiated
Ketchepedrakee Amphibolite
Kowaliga Gneiss
Lay Dam Formation
Loachapoka Schist
Mad Indian Group undifferentiated
Mafic and ultramafic rock
Manchester Schist
Mooreville Chalk
Mylonite and blastomylonite
Pinchoulee Gneiss
Poe Bridge Mountain Group undifferentiated
Ripley Formation
Rock Mills Granite Gneiss
Ropes Creek Amphibolite
Tallassee Metaquartzite
Tuscaloosa Group undifferentiated
Ultramafic rock
Wareoville Schist
Waverly Gneiss
Wedowee Group undifferentiated
Weisner and Wilson Ridge Formations undifferentiated
Whatley Mill Gneiss
Zana Granite
10 0 10 Miles

Figure A-13

Tennessee River Basin
Geological Formations

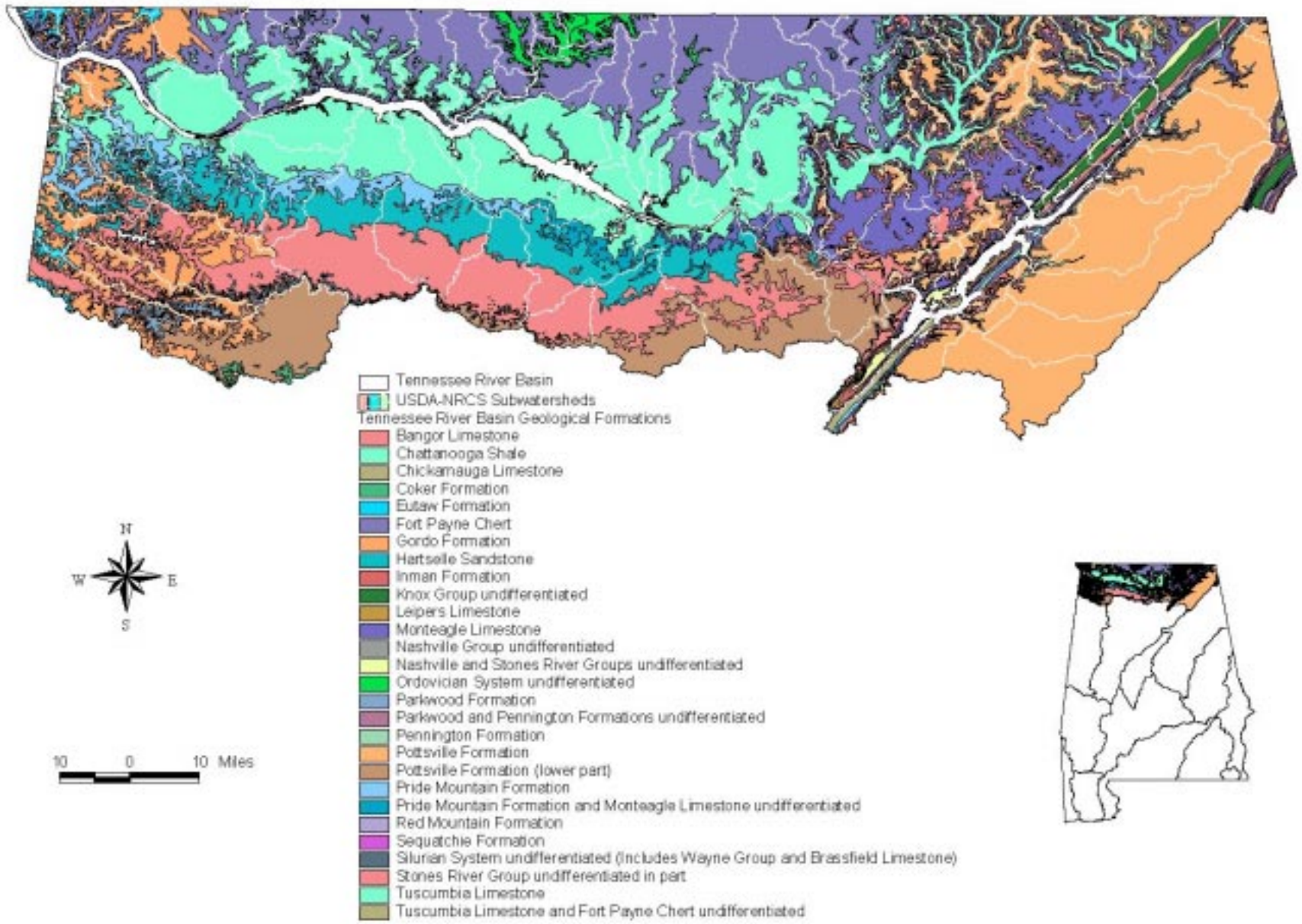
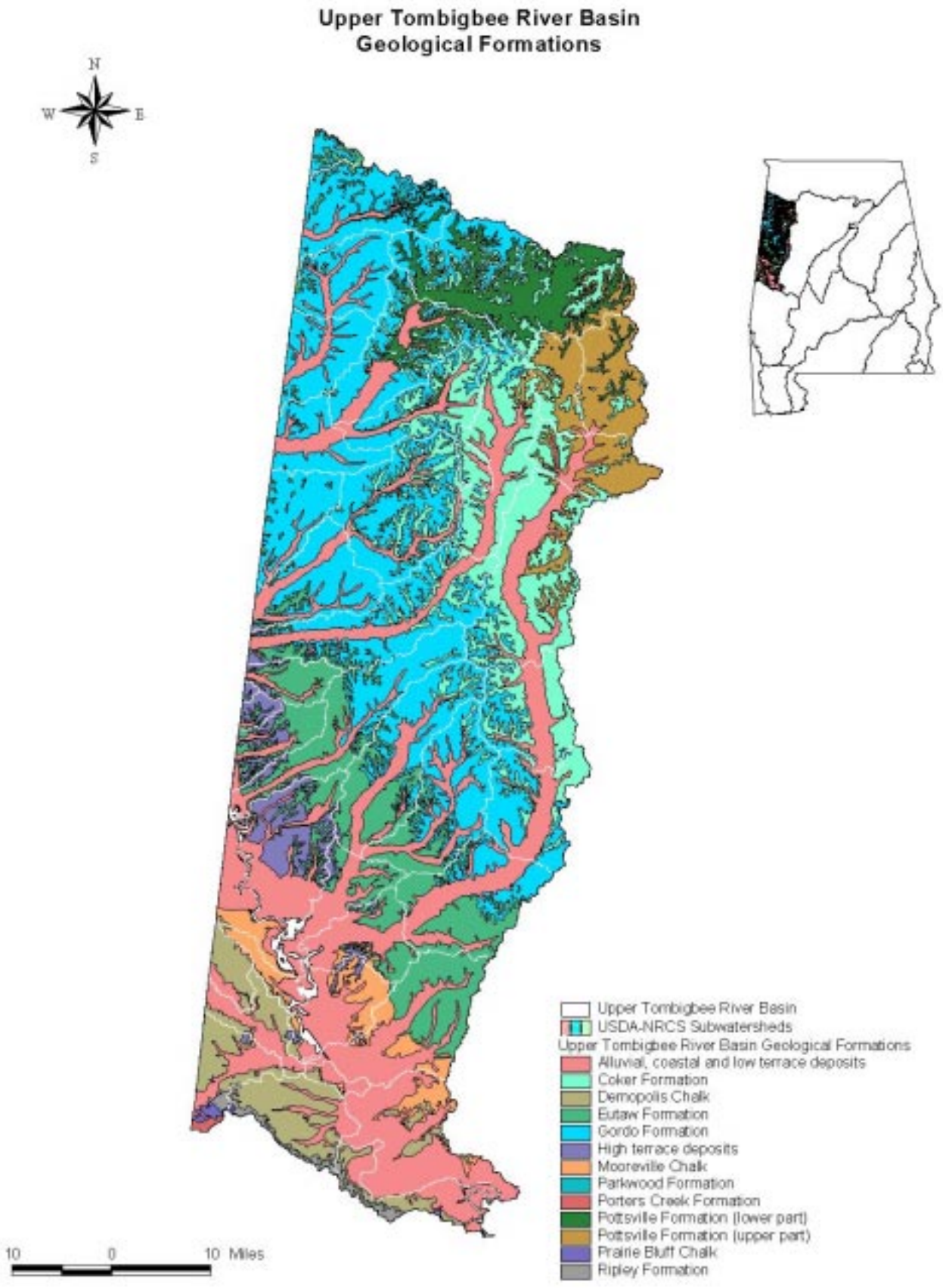


Figure A-14


Upper Tombigbee River Basin
Geological Formations
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Upper Tombigbee River Basin
USDA-NRCS Subwatersheds
Upper Tombigbee River Basin Geological Formations
Alluvial, coastal and low terrace deposits
Coker Formation
Demopolis Chalk
Eutaw Formation
Gordo Formation
High terrace deposits
Mooreville Chalk
Parkwood Formation
Porters Creek Formation
Pottsville Formation (lower part)
Pottsville Formation (upper part)
Prairie Bluff Chalk
Ripley Formation

Appendix B
Alabama Department of Environmental Management
Water Quality Assessment Methodology

Introduction

Surface water quality data and information collected by the Alabama Department of Environmental Management (ADEM) and others is used for many purposes. One of the principal purposes of this information is assessment of beneficial use support. Surface waters in Alabama are assigned various use classifications based on existing utilization, uses reasonably expected in the future, and those uses that could be possible after the effects of pollution are controlled or eliminated. Alabama's use classification system contains the following use classifications:

1. Public Water Supply
2. Swimming and Other Whole Body Water-Contact Sports
3. Shellfish Harvesting
4. Fish and Wildlife
5. Agricultural and Industrial Water Supply
6. Industrial Operations
7. Navigation
8. Outstanding Alabama Water

For each of the uses listed above, water quality criteria are applied for determining how the waters may be best utilized, for determining waste treatment requirements, and for standards of quality for State waters. The following methodology will set forth the manner in which ADEM uses surface water quality data and related information for determining whether a waterbody meets the minimum standards for its designated use. The methodology will also describe the procedure used for establishing the size or extent of assessed waterbodies.

Waterbody Assessments – Monitored versus Evaluated

Water quality data and information can take many forms, from anecdotal or casual observations to intensive water chemistry, biological, and physical characterization. When use support assessments are made it is important to understand the basis for the assessment. When information such as observed conditions, limited water quality data, water quality data older than five years, or estimated impacts from observed or suspected activities are used as the basis for the assessment, the assessment is generally referred to as an evaluated assessment. Evaluated assessments usually require the use of some degree of professional judgment by the person making the assessment. Monitored assessments are based on chemical, physical, and / or biological data collected using commonly accepted and well-documented methods. The following criteria are used to determine if information and /or data can be considered monitored or if it should be considered evaluated.

Table B-1 - Assessment Level Criteria

Monitored Data	Evaluated Data
• At least one measurement of chemical, physical, and biological conditions obtained between April and October. The biological conditions must be characterized by at least one biological indicator, i.e. macroinvertebrates, fish, chl-a, toxicity to aquatic organisms.	• Data and information obtained during reconnaissance visits, complaint investigations, screening level assessments, and once per year sampling of randomly selected sites (ALAMAP).
• At least five measurements of chemical and physical conditions obtained between April and October or over a time period considered critical for the particular pollutant of interest.	• Alabama Soil Conservation Service watershed assessments
• All data must be collected by personnel utilizing EPA approved QA/QC, an EPA approved SOP, and EPA approved analysis methods.	• Data and information older than five years or otherwise not meeting the criteria for monitored data.

Waterbody Assessments – Estimating the Size of the Assessed Waterbody

The United States Environmental Protection Agency's (EPA) published guidelines for preparation of the 1998 §305(b) reports provide only general guidance on estimating the extent or size of a waterbody represented by a given monitoring station. The general guidance suggests that a station represent no more than five to 10 miles on a wadeable stream and no more than 25 miles for large rivers. Because of the complexity of monitoring lakes and estuaries, no general guidance is given on estimating the size assessed by individual stations in those waterbodies. Geographic information systems are proving very useful in making these determinations but site specific knowledge of the waterbody is needed.

The following guidelines are intended to provide consistency in estimates of the size or extent of waterbodies assessed by individual sampling points. However, water quality and biological conditions may vary naturally from waterbody to waterbody or from sampling location to sampling location and are affected by numerous factors such as stream flow and velocity, stream bed composition, riparian and upstream land uses and land cover, geology, stream canopy, and seasonal changes. Some degree of knowledge of the waterbody being assessed will be necessary to make appropriate use of these guidelines. Different guidelines have been developed for the following different types of waterbodies.

- Wadeable streams and rivers
- Flowing and non-wadeable streams and rivers
- Impounded rivers (reservoirs)
- Natural lakes and public fishing or water supply lakes
- Tidal rivers and streams
- Estuaries

Table B-2 – Guidelines for Estimating Size or Extent of Assessed Waterbodies

Waterbody Type	Size or Extent Assessed
Wadeable stream / river	Use the lessor of the distances to the following points but not to exceed a total distance of 15 miles per sampling point: ▪ Upstream and downstream to the first point source ▪ Upstream and downstream to the next sampling location ▪ Upstream and downstream to the first tributary contributing 20% or more of the drainage area at the confluence of the tributary with the mainstem of the waterbody ▪ Upstream and downstream to the first significant change in land use or land disturbance activity ▪ Any combination of the above points
Flowing and non-wadeable stream / river	Use the lessor of the distances to the following points but not to exceed a total distance of 25 miles per sampling point: ▪ Upstream and downstream to the first significant point source ▪ Upstream and downstream to the next sampling location ▪ Upstream and downstream to the first tributary contributing 20% or more of the drainage area at the confluence of the tributary with the mainstem of the waterbody ▪ Upstream and downstream to the first significant change in land use or land disturbance activity ▪ Any combination of the above points
Impounded rivers (reservoirs)	The network of reservoir sampling stations assesses all mainstem reservoirs in Alabama on a rotating basis. Embayments will not be considered assessed unless specifically sampled.
Embayments of Impounded rivers (reservoirs)	Embayments must have at least one sampling station to determine use support.
Natural lakes and public fishing or water supply lakes	Areas considered assessed should not exceed 200 acres per sampling point.
Tidal rivers and streams	Use the lessor of the distances to the following points but not to exceed a total distance of 5 miles per sampling point: ▪ Upstream and downstream to the first point source ▪ Upstream and downstream to the next sampling location ▪ Upstream and downstream to the first tributary contributing 20% or more of the drainage area at the confluence of the tributary with the mainstem of the waterbody ▪ Upstream and downstream to the first significant change in land use or land disturbance activity ▪ Upstream to the extent of the tidal influence Any combination of the above points
Estuaries	Areas considered assessed should not exceed 5 square miles per sampling point.

Determining a Waterbody's Use Support Status

A variety of water quality data and related information can be used to determine the use support status of a waterbody. In most cases chemical water quality data will serve as the basis for the use support determination. However, biological data such as macroinvertebrate community indices, fish community indices, trophic status, bioassay results, or bacteriological indicators are often used in addition to chemical data to provide a more comprehensive use support determination. Fish consumption advisories and shellfish harvesting closures can also serve as the basis for a waterbody's use support determination.

The EPA guidelines for preparation of the 1998 §305(b) Water Quality Report to Congress offer the following guidance regarding use support determinations using conventional water quality parameters (i.e. dissolved oxygen, temperature, pH).

- Fully Supporting – For any one pollutant or stressor the criteria is exceeded in $\leq$ 10 percent of the measurements.
- Partially Supporting – For any one pollutant or stressor the criteria is exceeded in 11 to 25 percent of the measurements.
- Not Supporting – For any one pollutant or stressor the criteria is exceeded in > 25 percent of the measurements.

For toxicants (i.e. priority pollutants, metals, chlorine, and ammonia) the guidelines suggest the following criteria.

- Fully Supporting – For any one pollutant, no more than 1 exceedance of acute or chronic criteria in a 3-year period based on 10 or more samples.
- Partially Supporting – For any one pollutant, acute or chronic criteria exceeded more than once in a 3-year period but in $\leq$ 10 percent of the samples based on 10 or more samples.
- Not Supporting – For any one pollutant, acute or chronic criteria exceeded in > 10 percent of the samples based on 10 or more samples.

In those cases where the applicable water quality criteria is less than the method detection limit for a particular pollutant the waterbody will be considered unassessed for that pollutant. When the number of samples collected in a 3-year period is between 5 and 10 the use support status will be based on best professional judgement using the available information and applying the same guidelines as for conventional parameters.

Biological assessments compare data from biological surveys and other direct measurements of resident biota in surface waters to established biological criteria and assess the waterbody's degree of use support. Alabama has not established numeric biological criteria and, as a result, biological data are used as a means of applying narrative criteria contained in Alabama's water quality criteria document (ADEM Admin. Code R. 335-6-10). Although EPA has not made specific recommendations concerning the interpretation of biological data it has offered the following technical considerations when using biological data to make use support determinations.

- A waterbody's use support should be based on a comparison of site-specific biological data to a reference condition established for the ecoregion in which the waterbody is located.

- A multimetric approach to bioassessment is recommended.
- The biosurvey should include an assessment of habitat structure or condition.
- The use of a standardized index or sampling period is recommended.
- Standard operating procedures and a quality assurance program should be established.
- A determination of the performance characteristics of the bioassessment methodology is suggested.
- An identification of the appropriate number of sampling sites that are representative of the waterbody is also recommended.

Biological assessment data will generally be used in combination with other surface water quality data or information to arrive at an overall use support determination. However, EPA recommends that biological data should be weighted more heavily than other types of data when integrating information to make use support determinations since biological data provide a more direct indication of the condition of the aquatic community. For the purpose of making use support determinations for Alabama's §305(b) report and §303(d) list the following guidelines regarding interpretation of biological data will be used.

- Fully Supporting – Macroinvertebrates determined to be Excellent (Unimpaired), Good (Slightly Impaired) or Fair (Moderately Impaired) rating if Chemical /Physical/Field data indicates compliance.
- Partial Support - Macroinvertebrates determined to be Fair (Moderately Impaired) and Chemical/Physical/Field data indicates impairment.
- Not Supporting – Macroinvertebrates determined to be Poor (Severely Impaired) and Chemical/Physical/Field data indicates impairment.

Appendix C
Alabama 2000 305(b)

A S S E S S

ADEM's Strategy for Sampling Environmental indicators of Surface water quality Status

April, 1997

Field Operations Division
Alabama Department of Environmental Management

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

I. INTRODUCTION

Pursuant to the Clean Water Act, the Alabama Department of Environmental Management (ADEM) is charged with monitoring the status of the State's water quality. The ADEM has maintained a fixed ambient monitoring station network located on most of the State's major drainage basins since 1974. With the passage of the Clean Water Act and the implementation of surface water quality monitoring programs by state and federal agencies, the emphasis was placed on the chemical contamination of the nation's waters. (National Research Council 1992). Therefore, most ambient monitoring networks, including Alabama's, were established to monitor trends in water quality below point sources of pollution (ADEM 1994c, ADEM 1996c). These programs have been successful in controlling and reducing certain kinds of chemical pollution from point source discharges (National Research Council 1992), however, ambient water quality monitoring data from fixed stations often does not provide adequate information for watershed planning purposes. A watershed monitoring program should: 1) identify other impacts present within the watershed; 2) provide water quality data from a larger number of water bodies within each basin throughout the state; 3) reflect the overall water quality within the state; and 4) provide the management and regulatory branches of water pollution control agencies with an assessment tool for prioritizing or targeting watersheds and/or sub-watersheds most in need of remedial action.

During the 1980's, the ADEM implemented a multi-faceted approach to monitor the surface waters of the state. This approach included a fixed-station ambient monitoring network, a reservoir water quality monitoring program, intensive and/or special waterbody specific water quality studies, a fish tissue monitoring program, and the compliance monitoring of point source discharges utilizing both chemical monitoring and toxicity screening with aquatic organisms. This monitoring strategy addresses many of the EPA's expanded monitoring goals and incorporates many environmental indicators identified by the EPA as pertaining to the national water quality objectives, but still does not reflect the overall water quality within the state or provide an assessment tool for prioritizing or targeting watersheds most in need of remedial action.

ASSESS is designed to meet the goals of the EPA's Section 106 Monitoring Guidance (EPA 1994a), as well as the goals of the Intergovernmental Task Force on Monitoring Water Quality published in The Strategy for Improving Water Quality Monitoring in the United States (EPA 1995). ASSESS links monitoring data generated by the various Field Operations Division

(FOD) surface water quality monitoring programs to defined water quality objectives and their associated environmental indicators. An integral part of this strategy will be the incorporation of watershed monitoring by basin (Attachment 1). While most surface water monitoring conducted by the FOD will be focused within the targeted river basins, priority sub-watersheds identified by the regulatory branches of the ADEM will be monitored on a more frequent basis. This type of intensive monitoring is necessary to evaluate trends in water quality within these sub-basins. This "watershed" monitoring strategy will allow the synchronization of monitoring activities with inspections and permitting in order to support water quality protection activities on a geographic basis. By defining the major point and/or nonpoint source impacts within each basin, ASSESS will enable the permitting entities of the ADEM to make consistent and integrated decisions related to water resource issues within priority river basins.

The objective of ASSESS is to improve monitoring coverage within river basins, to improve spatial detail of water quality assessments, and to increase total stream miles monitored over the 5 year rotation period. Select historical ambient monitoring stations throughout the state will be monitored in June, August and October in order to provide data adequate for trend analysis. Specific objectives of ASSESS are as follows:

1. Implement a more efficient strategy to utilize and direct the water quality monitoring resources available to the ADEM by using a coordinated approach;
2. Document the water quality status of additional waterbodies within the State's river basins, thereby increasing the cumulative percentage of Alabama waters assessed year to year;
3. Implement a monitoring strategy that can be applied to all river basins and continue on the rotational cycle;
4. Identify existing major point and non-point pollution sources within each river basin;
5. Evaluate chemical, physical, biological, and habitat conditions of waterbodies within the targeted watershed using environmental indicators identified by the EPA as an appropriate assessment tool (EPA 1996b);
6. Identify watersheds impacted or impaired by point and non-point source pollution on a statewide basis;

7. Prioritize watersheds in greatest need of management and identify major sources of pollution within these watersheds;

8. Estimate the status and trends in ecological condition of priority watersheds and historical ambient monitoring stations;

9. Establish a basis of comparison through regular monitoring of least-impacted reference stations within each watershed and ecoregion; and,

10. Provide data that will assist in the implementation of a strategy to maintain and/or improve the status of the State's water resources and their associated use classifications.

This document describes the overall Field Operations Division (FOD) water quality monitoring strategy as well as the programs and program components utilized to meet the ASSESS objectives. The following summary of the FOD programs gives a brief description of each program and the types of information provided. The summary of the FOD program components providing data in support of EPA environmental indicators ties each component of a program to specific EPA water quality objectives and indicators to determine the status of each objective. (EPA 1996b)

II. SUMMARY OF FIELD OPERATIONS DIVISION PROGRAMS

Alabama Monitoring and Assessment Program (ALAMAP)

The Alabama Monitoring and Assessment Program is a statewide monitoring effort under development to provide data that can be used to estimate the current status of all streams and coastal/estuarine waters within the state using environmental indicators. Although the objectives are the same, the strategies used to provide the data are slightly different between the Coastal and Upland region of the state.

Upland ALAMAP

The Upland ALAMAP program (ADEM 1996d) is designed to enhance the current ambient monitoring program developed during the 1970's. First, stations in the historical ambient monitoring program were generally selected to monitor trends in water quality downstream of specific existing point sources. Therefore, the data collected at each of these sites represents only the area sampled and cannot be extrapolated to predict water quality at other similar size streams with any known level of uncertainty. To augment this type of monitoring, 50 stations will be selected statewide each year by EPA-Gulf Breeze using a probabilistic (random) design (Summers and Engle 1996). The data collected at these stations will statistically represent all upland stream miles and the level of uncertainty in the water quality estimates can be quantified. (Summers and Engle 1996). This type of assessment will be used in the 305(b) Water Quality Report to Congress to address overall State water quality.

Second, the historical ambient monitoring program required collection of water quality samples on a monthly basis at each of the stations in addition to water column metals samples on a quarterly basis. Statistical analysis of historical data by FOD and EPA Gulf Breeze suggests that sampling of water quality parameters on a quarterly schedule would have shown the same trends in water quality over time (ADEM 1996e, Summers and Engle 1996). Historically, water samples have been collected and analyzed for metal content. Metals have not been detected in the water column samples at ambient monitoring locations where metals have been detected in fish tissue or sediment samples. The modification of the historical ambient monitoring sampling schedule to a June/August/October Schedule for water quality and an annual sediment sample, where appropriate, will allow additional locations to be assessed with little additional

expenditure of resources. Data from the historical ambient monitoring stations can be used to update the CWA 303(d) list and to monitor site specific trends in water quality.

Third, many of the stations in the historical ambient monitoring program were chosen in the 1970's to monitor specific pollution sources. These stations are generally concentrated in watersheds in the Birmingham area. An evaluation of each site was conducted to determine if the rational for monitoring the site is still applicable and if the information generated is of use to the Department. After this re-evaluation of each of the historical stations, only those stations of value to the Department were retained in the historical network.

And Fourth, EPA-Gulf Breeze is statistically analyzing the parameters at each historical ambient monitoring station to evaluate and select those that are most useful in determining status and trends and the least redundant (Summers and Engle 1996). A minimum core set of environmental indicator parameters (EPA 1996b) will be collected as well as others specific to each station.

Coastal ALAMAP

The Field Operations Division-Mobile Field Office implemented a probabilistic design for the coastal ambient monitoring program in 1993. The coastal monitoring program focuses on the larger, mostly estuarine receiving water bodies within Alabama's coastal area, including Mobile Bay, Bon Secour Bay, Mississippi Sound, Wolf Bay, Bay La Launch, Perdido Bay, Bayou St. John, Little lagoon, and the Mobile-Tensaw River Delta. River stations and stations from these larger waterbodies were chosen with consideration given to sub-areas having different Water-Use-Classifications. (ADEM 1993b) The coastal assessments are conducted annually at each randomly chosen site. This data was used to assess trends in the water quality of estuarine/coastal waters and was included in the 1996 305(b) report in order to assess 100% of the coastal waters.

The existing 'core' historical ambient monitoring stations were maintained and are sampled monthly for the same parameters traditionally monitored. Several of the historical 'non-core' ambient monitoring sites were reintroduced to the program in 1996 to continue monitoring the trends at those select locations.

Coastal Watershed Survey Program

Beginning with Fiscal Year 1993, the Field Operations Division-Mobile Field Office initiated a program for assessing the condition of the small sub-basins located in Baldwin and Mobile Counties. The Coastal Watershed Survey utilizes a comprehensive, broad spectrum approach for assessing the "health" of a basin. This methodology was described in Water Quality and Natural Resource Monitoring Strategy for Coastal Alabama (ADEM 1993b) and incorporates a variety of information from multiple disciplines. Data are generated from water column and sediment samples as well as benthic macroinvertebrate fauna collections. Additional information is gathered and integrated into the survey including: land use, topography, soil characteristics, wetlands locations, and projected growth and development in the watershed.

The strategy employed for monitoring and sampling the coastal area waters follows a more varied regime than inland waters because of the high degree of seasonal variability of precipitation and water salinity. In order to accurately determine the effects of non-point sources on a watershed, it is necessary to collect samples and measure *insitu* field parameters with respect to meteorological events and seasonal conditions rather than on a routine schedule (National Research Council 1990; U.S. Environmental Protection Agency 1991; U.S. Fish and Wildlife Service 1991). Many of the problems related to non-point sources occur on an acute and irregular basis (i.e., fecal coliforms, oil sheens and turbidity) and are tied to stormwater runoff. These types of problems are often best investigated during and immediately following a storm event. Other forms of degradation manifest themselves on a more regular schedule, are often more chronic in duration (i.e., hypoxia, fish kills and phytoplankton blooms) and are best studied during times of stream low flows, salinity stratification and warm temperatures (National Research Council 1990). A sampling regime that accounts for these variations is essential (ADEM 1993b).

The tendency for estuarine water column metals to adsord to suspended particulates and settle to the bottom sediments makes the investigation of sediment contaminants a vital part of the watershed survey (Baudau and Muntau 1990; Delfino et al. 1991; Long and Morgan 1990; National Research Council 1990; NOAA 1989; Windom et al. 1989). To date, the evaluation of sediment quality in these surveys has delt solely with metal enrichment although analyses for organics might be included if the activities within a watershed have the potential for causing such contamination.

Nonpoint Source Assessment Program (NPSAP)

Basin Screening

Nonpoint Source Assessments are conducted at the request of the Nonpoint Source Unit of the Office of Education and Outreach as part of selected watershed projects. Intensive surveys conducted at nonpoint source priority stations are resource intensive. They are necessary, however, to assess subtle differences in water quality, to detect trends in water quality and to identify sources of impairment. Because these methods are resource intensive, an assessment tool is needed to identify sub-watersheds most impacted by point and nonpoint sources of pollution. The Department's regulating programs and the Nonpoint Source Unit can then use resources more effectively by targeting these basins for implementation of water pollution controls, total maximum daily load studies and intensive surveys. The objectives of the basin wide screening assessments developed by the FOD are to rank and prioritize sub-watersheds most in need of remedial action and to identify major pollution sources present in each sub-basin.

Intensive Watershed Assessment

Intensive nonpoint source watershed assessments generally consist of physical/chemical and bacteriological sample collection and analysis, instream community assessments (macroinvertebrate/fish/periphyton) and assessments of habitat quality. Assessments are conducted before and after implementation of Best Management Practices (BMPs) to evaluate trends in water quality and physical habitat due to BMPs implementation. This assessment method relies upon baseline data collected at reference stations to accurately assess trends in water quality.

Information generated during the basin screening and watershed assessments can be used to assess percent impaired waters within each major basin and will increase the miles monitored within each basin. This information can be used to update the CWA 303(d) list, the Alabama NPS Assessment Report and the 305(b) Report to Congress.

Point Source Assessment Program (PSAP)

Point Source Assessments, such as Water Quality Demonstration (WQD) studies are requested by the Municipal Branch of the Water Division. These studies are conducted on selected streams that receive treated waste from municipal wastewater treatment facilities that have been newly constructed or have been renovated using partial funding through the Alabama

Revolving Loan Program. A WQD study typically includes upstream and downstream monitoring during a period before construction or renovation has begun, and during a period after construction or renovation is complete. Stream monitoring of WQD studies includes collection of physical and chemical data, biological assessments, and stream flow determinations. The data is typically collected during the low flow period of the year, thereby documenting the greatest potential adverse impact attributable to discharge activity. The data collected serves to document improvement of stream water quality resulting from the implementation of improved wastewater treatment.

Intensive surveys such as Waste Load Allocation (WLA) and Total Maximum Daily Load (TMDL) studies are conducted at the request of the Water Quality Section of the Water Division. These studies are conducted to obtain the information to develop water quality models used in determining the allowable wasteload (permit limits) for each point source. These studies typically involve time-of-travel studies, flow determination, and intensive sampling of the waterbody and point sources for various water quality parameters over a three or four day period. Nonpoint sources are also considered and sampled if necessary.

In 1992, the Environmental Indicators Section and the Bioassay Unit began to integrate toxicity testing into selected stream assessment studies. These types of surveys are generally conducted when there is concern for a particular discharge and its effects on a receiving stream. In addition to chemical/physical water quality measurements and macroinvertebrate biological assessments, the potential toxicity of the effluent is surveyed. The facility discharge is tested at the permitted receiving water concentration (RWC) and the stream stations are tested at a concentration of one hundred percent (100%). Short-term (7-day) chronic toxicity tests are conducted on the samples utilizing Pimephales promelas and Ceriodaphnia dubia. At the end of the test period a statistical determination is made relative to the effluent's toxicity and whether or not that toxicity, if present, is transferred to the receiving stream.

Compliance Monitoring Program

The compliance monitoring program conducted by FOD includes a compliance monitoring inspection (CSI). During the CSI, representative samples required by the facilities' National Pollutant Discharge Elimination System (NPDES) permit are obtained. Chemical and bacteriological analyses are performed, and the results are forwarded to the appropriate

Departmental permitting entity, where they are used to verify the accuracy of the permittee's self-monitoring program and reports, determine compliance with discharge limitations, determine the quantity and quality of effluents, develop permits, and provide evidence for enforcement proceedings where appropriate.

Reservoir Water Quality Monitoring Program (RWQMP)

With the exception of reservoirs in the Tennessee River system which are assessed by the TVA, the Reservoir Water Quality Monitoring Program assesses the water quality and trophic status of all publicly accessible lakes and reservoirs in the State. Monitoring takes place during the algal growing season at least once every two years with many lakes/reservoirs being monitored every year. This routine reservoir monitoring is supplemented with information gained from more intensive studies conducted on selected reservoirs as funding becomes available. RWQMP studies typically include vertical profiles of select physical/chemical parameters, chemical and bacteriological sample collection, chlorophyll *a* and phytoplankton analysis. Objectives of the program are: a) to develop an adequate water quality database for all publicly owned lakes in the state; b) to establish trends in lake trophic status that are only established through long-term monitoring efforts; and, c) to satisfy Section 314 (a)(1) of the Water Quality act of 1987.

Fish Tissue Monitoring Program (FTMP)

The ADEM Fish Tissue Monitoring Program was initiated in 1991 as a cooperative agreement with the Alabama Department of Public Health (ADPH), the Alabama Department of Conservation and Natural Resources (ADCNR) and the Tennessee Valley Authority (TVA) to monitor fish tissue throughout the state for bioaccumulative contaminants that can pose a risk to human health. Twenty-eight (28) major reservoirs, 26 stream locations and 19 ADCNR-managed public fishing lakes are sampled on a five-year rotational basis. Additional water bodies are also monitored based on identified need. Each year's sampling locations are determined based upon information available to the ADEM and input from the cooperative agencies. Water bodies that have been identified as having elevated concentrations of bioaccumulative fish tissue contaminates, or greater potential for contamination, are more closely monitored.

At each location, a composite sample of six individuals (same species) from both the predator and the omnivore/bottom feeding groups is collected (usually six bass and six catfish). Skinless-fillet composite samples are screened for a select list of organo-chlorine pesticides, metals and PCBs. Screening results will normally dictate the need for additional sampling trips and analyses. Most contaminants are stored/concentrated primarily in fatty tissue. Therefore, sampling is conducted in the fall of the year when fatty tissue is accumulated for over-wintering. The results of these analyses are provided to the ADPH for their consideration. If data warrants, the ADPH will issue consumption advisories as appropriate.

The physical condition of important sport and/or commercial fish species collected for tissue monitoring is also evaluated using relative weights. Relative weight is a condition indicator used by fishery biologists to compare individual fish or a group of fish with a standardized norm. Using this system a fish that scores 80 to 100 would be considered in good-to-excellent condition while a fish that scores 79 or below would be considered fair-to-poor. These same fish are also examined for any external anomalies such as lesions (sores), tumors, parasites and deformities. This relative weight condition indicator is used to evaluate the trends in the health of a fish community.

III. SUMMARY OF FOD PROGRAM COMPONENTS PROVIDING DATA IN SUPPORT OF NATIONAL ENVIRONMENTAL GOALS FOR WATER

In 1996, EPA published Environmental Indicators of Water Quality in the United States (EPA 1996b). This document outlined two National Environmental Goals for Water, the objectives to meet these goals, and the environmental indicators used to measure the successful attainment of the objectives (Table 1). FOD programs and program components provide valuable data supporting at least one environmental indicator for each of the five objectives (Table 2). Figure 1 (modified from EPA 1996b) illustrates how each FOD program provides information for multiple objectives. 'These objectives are like the building blocks in a pyramid, where success in reaching the goals at the top is dependent on successful attainment of those lower in the pyramid' (EPA 1996b). The following section describes each of the FOD program components and how it provides data to support environmental indicator(s) and water objective(s).

GOAL NO. 1: CLEAN WATERS

GOAL NO. 2: SAFE DRINKING WATER

Water Quality Objective I: Conserve and enhance public health

Indicator: Fish consumption advisories -- Percentage of rivers and lakes with fish that states have determined should not be eaten, or should be eaten only in limited quantities.

FOD Program: Fish Tissue Monitoring Program

Program Component(s): Fish Tissue Analysis

Fish Tissue Analysis

At each sampling location, a composite sample of six individuals (same species) from both the predator and the omnivore/bottom feeding groups is collected (usually six bass and six catfish). Skinless-fillet composite samples are

screened for a select list of organo-chlorine pesticides, metals and PCBs. Sampling is conducted in the fall of the year when contaminants, if present, would most likely be stored in fatty tissue. The results of these analyses are provided to the ADPH for their consideration. If data warrants, the ADPH will issue consumption advisories as appropriate.

Water Quality Objective II: Conserve and Enhance Aquatic Ecosystems

Indicator: Biological Integrity -- Percentage of rivers and estuaries with healthy aquatic communities

FOD Program(s): *Alabama Monitoring and Assessment Program (ALAMAP) - Upland and Coastal; Nonpoint Source Assessment Program (NPSAP); Point Source Assessment Program (PSAP); Coastal Watershed Survey Program (CWSP); Reservoir Water Quality Monitoring Program (RWQMP); Fish Tissue Monitoring Program(FTMP)*

Program Component(s): *Macroinvertebrate/Fish/Periphyton Community Bioassessments (ALAMAP, NPSAP, PSAP, CWSP); Trophic State Determinations (RWQMP); Fish Health Analysis (FTMP)*

Macroinvertebrate Community Bioassessment

The FOD benthic macroinvertebrate assessment program is an integral part of the Department's biological monitoring effort. The use of the benthic macroinvertebrate community has proven to be a cost-effective water quality monitoring tool that reflects overall ecological integrity; i.e., chemical, physical, and biological integrity of the survey sites. These results, therefore, directly assess the status of a water body relative to the primary goal of the Clean Water Act (Plafkin et al. 1989). A Multihabitat Bioassessment Protocol is currently utilized to sample wadeable and nonwadeable streams (Lenat 1988, Plafkin et al. 1989). All methods utilized are documented in the Department's Standard Operating Procedures and Quality Control Assurance Manual, Volume II (ADEM 1996a).

The Biological Condition Scoring Criteria (BCSC) as outlined in Rapid Bioassessment Protocols for Use in Streams and Rivers: Macroinvertebrates and Fish (Plafkin et al. 1989) is currently utilized to evaluate the biotic integrity of each wadeable stream sampled in relation to the ecoregional reference site determined to be most comparable. These assessments are then used to determine the Aquatic Life Use Designations. These comparisons have aided the Department in evaluating the "best attainable biotic community" within an ecoregion.

The FOD Coastal Watershed Survey Program incorporates macroinvertebrate community bioassessments. In the absence of well defined scoring criteria applicable to estuarine species, such as the protocols of Plafkin et al. (1989), communities are evaluated relative to the presence and/or absence of tolerant-intolerant taxa.

Fish Community/Periphyton Community Bioassessment

At present, the macroinvertebrate community is the only biological indicator used by the Department to assess water quality. The EPA recommends biological assessments include more than one taxonomic group (EPA 1996b). Including more than one taxonomic group encompasses more than one trophic level, providing data than can assist investigators in evaluating the extent of impairment, the type of impairment, and degree of recovery (KDEP 1993, EPA 1996b). It is recommended that, as resources allow, fish and periphyton community collections be incorporated into the intensive biological assessments.

Trophic State Determinations

The extent of reservoir eutrophication is determined by trophic state determinations. The concern about eutrophication from a water quality standpoint is primarily due to cultural eutrophication. Cultural eutrophication negatively affects biological communities of water bodies through changes in water quality variables such as dissolved oxygen, pH, water temperature and light availability.

Chlorophyll a concentrations are used to calculate Carlson's Trophic State Index (TSI). Carlson's TSI provides limnologists and the public with a single number that serves as an indicator of a lake's trophic status. The Trophic State classification scale is used as follows:

Oligotrophic	TSI <40
Mesotrophic	TSI 40-49
Eutrophic	TSI 50-70
Hypereutrophic	TSI > 70

Fish Condition Analysis

The physical condition of important sport and/or commercial fish species collected for tissue monitoring is evaluated using relative weights. Relative weight is a condition indicator used by fishery biologists to compare individual fish or a group of fish with a standardized norm. Using this system, a fish that scores 80 to 100 would be considered in good-to-excellent condition while a fish that scores 79 or below would be considered fair-to-poor. These same fish are also examined for any external anomalies such as lesions (sores), tumors, parasites and deformities.

Water Quality Objective III: Support Uses Designated by States in their water quality standards.

Indicator: Designated uses in state and tribal water quality standards

a) *Aquatic life designated use* -- Percentage of assessed waterbodies that can support healthy aquatic life, as designated by the states and tribes.
b) *Drinking water supply designated use* -- Percentage of assessed waterbodies that can support safe drinking water supply use, as designated by the states and tribes.
c) *Fish and shellfish consumption designated use* -- Percentage of assessed waterbodies that can support fish and shellfish consumption, as designated by the states and tribes.
d) *Recreational designated use* -- Percentage of assessed waterbodies that can support safe recreation, as designated by the states and tribes.

FOD Program(s): Point Source Assessment Program (PSAP); Nonpoint Source Assessment Program (NPSAP); Reservoir Water Quality Monitoring Program (RWQMP); Alabama Monitoring and Assessment Program (ALAMAP) - Upland and Coastal; Coastal Watershed Survey Program (CWSP).

Program Component(s): Chlorophyll a, Fecal Coliform, Physical/Chemical *(RWQMP, NPSAP, PSAP);* Fecal Coliform, Physical/ Chemical *(ALAMAP; CWSP);* Toxicity Testing *(PSAP, NPSAP)*

Water quality studies of differing types are conducted each year at various locations throughout Alabama in response to identified informational needs. These studies typically include several monitoring locations and a frequency of sampling specific to the objectives of a particular study. Studies may include chemical, physical, and biological parameters.

Chlorophyll a

The RWQMP uses Carlson's trophic state index (TSI) for determination of the trophic state of Alabama lakes. Using chlorophyll *a* concentrations to determine trophic state is considered to give the best estimate of the biotic response of lakes to nutrient enrichment when phytoplankton is the dominant plant community. The TSI is a single number that serves as an indicator of trophic status of a lake but does not necessarily define it. Lakes with a TSI of 70 or greater are generally considered to be hypereutrophic and in need of regulatory

action appropriate for protection and restoration. A TSI of 50 - 70 indicates eutrophic conditions in a lake. Trophic state index values of 40 to 50 indicate mesotrophic conditions while oligotrophic conditions are indicated by TSI values less than 40.

Fecal Coliform

Bacteriological samples for Fecal Coliform analysis are routinely collected as a part of most field studies. Single samples from each station are used for screening purposes to determine if there is a potential problem. More intensive sample collection methods are used to determine if a segment warrants upgrade to a use classification of *Swimming and other whole body water-contact sports*.

Physical / Chemical

Water samples for analysis of Physical/Chemical parameters are collected as a part of most Departmental monitoring efforts. These samples are analyzed and the data made available to the Department through reports and/or storage in the EPA STORET database. The following parameters are routinely analyzed: Dissolved Oxygen, pH, Water Temperature, Conductivity, Turbidity, (Fecal Coliform - see above) as well as others that may be specific to a particular study.

Toxicity Testing

Water samples are collected from effluent sources, when appropriate, and analyzed for indications of toxic effects. At the conclusion of the tests, the results are included in any reports and forwarded to the Departmental entity responsible for regulating the effluent sources.

Water Quality Objective IV: Conserve and Improve Ambient conditions

Indicator: Surface water pollutants -- Trends of selected pollutants found in surface water

Indicator: Contaminated sediments -- Percentage of sites with sediment contamination that might pose a risk to humans and aquatic life

Indicator: Habitat Assessment (Suggested as a regional indicator and future national indicator)

FOD Program*: ALAMAP - upland and coastal, Point Source Assessment Program (PSAP); Nonpoint Source Assessment Program (NPSAP); Reservoir Water Quality Monitoring Program (RWQMP); Coastal Watershed Survey Program (CWSP).*

Program Component(s): Physical/Chemical, Fecal Coliform (ALAMAP - upland and coastal, PSAP, NPSAP, RWQMP, CWSP), Sediment Analysis (ALAMAP - upland and coastal, NPSAP, CWSP), Habitat Assessment (ALAMAP - upland, NPSAP, PSAP)

Habitat Assessment and Physical Characterization

Biological integrity and water quality are directly affected by physical habitat. In addition, the assessment of habitat quality is an important step in documenting the adverse impacts of NPS pollution. The Department utilizes the Habitat Assessment Matrices developed by EPA (Plafkin et al. 1989) and Barbour and Stribling (1994) in conjunction with physical characteristics and water quality parameters to evaluate and document habitat quality of each wadeable bioassessment sampling site.

Sediment Analysis

"Certain types of chemicals in water tend to bind to particles and collect in sediment. Chemicals often persist longer in sediment than in water because conditions might not favor natural degradation. When present at elevated concentrations in sediment, pollutants can be released back to water. Pollutants can also accumulate in bottom dwelling organisms and in fish and shellfish and move up the food chain. In both cases, excessive levels of chemicals in sediment might become hazardous to aquatic life and humans." (EPA 1996b) Sediment samples are collected annually, where appropriate, as part of the ALAMAP historical ambient monitoring program as well as select NPSAP and CWSP assessments.

Physical / Chemical

Water samples for analysis of Physical/Chemical parameters are collected as a part of most Departmental monitoring efforts. These samples are analyzed and the data made available to the Department through reports and/or storage in the EPA STORET database. A routine suite of parameters includes those chosen by EPA and its partners (EPA 1996b) to have significant effects on our surface waters (Total Suspended Solids (TSS), Total Phosphorus, Nitrogen (and Nitrate), Total Dissolved Solids (TDS), and Dissolved Oxygen (Fecal Coliform - see below) as well as others that are specific to a particular study.

Fecal Coliform

Bacteriological samples for Fecal Coliform analysis are routinely collected as a part of most field studies. Single samples from each station are used for screening purposes to determine if there is a potential problem. More intensive sample collection methods are used to determine if a segment warrants upgrade to a use classification of *Swimming and other whole body water-contact sports.*

Water Quality Objective V: Reduce or prevent pollutant loadings and other stressors

Indicator: Selected point source loadings to (a) surface water and (b) ground water -- Trends for selected pollutants discharged from point sources into surface water, and underground injection control wells that are sources of point source loading into ground water.

FOD Program*: Point Source Assessment Program (PSAP)*

Program Component(s): Physical/Chemical, Toxicity Testing, Time-of-Travel, AGPT

Physical / Chemical

Water samples for analysis of Physical/Chemical parameters are collected as a part of most Departmental monitoring efforts. Composite samplers are used to collect 24 hour composite samples from effluent sources. These samples are

analyzed and the data made available to the Department through reports. In the future these data will be available through the Departmental Surface Water Quality Database currently under development.

EPA and its partners have chosen a suite of toxic and conventional pollutants to track as *environmental indicators* of progress toward reducing point source pollution: Cadmium, Copper, Lead, Mercury, Phenol, Total Residual Chlorine, Total Suspended Solids (TSS), Total Phosphorus, Nitrogen (and Nitrate), Pathogens, BOD and Ammonia (EPA 1996b). In order to make the Department's monitoring parameters also consistent with EPA's 'Index of Watershed Indicators' (EPA 1997), Hexavalent Chromium, Nickel, and Zinc are also collected as part of the effluent monitoring effort. These 'ASSESS' parameters will be collected, in addition to the permitted parameters, at all Industrial and Municipal point source discharges to surface waters. The usefulness of each of these parameters will be re-evaluated at regular intervals.

Toxicity Testing

Water samples are collected from effluent sources, when appropriate and analyzed for indications of toxic effects. At the conclusion of the tests, the results are included in any reports and forwarded to the Departmental entity responsible for regulating the effluent sources.

Time-of-travel

The use of fluorescent dyes and tracing techniques provides a means for measuring the time-of-travel and dispersion characteristics of steady and gradually varied flow in streams. Measurements of the dispersion and concentration of dyes give insight into the behavior of soluble contaminants that may be introduced into a stream. (Hubbard 1982) This information can be used by Departmental staff to determine NPDES permit limits.

AGPT

More specialized types of biological monitoring such as algal growth potential testing (AGPT) are also increasingly utilized in the surface water monitoring program. AGPT provides valuable information such as the estimation of limiting nutrients that is useful in waste load modeling efforts, non-point source monitoring, and reservoir trophic status determinations.

The Algal Growth Potential Test was developed 24 years ago as a standard, inexpensive, reproducible, and interpretable method to determine the potential of natural waters, wastewater effluent, and various compounds to support or inhibit algal growth. The assay is based on the premise that the maximum yield is proportional to the amount of the limiting nutrient present and biologically available with respect to the growth requirements of the alga. It is intended that the test be used: 1) to identify algal growth-limiting constituents; 2) to determine biologically the availability of algal growth-limiting nutrients; and 3) to quantify the biological response to changes in concentrations of algal growth-limiting constituents. These measurements are made by adding the test alga to the test water and determining algal growth at appropriate intervals (Raschke and Schultz 1987).

IV. DATA MANAGEMENT/STORAGE

The FOD utilizes EPA's national STORET database for the storage, analysis, and retrieval of physical, chemical, and some biological surface water data collected throughout the State.

The Environmental Indicators Section of FOD has several databases housed on the Department's mini-mainframe computer: The macroinvertebrate database created in 1991 and updated in 1995, the fish tissue database created in 1993, and the toxicity testing database added to the mainframe computer system in 1995. All data entered into the mainframe databases are checked for accuracy. The macroinvertebrate database facilitates the management and analysis of data by both calculating the biometrics and creating the standardized reports used in macroinvertebrate studies. Accuracy of the biometric results is hand verified for 10% of the sampling events each year. The toxicity testing database is used in evaluation of toxicity effects of wastewater discharges and allows users to view facility test results in a standardized and accessible format. Historical toxicity data are currently being incorporated into this database. The fish tissue database is used in evaluation of fish health as related to human fish tissue consumption. The database allows compilation of data for reports and easy access to almost twenty years of data. Manuals for the use of these databases regarding data entry and analysis are currently being developed.

V. QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

Laboratory Analytical Support for the Department is provided by the ADEM Central Laboratory in Montgomery, the Birmingham Branch Laboratory, and the Mobile Branch Laboratory. These laboratories are responsible for organic, inorganic, and radiochemical analyses for the Department's Surface Water Monitoring Program. Analyses are performed utilizing the protocols found in the Standard Methods for the Examination of Water and Wastewater, 18th edition (APHA 1992), and the EPA's Methods for Chemical Analysis of Water and Wastes (EPA 1983) manuals. In addition, the Central Laboratory is fully certified by EPA Region IV for the analysis of Phase II and Phase V drinking water parameters.

As a regulatory agency, it is necessary to document the methodologies used in the monitoring programs conducted by the FOD to ensure the accuracy, comparability, and representativeness of the data collected (Plafkin et al. 1989). Quality assurance and quality

control programs have therefore been established as an integral part of each of the monitoring programs conducted by FOD. Each program is fully documented in one of the FOD Standard Operating Procedures Manuals. As recommended by the EPA (Plafkin et al. 1989, EPA 1993, EPA 1994b), these programs include the development of standard operating procedures manuals, quality assurance of both field and laboratory procedures, as well as the management and analysis of data.

Standard Operating Procedures Manuals

Written protocols of methodologies utilized by the FOD have been developed and updated in conjunction with each of the monitoring programs.

The Field Operations Division Standard Operating Procedures and Quality Control Assurance Manual, Volume I - Physical Chemical (SOP) (ADEM 1994a) is a comprehensive document covering safety, sample collection and field measurements, microbiological analysis, QA/QC, and other information necessary to conduct quality field and laboratory work.

The Field Operations Division Standard Operating Procedures and Quality Control Assurance Manual, Volume II - Freshwater Macroinvertebrate Biological Assessment (SOP) (ADEM 1996a) documents all methodologies currently utilized by the Department to collect and analyze freshwater macroinvertebrate samples and to conduct site assessments of habitat quality and characterization of the physical attributes.

The Field Operations Division also has in effect a Fish Tissue Monitoring SOP (Standard Operating Procedures and Quality Control Assurance Manual, Volume III - Fish Sampling and Tissue Preparation for Bioaccumulative Contaminants) (ADEM 1996b). This latest revision includes many of the most recent changes recommended by EPA.

In 1994, a comprehensive standard operating procedures manual documenting all methodologies used by the Bioassay Unit was developed (Standard Operating Procedures and Quality Control Assurance Manual, Volume IV - Toxicity Testing Procedures) (ADEM 1994b). A standardized effluent toxicity test report format was also created for the submission of self-monitoring test results.

A manual, developed in 1993 and finalized in 1997, documents the procedures used in the Algal Growth Potential bioassay currently used by the Field Operations Division (Standard

Operating Procedures and Quality Control Assurance Manual, Volume V - Algal Growth Potential Bioassay Methods) (ADEM 1997).

QA/QC Field Procedures

Duplicate water samples and field parameters are collected at 10 percent of the sampling events during each study.

Every individual that will be involved in stream bioassessments during the year participates in a joint bioassessment conducted prior to the sampling season. Crews of two conduct simultaneous intensive multihabitat bioassessments (MB-I) of the site, including the physical characterization and habitat assessment to ensure comparability of macroinvertebrate bioassessment techniques between sampling events and collectors. In addition, during the sampling year duplicate macroinvertebrate samples are taken at 10% of the stations to ensure that results obtained can be duplicated and are representative of the stream site.

Reservoir monitoring completed as part of the Clean Lakes Program also incorporates duplicate and "blank" samples. Field duplicate samples are obtained by completely duplicating the collection process of both field parameters and each sample type at 10% of the sampling sites. Blank samples are also collected at the same frequency as duplicates by processing distilled water through the collection and filtration equipment in the same manner as regular samples. This procedure documents that the procedures used to rinse equipment prevent contamination between samples and stations.

QA/QC Laboratory Procedures

The laboratory QA procedures for the bioassay program encompass all activities that affect the quality of effluent toxicity data. Quality control in the bioassay laboratory is a day-to-day routine that incorporates every aspect of organism culturing, general lab maintenance, and toxicity testing. Quality control is also measured with monthly bioassay reference tests to ensure comparability of test organisms. New procedures are currently being developed to integrate chronic toxicity tests to the QA/QC program.

The Environmental Indicators Section assesses comparability of macroinvertebrate identifications between investigators for 10% of the sampling stations. In addition, a specimen of each macroinvertebrate taxon identified is maintained in a reference collection.

VI. REPORTING

All data collected by the FOD are provided to the requesting Division or incorporated into reports by FOD for circulation. Table 3 lists all of the reports generated by the various organizational units of the FOD since 1989. The following are a list of reports routinely generated by FOD or that FOD provides a substantial amount of data.

Biennial Water Quality Report to Congress (305B)

ADEM Fish Tissue Monitoring Report

ADEM Reservoir Water Quality Monitoring Report

ALAMAP (Coastal) - Annual Data Summary

Coastal Watershed Survey Reports

Various special studies reports as projects are completed

Table 1. EPA Water Quality Objectives and Indicators (EPA 1996b)

Objective I: Conserve and Enhance Public Health

1. *Population served by community drinking water systems violating health-based requirements*---Population served by drinking water systems with one or more violations of health-based requirements.
2. *Population served by unfiltered surface water systems at risk from microbiological pollution*---Population served by, and number of, systems that have not met the requirements to filter their water to remove microbiological contaminants.
3. *Population served by drinking water systems exceeding lead action levels*---Population served by, and number of, systems with lead levels in drinking water exceeding the regulatory threshold.
4. *Source water protection*---Number of community drinking water systems using ground water that have programs to protect them from pollution.
5. *Fish Consumption advisories*---Percentage of rivers and lakes with fish that states have determined should not be eaten, or should be eaten in only limited quantities.
6. *Shellfish growing water classification*---Percentage of estuarine and coastal shellfish growing waters approved for harvest for human consumption.

Objective II: Conserve and Enhance Aquatic Ecosystems

7. *Biological integrity*---Percentage of rivers and estuaries with healthy aquatic communities.
8. *Species at risk*---Percentage of aquatic and wetland species currently at risk of extinction.
9. *Wetland acreage*---Rate of wetland acreage loss.

Objective III: Support Uses Designated by the States and Tribes in Their Water Quality Standards

10. *Designated uses in state and tribal water quality standards*
    a. *Drinking water supply designated use*---Percentage of assessed waterbodies that can support safe drinking water supply use, as designated by the states and tribes.
    b. *Fish and shellfish consumption designated use*---Percentage of assessed waterbodies that can support fish and shellfish consumption, as designated by the states and tribes.
    c. *Recreational designated use*---Percentage of assessed waterbodies that can support safe recreation, as designated by the states and tribes.
    d. *Aquatic life designated use*---Percentage of assessed waterbodies that can support healthy aquatic life, as designated by the states and tribes.

Objective IV: Conserve and Improve Ambient Conditions

11. *Ground water pollutants*---Population exposed to nitrate in drinking water. In the future, the indicator will report the presence of other chemical pollutants in ground water.
12. *Surface water pollutants*---Trends of selected pollutants found in surface water.
13. *Selected coastal surface water pollutants in shellfish*---The concentration levels of selected pollutants in oysters and mussels.
14. *Estuarine eutrophication conditions*---Trends in estuarine eutrophication conditions.
15. *Contaminated sediments*---Percentage of sites with sediment contamination that might pose a risk to humans and aquatic life.

Objective V: Reduce or Prevent Pollutant Loadings and Other Stressors

16. *Selected point source loadings to (a) surface water and (b) ground water*---Trends for selected pollutants discharged from point sources into surface water, and underground injection control wells that are sources of point source loadings into ground water.
17. *Nonpoint source loadings to surface water*---Amount of soil eroded from cropland that could run into surface waters. Future reports will include additional nonpoint source surface water pollutants as well as sources of nonpoint source ground water pollution.
18. *Marine debris*---Trends and sources of debris monitored in the marine environment.

Table 2. Field Operations Division Programs and Program Components providing Data toward EPA Environmental Indicators for EPA
Water Objectives to Meet National Environmental Goals (EPA 230-D-96-002).

EPA Environmental Objective	***EPA Environmental Indicator***	***FOD Program Component***	***FOD Program***
I. Conserve and Enhance Public Health	Fish consumption advisories	Fish Tissue Analysis	Fish Tissue Monitoring Program (FTMP)
II. Conserve and Enhance Aquatic Ecosystems	Biological integrity	Macroinvertebrate / Fish / Periphyton Community Bioassessment	Alabama Monitoring and Assessment Program (ALAMAP) - upland
	Biological integrity	Macroinvertebrate / Fish Community Bioassessment	Alabama Monitoring and Assessment Program (ALAMAP) - Coastal
	Biological integrity	Macroinvertebrate Community Bioassessment	Coastal Watershed Survey Program (CWSP)
	Biological integrity	Macroinvertebrate / Fish / Periphyton Community Bioassessment	Nonpoint Source Assessment Program (NPSAP)
	Biological integrity	Macroinvertebrate / Fish / Periphyton Community Bioassessment	Point Source Assessment Program (PSAP)
	Biological integrity	Trophic State Determination	Reservoir Water Quality Monitoring Program (RWQMP)

Table 2 (cont.)

EPA Environmental Objective	***EPA Environmental Indicator***	***FOD Program Component***	***FOD Program***
	Biological integrity	Fish Health Analysis	Fish Tissue Monitoring Program (FTMP)
III. Support Uses Designated by the States and Tribes in their Water Quality Standards	Designated uses in state and tribal water quality standards	Chlorophyll *a*	Nonpoint Source Assessment Program (NPSAP)
	Designated uses in state and tribal water quality standards	Chlorophyll *a*	Point Source Assessment Program (PSAP)
	Designated uses in state and tribal water quality standards	Chlorophyll *a*	Reservoir Water Quality Monitoring Program (RWQMP)
	Designated uses in state and tribal water quality standards	Fecal coliform	Alabama Monitoring and Assessment Program (ALAMAP) - upland
	Designated uses in state and tribal water quality standards	Fecal coliform	Coastal Watershed Survey Program (CWSP)
	Designated uses in state and tribal water quality standards	Fecal coliform	Point Source Assessment Program (PSAP)
	Designated uses in state and tribal water quality standards	Fecal coliform	Nonpoint Source Assessment Program (NPSAP)
	Designated uses in state and tribal water quality standards	Fecal coliform	Reservoir Water Quality Monitoring Program (RWQMP)

Table 2 (cont.)

EPA Environmental Objective	***EPA Environmental Indicator***	***FOD Program Component***	***FOD Program***
	Designated uses in state and tribal water quality standards	Physical / Chemical	Alabama Monitoring and Assessment Program (ALAMAP) - upland
	Designated uses in state and tribal water quality standards	Physical / Chemical	Alabama Monitoring and Assessment Program (ALAMAP) - Coastal
	Designated uses in state and tribal water quality standards	Physical / Chemical	Coastal Watershed Survey Program (CWSP)
	Designated uses in state and tribal water quality standards	Physical / Chemical	Reservoir Water Quality Monitoring Program (RWQMP)
	Designated uses in state and tribal water quality standards	Physical / Chemical	Nonpoint Source Assessment Program (NPSAP)
	Designated uses in state and tribal water quality standards	Physical / Chemical	Point Source Assessment Program (PSAP)
	Designated uses in state and tribal water quality standards	Toxicity Testing	Nonpoint Source Assessment Program (NPSAP)
	Designated uses in state and tribal water quality standards	Toxicity Testing	Point Source Assessment Program (PSAP)
IV. Conserve and Improve Ambient Conditions	Habitat quality (suggested as a regional indicator and future national indicator)	Habitat Assessment	Alabama Monitoring and Assessment Program (ALAMAP) - upland

Table 2 (cont.)

EPA Environmental Objective	*EPA Environmental Indicator*	*FOD Program Component*	*FOD Program*
	Habitat quality (suggested as a regional indicator and future national indicator)	Habitat Assessment	Nonpoint Source Assessment Program (NPSAP)
	Habitat quality (suggested as a regional indicator and future national indicator)	Habitat Assessment	Point Source Assessment Program (PSAP)
	Surface water pollutants	Physical / Chemical	Alabama Monitoring and Assessment Program (ALAMAP) - upland
	Surface water pollutants	Physical / Chemical	Alabama Monitoring and Assessment Program (ALAMAP) - coastal
	Surface water pollutants	Physical / Chemical	Coastal Watershed Survey Program (CWSP)
	Surface water pollutants	Physical / Chemical	Point Source Assessment Program (PSAP)
	Surface water pollutants	Physical / Chemical	Nonpoint Source Assessment Program (NPSAP)
	Surface water pollutants	Physical / Chemical	Reservoir Water Quality Monitoring Program (RWQMP)
	Surface water pollutants	Fecal Coliform	Alabama Monitoring and Assessment Program (ALAMAP) - upland
	Surface water pollutants	Fecal Coliform	Alabama Monitoring and Assessment Program (ALAMAP) - coastal

Table 2 (cont.)

EPA Environmental Objective	EPA Environmental Indicator	FOD Program Component	FOD Program
	Surface water pollutants	Fecal Coliform	Coastal Watershed Survey Program (CWSP)
	Surface water pollutants	Fecal Coliform	Point Source Assessment Program (PSAP)
	Surface water pollutants	Fecal Coliform	Nonpoint Source Assessment Program (NPSAP)
	Surface water pollutants	Fecal Coliform	Reservoir Water Quality Monitoring Program (RWQMP)
	Contaminated sediments	Sediment Analysis	Alabama Monitoring and Assessment Program (ALAMAP) - upland
	Contaminated sediments	Sediment Analysis	Alabama Monitoring and Assessment Program (ALAMAP) - coastal
	Contaminated sediments	Sediment Analysis	Coastal Watershed Survey Program (CWSP)
V. Reduce or Prevent Pollutant Loadings and other stressors	Selected point source loadings to surface water	Physical / Chemical	Point Source Assessment Program (PSAP)
	Selected point source loadings to surface water	Toxicity Testing - Ceriodaphnia / Fathead Minnows	Point Source Assessment Program (PSAP)
	Selected point source loadings to surface water	Time of Travel	Point Source Assessment Program (PSAP)

Table 2 (cont.)

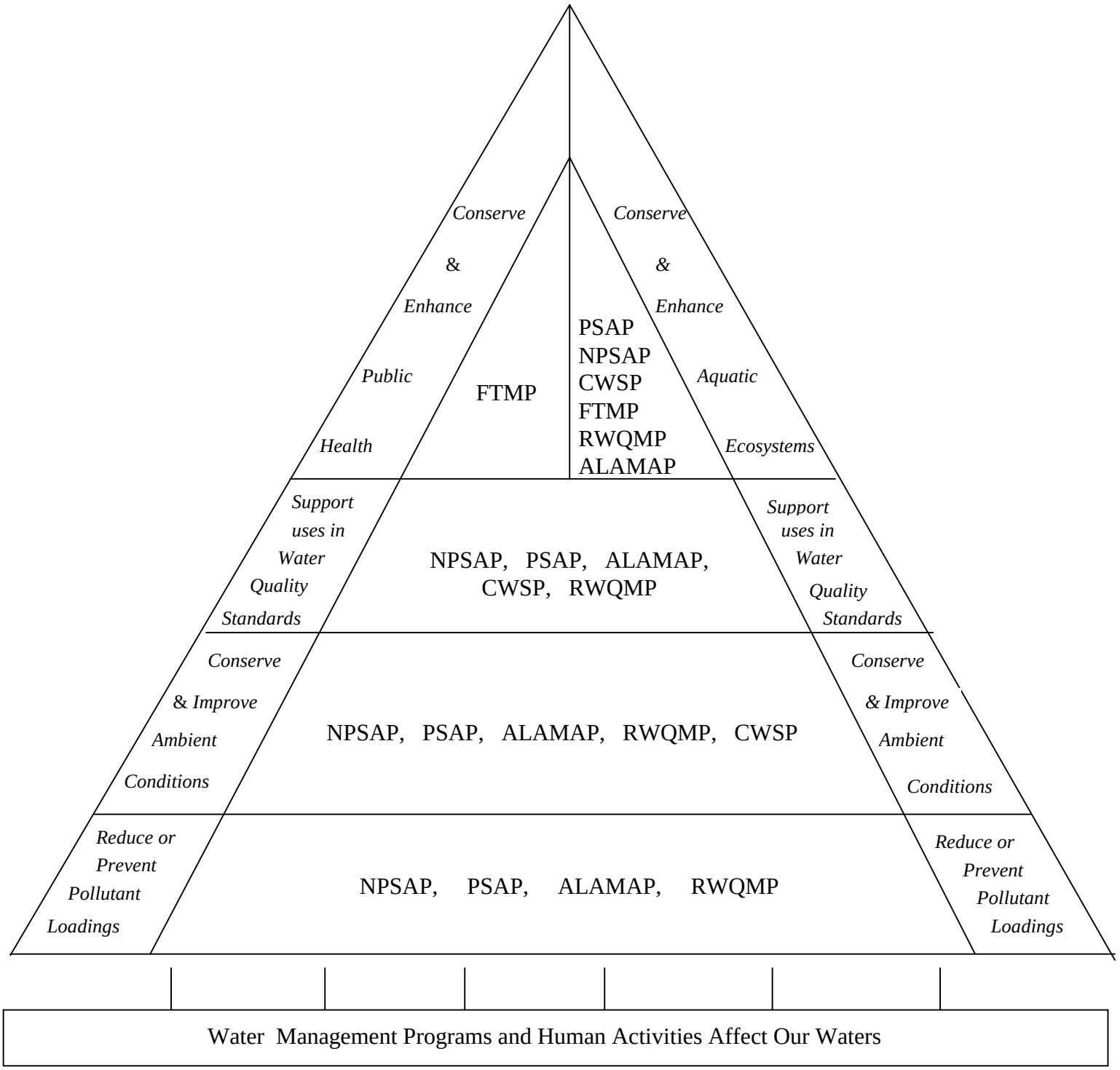
EPA Environmental Objective	EPA Environmental Indicator	FOD Program Component	FOD Program
	Selected point source loadings to surface water	AGPT	Point Source Assessment Program (PSAP)

Table 3. Reports Generated by Field Operations Division Since 1990

FY Report Completed	Title	
1990	A Comparison of Direct and Indirect Analyses of Nutrient Concentrations in the Particulate Fraction of Water Samples	Coastal
1990	Choccolocco Creek WQDS- Anniston	
1990	Coastal Program Water Quality Trend Report FY90	Coastal
1990	Mud Creek WQDS - Hanceville	
1990	Town Creek and Swan Creek WQDS - Athens	
1990	Waxahatchee Creek WQDS - Columbiana	
1991	A Sediment Chemistry Baseline Study of Coastal Alabama	Coastal
1991	Alabama Reservoirs - Water Quality Monitoring Program Annual Report: 1990	
1991	Aldridge Creek WQDS -Huntsville	
1991	An Investigation of the Fish Kills Occurring in Lower Fish River, Baldwin County, Alabama	Coastal
1991	Huntsville Spring Branch WQDS- Huntsville	
1991	Moore Creek WQDS- Haleyville	
1991	Patsaliga Creek WQDS - Luverne	
1990 - 1991	Portersville Bay WQDS	Coastal
1991	Riley Maze Creek WQDS - Arab	
1991	Talladega Creek WQDS - Talladega	
1992	A Survey of the Water Quality and Sediment Chemistry of Selected Sites in the Mobile Delta System	Coastal
1992	A Survey of the Water Quality and Sediment Chemistry of Shipyards in Coastal Alabama	Coastal
1992	Alabama Reservoirs - Water Quality Monitoring Program Annual Report: 1991	
1992	Big Wills Creek WQDS - Fort Payne	
1992	Puppy Creek WQDS - Citronelle	
1993	Klondike Creek WQDS - Ozark	
1993	Limestone Creek WQDS - Monroeville	
1993	Pigeon Creek WQDS - Fort Deposit	
1993	Sand Mountain Lake Guntersville Watershed Project: Macroinvertebrate Bioassessment - June 1992	
1993	Sandy Creek WQDS - Camp Hill	
1994	A Survey of the Dog River Watershed: 1st Year's Study. An Overview of Land-Use Practices and the Effects of Development on the Basin.	Coastal
1994	ADEM Reservoir Water Quality and Fish Tissue Monitoring Program Report: 1992 - 1993	
1994	Choccolocco Creek Watershed Study	
1994	Omussee Creek WQDS - Dothan	
1994	Sand Mountain Lake Guntersville Watershed Project: Macroinvertebrate Bioassesssment - June 1993	
1994	Water Quality Trends of Selected Ambient Monitoring Stations in Alabama Utilizing Aquatic Macroinvertebrate Assessments: 1974-1992	
1994	West Point Lake Phase I Diagnostic / Feasibility Study: Final Report (Joint report with Georgia Environmental Protection Division)	
1995	A Survey of the Do[illegible] Table 3 (cont.) [illegible]r's Study. Ongoing Development and Assessment of [illegible]int Sources on the Aquatic Resources of the Basin: Macroinvertebrate Community and Sediments.	Coastal
1995	Alabama/Mississippi Pilot Reference Site Project: 1990-1994	

FY Report Completed	Title	
1990 - 1995	Black Warrior River Water Quality Study 1989 - 1994	
1995	Sand Mountain Lake Guntersville Watershed Project: Macroinvertebrate Bioassesssment - June 1994	
1995	Sugar Creek Water Quality Demonstration Report - Phase I	
1996	A Survey of the Bon Secour River Watershed: An Overview of Land Use Practices and an Examination of the Effects of Development on the Aquatic Resources of the Basin.	Coastal
1996	ADEM Fish Tissue Monitoring Program Report 1991-95	
1996	ADEM Reservoir Water Quality and Fish Tissue Monitoring Program Report: 1994 - 1995	
1996	ADEM Reservoir Water Quality Monitoring Program Report 1990-95	
1996	Alabama Regional Environmental Monitoring and Assessment Program, Data Report for 1993 and 1994 (Coastal)	Coastal
1996	Flint Creek Watershed Project: Macroinvertebrate Bioassessment, 1992 and 1995	
1996	Sand Mountain Lake Guntersville Watershed Project: Macroinvertebrate Bioassesssment - May 1995	
1996	Trends in Water Quality of Ambient Monitoring Stations of the Coosa and Tallapoosa Watersheds: Aquatic Macroinvertebrate Bioassessments, 1980-1995	

Fig. 1. EPA Environmental Objectives and FOD Programs providing indicator data.



FTMP - FISH TISSUE MONITORING PROGRAM

NPSAP - NONPOINT SOURCE ASSESSMENT PROGRAM

PSAP - POINT SOURCE ASSESSMENT PROGRAM

RWQMP - RESERVOIR WATER QUALITY MONITORING PROGRAM

ALAMAP - ALABAMA MONITORING AND ASSESSMENT PROGRAM

CWSP COASTAL WATERSHED SURVEY PROGRAM

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Appendix D

Alabama's Upland Alamap Program (summary from Appendix C ASSESS)

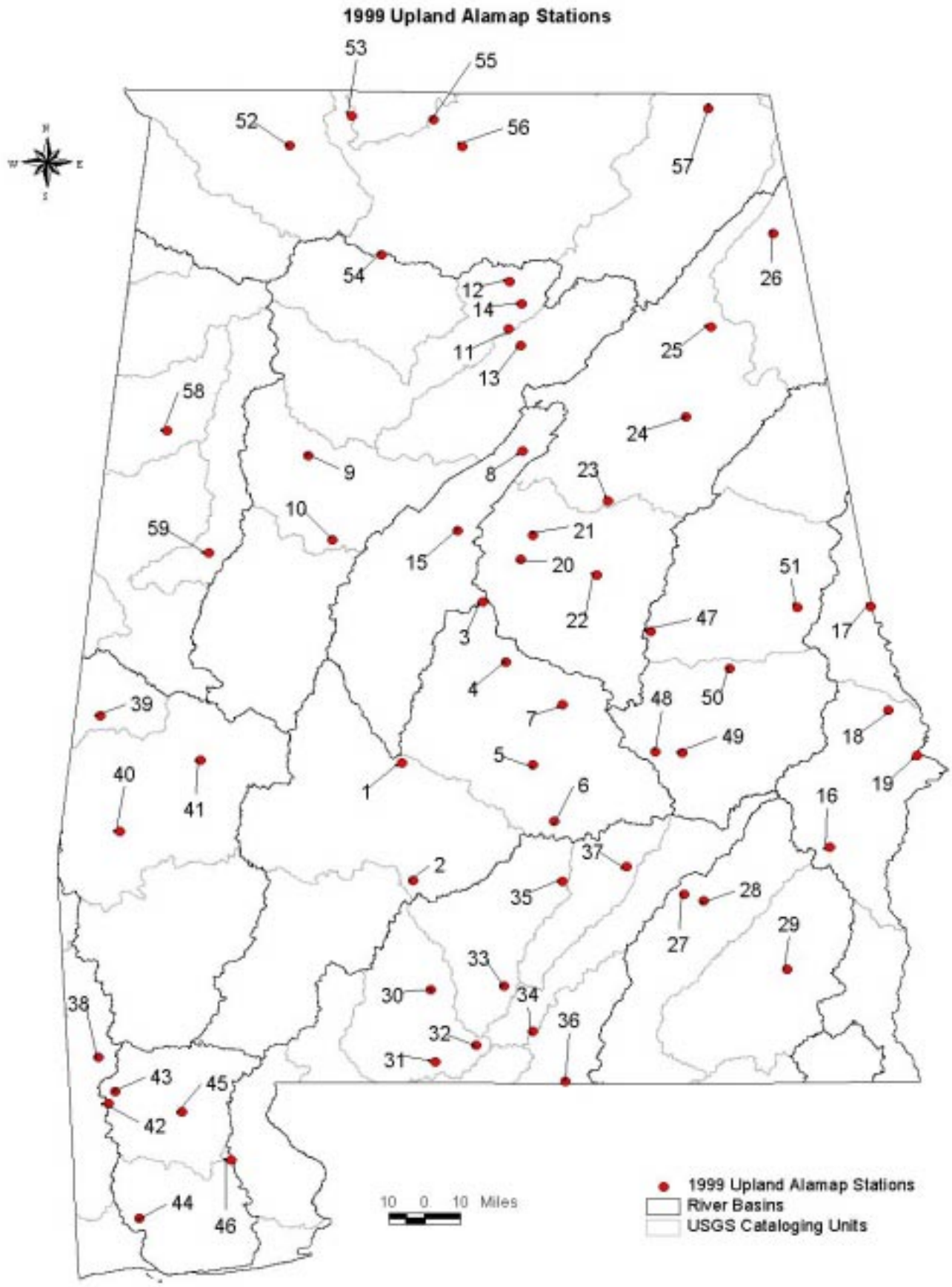
The Upland ALAMAP program (ADEM 1996d) is designed to enhance the current ambient monitoring program developed during the 1970's. First, stations in the historical ambient monitoring program were generally selected to monitor trends in water quality downstream of specific existing point sources. Therefore, the data collected at each of these sites represents only the area sampled and cannot be extrapolated to predict water quality at other similar size streams with any known level of uncertainty. To augment this type of monitoring, 50 stations will be selected statewide each year by EPA-Gulf Breeze using a probabilistic (random) design (Summers and Engle 1996). The data collected at these stations will statistically represent all upland stream miles and the level of uncertainty in the water quality estimates can be quantified. (Summers and Engle 1996). This type of assessment will be used in the 305(b) Water Quality Report to Congress to address overall State water quality.

Second, the historical ambient monitoring program required collection of water quality samples on a monthly basis at each of the stations in addition to water column metals samples on a quarterly basis. Statistical analysis of historical data by FOD and EPA Gulf Breeze suggests that sampling of water quality parameters on a quarterly schedule would have shown the same trends in water quality over time (ADEM 1996e, Summers and Engle 1996). Historically, water samples have been collected and analyzed for metal content. Metals have not been detected in the water column samples at ambient monitoring locations where metals have been detected in fish tissue or sediment samples. The modification of the historical ambient monitoring sampling schedule to a June/August/October Schedule for water quality and an annual sediment sample, where appropriate, will allow additional locations to be assessed with little additional expenditure of resources. Data from the historical ambient monitoring stations can be used to update the CWA 303(d) list and to monitor site specific trends in water quality.

Third, many of the stations in the historical ambient monitoring program were chosen in the 1970's to monitor specific pollution sources. These stations are generally concentrated in watersheds in the Birmingham area. An evaluation of each site was conducted to determine if the rational for monitoring the site is still applicable and if the information generated is of use to the Department. After this re-evaluation of each of the historical stations, only those stations of value to the Department were retained in the historical network.

And Fourth, EPA-Gulf Breeze is statistically analyzing the parameters at each historical ambient monitoring station to evaluate and select those that are most useful in determining status and trends and the least redundant (Summers and Engle 1996). A minimum core set of environmental indicator parameters (EPA 1996b) will be collected as well as others specific to each station.

Figure D-1


1999 Upland Alamap Stations
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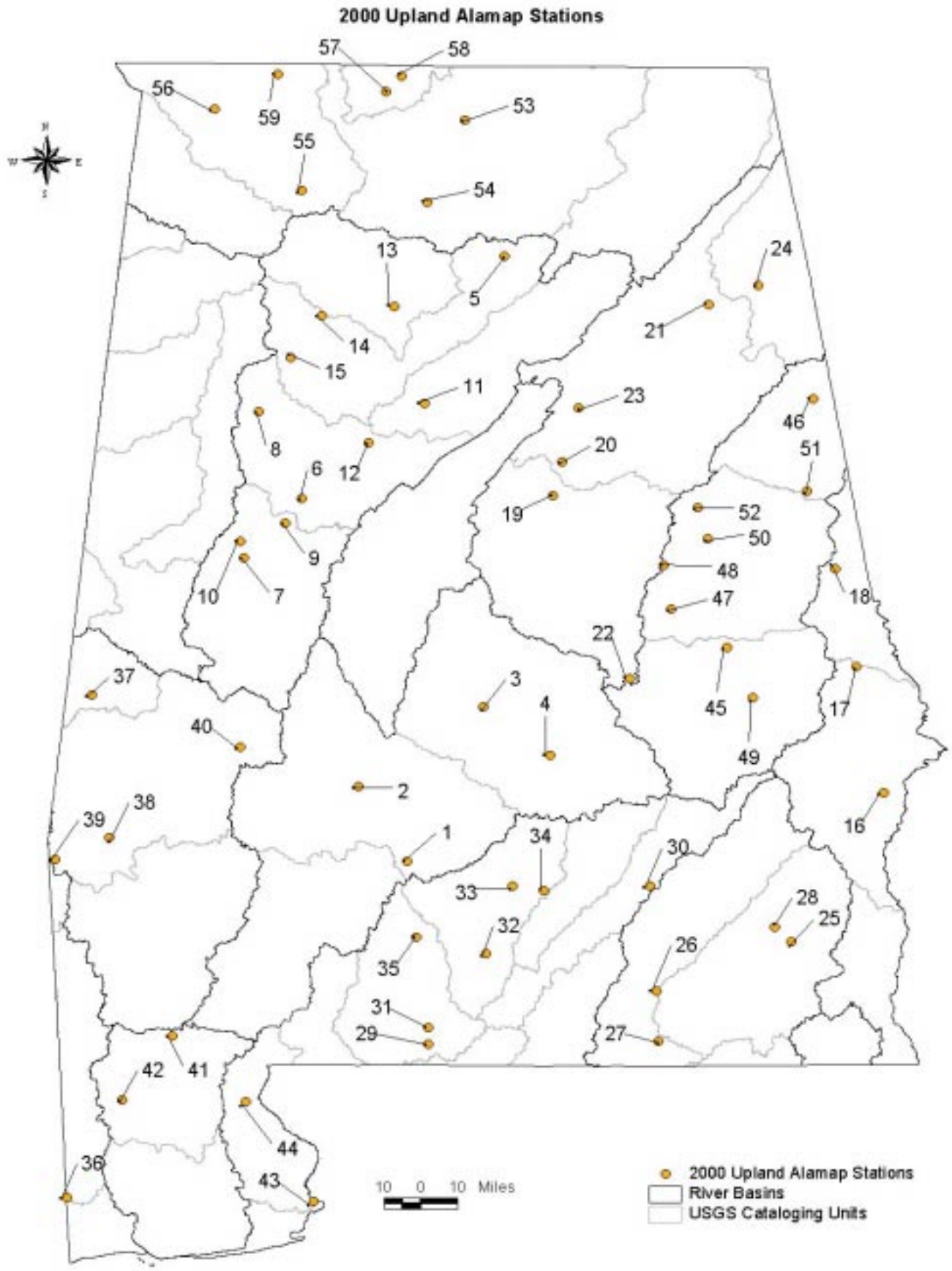
1999 Upland Alamap Stations
River Basins
USGS Cataloging Units

Table D-1 1999 Upland Alamap Stations

Index	ID	Stream Name	River Basin	Latitude	Longitude
1	AR01U3-7	Alabama River	Alabama River	32.285874	-87.085931
2	AR02U3-2	Alabama River	Bear Creek	31.810310	-87.042500
3	AR03U3-45	Alabama River	Pate Creek	32.934681	-86.761677
4	AR04U3-20	Alabama River	Indian Creek	32.693970	-86.667443
5	AR05U3-9	Alabama River	Tallawassee Creek	32.276519	-86.560261
6	AR06U3-55	Alabama River	Cherry Creek	32.052023	-86.475163
7	AR07U3-57	Alabama River	Pierce Creek	32.522323	-86.440982
8	BW01A3-27	Black Warrior River	North River	33.545427	-86.6017097
9	BW02U3-43	Black Warrior River	McDuff Spring Branch	33.527682	-87.4624405
10	BW03U3-53	Black Warrior River	Tributary to Kepple Creek	33.18799	-87.36608
11	BW04U3-58	Black Warrior River	Williams Creek	34.036451	-86.658272
12	BW05U3-5	Black Warrior River	Duck River	34.230528	-86.653580
13	BW06U3-38	Black Warrior River	Dry Creek	33.972144	-86.608565
14	BW07U3-51	Black Warrior River	Hurricane Creek	34.140553	-86.604809
15	CA01U3-29	Cahaba River	Beaverdam Creek	33.225070	-86.8632932
16	CH01U3-33	Chattahoochee River	Tributary to Leak Creek	31.947234	-85.362669
17	CH02U3-14	Chattahoochee River	Hardley Creek	32.916817	-85.198580
18	CH03U3-44	Chattahoochee River	Tributary to Hospilika Creek	32.497807	-85.127057
19	CH04U3-13	Chattahoochee River	Uchee Creek	32.316111	-85.014167
20	CO01U3-31	Coosa River	Mud Creek	33.106005	-86.6078952
21	CO02U3-18	Coosa River	Beeswax Creek	33.206529	-86.5589063
22	CO03U3-47	Coosa River	Stewart Branch	33.044979	-86.303156
23	CO04U3-34	Coosa River	Tributary to Talladega Creek	33.34165	-86.25564
24	CO05U3-36	Coosa River	Tributary to Cane Creek	33.681455	-85.9449708
25	CO06U3-37	Coosa River	Tributary to Coosa River	34.04654	-85.84366
26	CO07U3-25	Coosa River	Little River	34.424011	-85.5914129
27	CW01U3-52	Choctawhatchee River	Tributary to Walnut Creek	31.753687	-85.950965
28	CW02U3-26	Choctawhatchee River	Whitewater Creek	31.729127	-85.871466
29	CW03U3-10	Choctawhatchee River	West Fork of Choctawhatchee River	31.454302	-85.536950
30	EB01U3-28	Escambia River	Tributary to Murder Creek	31.370690	-86.970600
31	EB02U3-1	Escambia River	Tributary to Conecuh River (oxbow)	31.078290	-86.953700
32	EB03U3-8	Escambia River	Poley Creek	31.145934	-86.786239
33	EB04U3-23	Escambia River	Pigeon Creek	31.385080	-86.675000
34	EB05A3-41	Escambia River	Tributary to Shady Bend Creek	31.201115	-86.559218
35	EB06U3-46	Escambia River	Fayette Branch	31.805813	-86.442200
36	EB07A3-42	Escambia River	Tributary to Horsehead Creek	31.000706	-86.428313
37	EB08U3-15	Escambia River	Patsaliga Creek	31.865703	-86.182226
38	EW01U3-32	Escatawpa River	Tributary to Bennett Creek	31.097116	-88.308070
39	LT01U3-3	Lower Tombigbee River	Alamuchee Creek	32.475872	-88.300169
40	LT02U3-21	Lower Tombigbee River	Middle Tallawampa Creek	32.008233	-88.221346
41	LT03U3-30	Lower Tombigbee River	Greer Branch	32.297775	-87.896463
42	MR01U3-50	Mobile River	Mill Branch	30.910188	-88.269057
43	MR02U3-24	Mobile River	Sweetwater Branch	30.960750	-88.2405
44	MR03U3-6	Mobile River	Fowl River	30.448727	-88.143025
45	MR04U3-12	Mobile River	Tributary to Big Briar Creek	30.878842	-87.971370
46	MR05U3-11	Mobile River	Tributary to Threemile Creek	30.684428	-87.775805
47	TA01U3-16	Tallapoosa River	Tributary to Chapman Creek	32.816594	-86.084949
48	TA02U3-22	Tallapoosa River	Miller Creek	32.331072	-86.067982
49	TA03U3-19	Tallapoosa River	Old Town Creek	32.327357	-85.959120
50	TA04U3-4	Tallapoosa River	Tributary to Ledbetter Creek	32.666091	-85.766800
51	TA05U3-17	Tallapoosa River	Chatahospee Creek	32.913582	-85.496041
52	TE01U3-54	Tennessee River	Shegog Creek	34.779280	-87.537570
53	TE02U3-35	Tennessee River	First Creek	34.898450	-87.287920
54	TE03U3-48	Tennessee River	Sinking Creek	34.338100	-87.169500
55	TE04U3-56	Tennessee River	Swan Creek	34.880803	-86.958220
56	TE05U3-49	Tennessee River	Tributary to Limestone Creek	34.774420	-86.843290
57	TE06U3-59	Tennessee River	Tributary to Wimberly Branch	34.926629	-85.852144
58	UT01U3-40	Upper Tombigbee River	Cooper Creek	33.628125	-88.0329239
59	UT02U3-39	Upper Tombigbee River	Tributary to Taylor Creek	33.135017	-87.865833

Figure D-2


2000 Upland Alamap Stations
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2000 Upland Alamap Stations
River Basins
USGS Cataloging Units

Table D-2 2000 Upland Alamap Stations

Index	ID	Stream Name	River Basin	Latitude	Longitude
1	AR1U4-2	Bear Creek	Alabama	31.808699	-87.042395
2	AR2U4-8	Pine Barren Creek	Alabama	32.109798	-87.235192
3	AR3U4-10	Beaver Creek	Alabama	32.427760	-86.736454
4	AR4U4-21	Steep Creek	Alabama	32.235677	-86.472675
5	BW1U4-5	Duck River	Black Warrior	34.231373	-86.654905
6	BW2U4-29	Yellow Creek	Black Warrior	33.262692	-87.462962
7	BW3U4-37	Grant Creek	Black Warrior	33.023395	-87.693858
8	BW4U4-39	North River	Black Warrior	33.608123	-87.633399
9	BW5U4-40	Cypress Creek	Black Warrior	33.164589	-87.528650
10	BW6A4-41	Grant Creek	Black Warrior	33.091693	-87.708960
11	BW7A4-42	Trib to Fivemile Creek	Black Warrior	33.643574	-86.971020
12	BW8U4-50	Mud Creek	Black Warrior	33.485933	-87.194185
13	BW9U4-53	Trib to Little Crooked Creek	Black Warrior	34.029282	-87.091342
14	BW10U4-55	Bunkum Creek	Black Warrior	33.993491	-87.381534
15	BW11U4-59	Jess Creek	Black Warrior	33.825389	-87.504417
16	CH1U4-16	Trib to Little Barbour Creek	Chattahoochee	32.083543	-85.139633
17	CH2U4-35	Trib to Sturkie Creek	Chattahoochee	32.590718	-85.247868
18	CH3U4-58	Trib to Wells Creek	Chattahoochee	32.979697	-85.335118
19	CO1U4-17	Yellowleaf Creek	Coosa	33.274649	-86.459486
20	CO2U4-20	Spring Creek	Coosa	33.408845	-86.423907
21	CO3U4-24	Trib to Coosa River	Coosa	34.036019	-85.838116
22	CO4U4-31	Corn Creek	Coosa	32.543098	-86.151443
23	CO5U4-34	Cane Creek	Coosa	33.624300	-86.357623
24	CO6U4-45	Trib to Terrapin Creek	Coosa	34.115148	-85.642509
25	CW1A4-13	Trib to West Fork Choctawhatcee River	Choctawhatchee	31.487375	-85.508140
26	CW2A4-14	Phillips Creek	Choctawhatchee	31.291687	-86.046777
27	CW3U4-26	Trib to Sandy Creek	Choctawhatchee	31.090675	-86.038400
28	CW4U4-38	Little Judy Creek	Choctawhatchee	31.544952	-85.573240
29	EB1U4-1	Trib to Conecuh River (oxbow)	Perdido-Escambia	31.078016	-86.955966
30	EB2U4-11	Smilies Mill Creek	Perdido-Escambia	31.709786	-86.071778
31	EB3U4-15	Trib to Maye Creek	Perdido-Escambia	31.145681	-86.957214
32	EB4U4-19	Trib to Sepulga River	Perdido-Escambia	31.439247	-86.728946
33	EB5U4-30	Deep Step Creek	Perdido-Escambia	31.712677	-86.619879
34	EB6U4-43	Trib to Hard Labor Creek	Perdido-Escambia	31.691832	-86.495490
35	EB7U4-47	Trib to Murder Creek	Perdido-Escambia	31.507562	-87.005984
36	EW1U4-48	Trib to Franklin Creek	Escatawpa	30.465285	-88.399467
37	LT1U4-3	Alamuchee Creek	Lower Tombigbee	32.474384	-88.300091
38	LT2U4-28	Surveyors Creek	Lower Tombigbee	31.903208	-88.229293
39	LT3U4-32	Puss Cuss Creek	Lower Tombigbee	31.815705	-88.445617
40	LT4U4-49	Trib to Sandy Branch	Lower Tombigbee	32.265587	-87.705783
41	MR1U4-12	Barrow Creek	Mobile	31.112410	-87.977416
42	MR2U4-22	Chickasaw Creek	Mobile	30.854316	-88.177838
43	PE1U4-7	Caney Bayou	Perdido-Escambia	30.450513	-87.414909
44	PE2U4-23	Hollinger Creek	Perdido-Escambia	30.847333	-87.687249
45	TA1U4-4	Trib to Ledbetter Creek	Tallapoosa	32.664378	-85.766796
46	TA2U4-6	Trib to Tallapoosa River	Tallapoosa	33.661333	-85.422854
47	TA3U4-9	Trib to Martin Lake	Tallapoosa	32.818709	-85.986732
48	TA4U4-18	Oaktasasi Creek	Tallapoosa	32.993639	-86.016886
49	TA5U4-25	Trib to Choctafaula Creek	Tallapoosa	32.462961	-85.663410
50	TA6U4-27	Enitachopco Creek	Tallapoosa	33.100661	-85.842689
51	TA7U4-33	Green Creek	Tallapoosa	33.292912	-85.447552
52	TA8U4-36	Trib to Lynch Creek	Tallapoosa	33.226451	-85.883618
53	TE1U4-44	Trib to Limestone Creek	Tennessee	34.775615	-86.812061
54	TE2U4-46	Trib to Snow Hill Branch	Tennessee	34.447363	-86.962719
55	TE3U4-51	Trib to Town Creek	Tennessee	34.495898	-87.461225
56	TE4U4-52	Sinking Creek	Tennessee	34.819446	-87.808251
57	TE5U4-54	Trib to Sugar Creek	Tennessee	34.888923	-87.124170
58	TE6U4-56	Shoal Creek	Tennessee	34.950853	-87.061937
59	TE7U4-57	Trib to Cowpen Creek	Tennessee	34.957185	-87.556193

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